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THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XII.

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THE

CYCLOPÆDIA;

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UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

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ARTS and SCIENCES.

DISSIMULATION, in *Morals*, the act of diſſembling, by fallacious appearances, or falſe pretenſions.

Good princes regard diſſimulation as a neceſſary vice; but tyrants conſider it as a virtue.

It is apparent that ſecrecy is often neceſſary, to oppoſe thoſe who may be willing to circumvent our lawful intentions. But the neceſſity of precaution would become very rare, were no enterprizes to be formed, but ſuch as could be avowed openly. The frankneſs with which we could then act, would engage people in our intereſts. Marſhal Biron would have ſaved his life, by dealing ingenuouſly with Henry IV.

Lord Bacon very juſtly obſerves, in his ſhort eſſay "De Diſſimulatione et Simulatione" (Works, vol. iii. p. 629.) "that the weaker ſort of political perſons are the great diſſemblers." "For," he adds, "if a man poſſeſs penetration of judgment, ſufficient for enabling him to diſcern what things are to be laid open, and what to be concealed, and what to be partially diſcloſed, to whom and at what time, (which, indeed, are acts of ſtate and acts of life, as Tacitus has well denominated them) to him a habit of diſſimulation is an hindrance. But if a man cannot acquire that judgment, then it is left to him as the ſafeſt courſe he can purſue, to be generally a diſſembler." Lord Bacon diſtinguiſhes between diſſimulation and ſimulation: the former being negative, as when any one by ſigns and tokens leads others to conclude that he is not the perſon, that he really is; and the latter being affirmative, as when any one openly feigns and pretends that he is the perſon, that he really is not. Montaigne, in his "Eſſays" (vol. ii.) has admirably pourtrayed and expoſed the vice of diſſimulation. "As to this virtue of diſſimulation," ſays he, "I mortally hate it; and of all vices find none that does evidence ſo much baſeneſs and meanneſs of ſpirit. 'Tis a cowardly and ſervile humour, to hide and diſguiſe a man's ſelf under a vizor, and not to dare to ſhew himſelf what he is. By that vice followers are trained up to treachery Being brought up to ſpeak what is not true, they make no conſcience of a lye. A generous heart ought not to belye its own thoughts, but will make itſelf ſeen within, all there is good, or at leaſt manly. Ariſtotle reputes it the office of magnanimity, openly and profeſſedly to love and hate, to judge and ſpeak with all freedom; and not to value the approbation or diſlike of others in compariſon of *truth*. Apollonius ſaid, it was for ſlaves to lye, and for freemen to ſpeak truth. 'Tis the chief and fundamental part of *virtue*; we muſt love it for itſelf. A man muſt not always tell all, for that were folly; but what a man ſays ſhould be what he thinks, otherwiſe 'tis knavery. I do not know what advantage men pretend to by eternally counterfeiting and diſſembling, if not, never to be believed when they ſpeak the truth. This may once or twice paſs upon men; but to profeſs concealing their thoughts, and to ſay, as ſome of our princes have done, that "they would burn their ſhirts if they knew their intentions," and "that who knows not how to diſſemble, knows not how to rule," is to give warning to all who have any thing to do with them, that all they ſay is nothing but lying and deceit.

With reſpect to diſſimulation, three things are to be obſerved; 1. That the characters of thoſe are not to be eſteemed, who are reserved and cautious without diſtinction. 2. Not to make ſecrets of unimportant matters. 3. To conduct ourſelves in ſuch manner, as to have as few ſecrets as poſſible.

DISSIPATION, in *Phyſics*, an inſenſible loſs, or conſumption, of the minute parts of a body: or, more properly, that flux whereby they fly off, and are loſt. See Effluvia.

We do not ſay diſſipation, but loſs of blood, in ſpeaking of the blood diſcharged at a wound, or in any other ſenſible manner: on the contrary, we ſay diſſipation, or expence of ſpirits: this is more copious than that of the ſolid parts: and conſequently, the reparation ought to be more copious.

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Dissipation, *Circle of*, or Aberration, in *Optics*, denotes that circular ſpace upon the retina of the eye, which is occupied by the rays of each pencil in indiſtinct viſion: thus, if the diſtance of the object, or the conſtitution of the eye be ſuch, that the image falls beyond the retina, as when objects are too near; or before the retina, when the rays have not a ſufficient divergency, the rays of the pencil, inſtead of being collected into a central point, will be diſſipated over this circular ſpace: and all other circumſtances being alike, this circle will be greater or leſs, according to the greater or leſſer diſtances from the retina of the focuſes of refracted rays. But this circle cauſes no perceptible difference in the diſtinctneſs of viſion, while that circle is not greater than ſome determinate magnitude; as ſoon as it exceeds that magnitude, we begin to perceive an indiſtinctneſs, which increaſes as the circle of diſſipation increaſes, and at length the object is loſt in confuſion. The circle is alſo greater or leſs, according to the greater or leſs magnitude of the viſible object; and though it is not eaſy to aſſign the diameter of the ſaid circle, it ſeems very probable, that viſion continues diſtinct for all ſuch diſtances, or ſo long as theſe circles, or the pencils of light from them do not touch one another upon the retina; and the indiſtinctneſs begins, when the ſaid circles begin to interfere. It has been often obſerved, that a preciſe union of the reſpective rays upon the retina is not neceſſary to diſtinct viſion; but the firſt author that aſcertained the fact beyond all doubt, was Dr. Jurin. See a variety of obſervations and experiments on this ſubject, in his Eſſay on diſtinct and indiſtinct Viſion, in Smith's Optics, Appendix. See Moon and Vision.

Dissipation, *Radius of*, is the radius of the circle of diſſipation.

DISSOLENA, in *Botany*, (from δις, *double*, and ςωλην, a *tube*, on account of the different ſhapes of the two different parts of the tube of the corolla,) Loureiro Cochinch. v. 1. 137. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Vitices*, Juſſ.

Gen. Ch. *Cal.* Perianth tubular, inferior, five-cleft; ſegments awl-ſhaped, erect. *Cor.* of one petal, funnel-ſhaped; tube long, in the lower part thickeſt, pentagonal, bearing the ſtamens; in the upper cylindrical: limb five-cleft, ſpreading. *Stam.* Filaments five, capillary, ſhort, inſerted below the top of the inferior portion of the tube; anthers ovate, erect. *Piſt.* Germen inferior, ovate; ſtyle thread-ſhaped, ſhorter than the ſtamens; ſtigma ſomewhat ovate, thick, rough. *Peric.* Drupa ſmall, ovate. *Nut* compreſſed, rough, with one ſeed.

Eſſ. Ch. Drupa inferior, with a rough nut. Tube of the corolla of two different ſhapes. Stigma ovate.

D. *verticillata*, the only ſpecies. *Mat ſa* of the Chineſe. Found in the province of Canton in China. A ſmall tree, about eight feet high, with ſpreading branches. *Leaves* lanceolate, entire, ſmooth; the lowermoſt oppoſite; the upper ones ſtellate, three or four together. *Cluſters* terminal, ſubdivided. *Flowers* white. *Drupa* ſmall, black, ſmooth. *Loureiro.*

DISSOLVENT }
DISSOLUTION } . See Solution.

Dissolution *of Metals*, &c. by fire, is particularly called *fuſion*.

Dissolution *of the blood*, is an affection of that humour, directly oppoſite to coagulation.

The diſſolution is ſuch a comminution of the fibrous parts of the blood, as indiſpoſes it for that ſeparation of the craſſamentum from the ſerous part, which always enſues in healthy blood, on its cooling out of the body.

This diſſolution is frequently the conſequence of malignant and peſtilential fevers, and ſhews itſelf in petechiæ, or purple ſpots; alſo of certain poiſons, particularly the bites of venomous beaſts, &c.

Dissolution *of Parliament*. See Parliament.

DISSONANCE, ſee Discord. This is a remarkable word, half Greek, and half Latin, δις and *ſonans*, ſounding twice. The only perceptible diſſonance, or diſcord, which nature gives in the harmonies to a given baſs, is the flat 7th 1, 2, 3, 4, 5, 6, 7. See Harmonics, and Basse *fondamentale*. Syſteme de Paſtini. This term is generally uſed in the ſame ſenſe as diſcord, but a late writer, whoſe MSS. we have peruſed, ſays that if 1, $\frac{a}{b}$, and $\frac{c}{d}$, expreſs the ratios of three ſounds, their harmony will be uninterrupted or the effect of the three ſounded together a concord, if b and d have no common diviſor but 1; and, on the other hand, their harmony will be interrupted or a diſſonance if b and d have a common diviſor; in that caſe, let this diviſor be x; then will $x - 1$ expreſs the order of diſſonancy. Among the examples given of the application of this rule are, the key, octave and double octave, or 1, $\frac{1}{2}$ and $\frac{1}{4}$, where conſequently x is $= 2$ and $x - 1 = 1$; or, according to this rule, this chord is an example of the firſt order of diſſonancy. The common chord minor is next examined by this rule, or 1, $\frac{5}{6}$ and $\frac{2}{3}$, where x being $= 3$, this chord is declared to be a diſſonance of the ſecond order, and the theories of Tartini and Pizzoti are quoted, in juſtification of this degradation of the minor common chord to the rank of diſcords, a doctrine however, to which we are by no means diſpoſed to ſubſcribe, or to admit the propriety of the general rules abovementioned.

DISSONANT Triad. This conſiſts of two major-thirds, or the ſuperfluous triad of the chromatic ſcale, as C, E, ※G (Callicott's Muſ. Gram. p. 147.) The interval C ※ G is a ſharp or ſuperfluous fifth, which ſee.

DISSONANZE, } *Ital.* Sounds that are diſpleaſing to
DISSONI. } the ear.

DISSYLLABLE, a word of two ſyllables; as *fortune*, *lament*, &c.

The ſpondee, trochee, iambus, and pyrrhichius, are diſſyllabic feet. See Spondee, &c.

DISTA, in *Ancient Geography*, a town of Aſia in Aria. Ptol.

DISTAFF, an inſtrument about which flax is tied, in order to the ſpinning of it.

Distaff *thiſtle*, a name ſometimes given to the *atractylis* of authors. See Atractylis and Carthamus.

DISTANCE properly denotes the ſhorteſt line between two points, objects, &c.

Diſtance, according to an ingenious author, cannot of itſelf and immediately be ſeen. For diſtance being a line directed end-wiſe to the eye, it projects only one point in the fund of the eye, which point remains invariably the ſame, whether the diſtance be longer or ſhorter. Dr. Berkeley, Eſſay on Viſion.

A late eminent mathematician obſerves that the diſtance here ſpoken of is diſtance from the eye; and that what is ſaid of it muſt not be applied to diſtance in general. The apparent diſtance of two ſtars is capable of the ſame variations as any other quantity or magnitude. Viſible magnitudes conſiſt of parts into which they may be reſolved, as well as tangible magnitudes; and the proportions of the former may be aſſigned, as well as thoſe of the latter: ſo that it is going too far to tell us, that viſible magnitudes are no more to be accounted the objects of geometry than words, and that the ideas of ſpace, and things placed at a diſtance, are not, ſtrictly ſpeaking, the objects of ſight, and are not otherwiſe perceived by the eye than by the ear. Mr. Maclaurin, in his account of ſir Iſaac Newton's diſcoveries, p. 225.

The word is alſo uſed figuratively for an interval, not only in reſpect of place, but alſo of time or quality.

Thus, we ſay, the diſtance of the creation of the world from the nativity of Jeſus Chriſt, is upwards of four thouſand years: the diſtance between the Creator and the creature is infinite.

For the diviſion of DISTANCES, or the manner wherein we come by the idea of diſtance in objects, ſee VISIBLE.

DISTANCE, in *Aſtronomy*. The ſcience of aſtronomy muſt have arrived at no inconſiderable degree of perfection before any adequate conception could have been formed of the diſtances of the heavenly bodies.

To the firſt uninformed inhabitants of the earth, the ſun, moon, and ſtars would appear to riſe and ſet in their neighbouring hills and foreſts: when they were ſought for there in vain, the next theory would ſuppoſe them riſing from the limits of the extended ocean, and deſcending there again, after having performed their daily courſe. Ages muſt have elapſed, and the ſpherical hypotheſis of the earth's figure have been eſtabliſhed, before it could have been perfectly aſcertained, that the heavenly bodies were inſulated, and entirely detached from the ſurface of the earth.

The phenomena of eclipſes, when the cauſe of them was underſtood, were ſufficient to demonſtrate that the moon was nearer to us than the ſun; and it might have been inferred from the properties of the ſphere, that the ſun was diſtant at leaſt ſeveral diameters of the earth. For as the ſun was, on the day of the equinox, twelve hours above the horizon, it muſt have been ſuppoſed that half the earth was enlightened at one time, which could not have been the caſe if the luminary were not placed at a conſiderable diſtance. The phaſes of the moon would likewiſe indicate the great diſtance of the ſun, by a method we ſhall ſoon have occaſion to explain.

The principle we uſually have recourſe to, when we wiſh to determine the diſtance of an inacceſſible point, is the moſt ſimple that can poſſibly be imagined. An obſerver at A (*Plate* VI. *Geometry*, *fig.* 85.) determines from obſervation that the object in queſtion is ſomewhere in the line A M; he then removes to another ſtation, as B, and by a ſimilar obſervation infers that it is likewiſe ſomewhere in the line B N, it is evident that the place of the object muſt be in the interſection O of theſe two lines, as that is the only point which is common to each of them.

But, to derive any practical advantage from this method, it is neceſſary that the diſtance of the two ſtations A, B, ſhould not be extremely diſproportionate to the diſtance ſought, as in that caſe a very ſmall error in the poſition of the lines A M, B N, would cauſe a very large one in the poſition of the point O.

It is for this reaſon that the above method is with difficulty applied to the heavenly bodies that are neareſt to us, and to thoſe more remote it entirely fails. This being the caſe in the preſent improved ſtate of the ſcience, it is not ſurpriſing that the ancient aſtronomers ſhould have formed ſuch very erroneous conceptions of the diſtances of the heavenly bodies.

Pythagoras eſtimated the diſtance of the moon to be about 5000 leagues inſtead of 80,000, but in the time of Hipparchus, 300 years later, we find that the true diſtance was pretty accurately known.

Ptolemy determined the diſtance of the moon by methods perfectly correct in their theory, and very ſimilar to thoſe employed by modern aſtronomers; theſe will be fully explained under PARALLAX.

By the moſt accurate obſervations made in Europe, and at the ſame time at the Cape of Good Hope, the moon's greateſt diſtance was determined 63.66 ſemi-diameters of the earth, and its leaſt 57.66.

But the law of univerſal gravitation affords us another method of determining the diſtance of the moon independent of all trigonometrical meaſurement whatever: and La Place, who has eſtimated the errors to which the various methods are liable, prefers that reſult which is obtained from theory alone to any other.

To comprehend the poſſibility of this method, we ſhould recollect, that the force of gravity on the earth's ſurface is accurately known by experiments on pendulums; and as this force varies inverſely as the ſquares of the diſtances, the force of gravity is known at any diſtance from the earth; and from the doctrine of central forces we can determine the time in which a ſatellite would revolve at any diſtance from the earth; and inverſely, having given the periodical time of the moon's revolution, we can by the ſame theory compute the diſtance.

It is much more difficult to determine the diſtance of the ſun from the earth, than that of the moon. The ancients before the time of Ariſtarchus, ſeem to have contented themſelves with mere conjecture. Pythagoras ſuppoſed the ſun three times as diſtant as the moon; and even Pliny believed it only twelve times as far, becauſe the time of its revolution was twelve times as long. Ariſtarchus of Samos, finding that the diameter of the earth was too ſmall a baſe to determine the immenſe diſtance of the ſun, aſſumed inſtead of it, the diſtance of the moon from the earth. His method is to be found in a work of his ſtill preſerved, and publiſhed by Commandine in 1752, and afterwards by Wallis in 1688. It ſuppoſes the moment of the quadrature of the moon to be preciſely aſcertained. See ARISTARCHUS and DICHOTOMY.

Kepler, in 1718, recommended it to Galileo, to apply his teleſcopes to theſe obſervations, and thus to determine the diſtance of the ſun more accurately than had been done before.

The inaccuracy of this method in practice, ariſes from the difficulty of determining the preciſe moment when the enlightened part of the moon is terminated by a ſtraight line. But as it has no tendency to give the diſtance either too great or too ſmall, the mean of a number of obſervations ſhould approach the truth; and if Ariſtarchus concluded the diſtance to be not above one-tenth of what it really is, it aroſe probably from the natural repugnance we have to adopt a theory ſo much at variance with the firſt impreſſions of our ſenſes. The diſtances of the heavenly bodies are ſo immenſely greater than could poſſibly have been imagined, that out of a number of reſults, the early aſtronomers have inſenſibly been led to ſelect thoſe which gave the diſtance the leaſt. Vandelinus practiſed this method at Majorca in 1650, and deduced the diſtance of the ſun about one half that which we now ſuppoſe it really to be.

Hipparchus, and afterwards Ptolemy, employed a method founded on obſervations of eclipſes of the moon. This method, like that of Ariſtarchus, was correct in its theory, but defective in practice, on account of the immenſe diſtance of the ſun, which Ptolemy eſtimated at only $\frac{1}{20}$ of what it really is. Tycho employed the ſame means, and found the diſtance even leſs than the above.

Dr. Halley obtained a reſult nearer the truth by a tranſit of Mercury; he made the diſtance $\frac{1}{5}$ of that which was afterwards determined by a tranſit of Venus. He was conſcious of the inaccuracy of his own reſult, and ſtrongly recommended to future aſtronomers to avail themſelves of the tranſits of Venus, which, as he rightly judged, were better calculated than any other aſtronomical obſervations, to remove the great uncertainty in which this queſtion was involved.

Previouſly, however, to the tranſits of Venus, which happened in 1761 and 1769, a great part of the uncertainty was removed, by a number of very accurate obſervations of the parallax of Mars. It clearly appeared from the beſt obſervations that had been made both by the Engliſh and French aſtronomers, that the ſemi-diameter of the earth, as ſeen from the ſun, could not ſubtend a greater angle than 10″; this was a near approximation to the truth.

It is well known that the determination of the ſun's diſtance, which we now aſſume as the baſis of our aſtronomical calculations, is derived from the obſervations of the tranſits of Venus over the ſun's diſk in 1761 and 1769. To derive the greateſt poſſible advantage from theſe important obſervations, aſtronomers were ſent from Europe to all parts of the globe, and the reſult obtained from their obſervations was, that the ſun's mean parallax was very nearly 8.″6 or 8.″7, which gives the diſtance of the ſun 23600 times the radius of the earth, or about 95 millions of miles.

The diſtance of the ſun from the earth being thus determined and taken as unity, the diſtance of the other planets may be computed from the law of Kepler demonſtrated by Newton, that the ſquares of their periodic times are as the cubes of their diſtances.

In this manner the diſtances of the planets have been computed by different aſtronomers, as in the following table.

	Kepler.	Caſſini.	Halley.	De la Lande.	Log. of theſe Diſtances.
Mercury	38806	38760	38710	38710	9.5878221
Venus	72413	72340	72333	72333	9.8593379
Earth	100000	100000	100000	100000	0.0000000
Mars	152350	152373	152369	152369	0.1828973
Ceres and the new planets				260000	
Jupiter	520000	520290	520098	520279	0.7162364
Saturn	951000	954180	954007	954072	0.9795813
Herſchel				1908180	1.2806193

The above diſtances, neglecting the four decimals, may be nearly expreſſed as follows.

Mercury	- -	4
Venus	- -	7
Earth	- -	10
Mars	- -	15
Ceres	. -	26
Jupiter	- -	52
Saturn	- -	95
Georgian	- -	191

The diſtances of the ſatellites are determined by meaſuring the angle of their greateſt elongation from the primary planet, with a micrometer, and the diſtance of one being determined, the diſtances of the others may be computed from their periodic times, in the ſame manner as for the planets.

The diſtances of the ſatellites of Jupiter are as follows:

In ſemidiameters of Jupiter,	I.	II.	III.	IV.
according to Caſſini, - -	5.67	9.00	14.38	25 30
Newton, -	5.96	9.49	15.14	26.60
Diſtance in minutes at the mean diſtance of Jupiter,	1′ 51″	2′ 57″	4′ 42″	8′ 16″

Diſtance of the ſatellites of Saturn.

	I.	II.	III	IV.	V.	VI.	VII.
Diſtance in minutes, - -	0.43	0.56	1.18	3.0	8.42	35″.06	27″.36
In ſemidiameters of Saturn, -	4.89	5.27	8.75	20.29	59.18		

Diſtance of the ſatellites of the Georgian, - - - - I. 33″.09, II. 44″.23.

The following table is taken from the Aſtronomy of Biot:

Table of the mean diſtances of the ſatellites, the radius of the planet being taken as unity.

	Diameter.	Sidereal Revolution in Days.
1ſt ſatellite of Jupiter,	5.6973	1.76913
2d,	9.0659	3.55118
3d,	14.4616	7.15455
4th,	25.4360	16.68902
1ſt ſatellite of Saturn,	3.080	0.94271
2d,	3.952	1.37024
3d,	4.893	1.88780
4th,	6.268	2.73948
5th,	8.754	4.51749
6th,	20.295	15.9453
7th,	59.154	79.3296
1ſt ſatellite of Uranus,	13.120	5.8926
2d,	17.022	8.7068
3d,	19.845	10.9611
4th,	22.752	13.4559
5th,	45.507	38.0750
6th,	91.008	107.6944

If the diameter of the earth was found too ſmall a baſe to determine the diſtance of the ſun, no wonder that it ſhould be totally inſufficient to give us any accurate information relative to the diſtance of the fixed ſtars, which is ſo immenſe, that even the diameter of the orbit of the earth ſcarce ſubtends a viſible angle, though it is very little leſs than two hundred million miles. One of the moſt rational arguments againſt the motion of the earth round the ſun, is founded on the want of a correſponding parallax in the fixed ſtars; but the arguments on the other ſide are ſo ſtrong and irreſiſtible, that we are neceſſarily led, as an obvious conſequence, to place the fixed ſtars at a diſtance inconceivably remote. When we come to treat more fully of *parallax*, we ſhall find that there are very reaſonable grounds for ſuppoſing, that the neareſt fixed ſtars are about a million, million of miles diſtant from us. And the ſmall teleſcopic ſtars at the extremity of the milky way 500 times that diſtance; ſo that the light by which they are viſible, would be twenty thouſand years in being tranſmitted from them to us!—But ſome of the nebulæ, ſeen by Dr. Herſchel in his 40 feet teleſcope, are immenſely more remote; their light muſt probably have been ſome millions of years in reaching our ſyſtem, from which we may draw this curious inference, that they at leaſt have exiſted that length of time.

Diſtance of the Moon from the Sun or fixed Star.

It is by means of the angular diſtance of the moon from the ſun or fixed ſtars, previouſly calculated, that the longitude is found at ſea, by what is called the lunar method.

To calculate the diſtance of the moon from the ſtar, the longitude of the moon muſt be found by the tables for the given time, and alſo the longitude of the ſtar. Their reſpective diſtances from the pole of the ecliptic or latitudes muſt likewiſe be taken, and a ſpherical triangle formed by the moon, the ſtar, and the pole of the ecliptic, which may be reſolved by the following proportion.

As rad. : coſ. of difference of longitude :: tangent of the leaſt of the two diſtances from the north pole of the ecliptic : tangent of ſegment I.

Subſtract ſegment I. from the greateſt of the two diſtances from the pole : the remainder is ſegment II.

Then as coſ. ſegment I. : coſ. ſegment II. :: coſ. of leaſt ecliptic polar diſtance : coſ. of the diſtance required.

If the diſtance required is that of the ſun, inſtead of a ſtar, the two proportions are reduced to one, namely,

Rad. : coſ. difference of longitudes :: coſ. latitude of the moon : coſ. of diſtance required.

Dr. Maſkelyne's method, as given in Ph. Tranſ. 1764, conſiſts in finding the approximate diſtance by a ſimilar proportion to that given for finding the diſtance of the ſun, namely, as rad. is to coſ. of the difference of longitude, ſo is the coſ. of their difference of latitude to the coſ. of the required diſtance. The diſtance thus found is to be then corrected in the following manner.

To the log. of the arc equal radius $= 5.3144251$, add the logarithms of — the ſine of the latitude of the moon — the ſine of the latitude of the ſtar — the verſed ſine of the difference of the longitude — and the complement of the logarithms of the approximate diſtance found as above. The ſum will be the logarithm of the number of ſeconds which muſt be taken from the approximate diſtance to have the true.

When the given coſines vary rapidly; and the coſines found, very ſlowly; we may employ a formula, given by Mr. Murdoch in the Phil. Tranſ. 1758. In any ſpherical triangle (*Plate* VI. *Geometry*, *fig*. 86.) A B C; $2\ \text{ſin.}\ \frac{1}{2} A^2 = \frac{\text{coſ.}\ (AB - AC) - \text{coſ.}\ BC}{\text{ſin.}\ AB}$, or $2\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC\ .\ \text{ſin.}\ \frac{1}{2} A^2 = \text{coſ.}\ (AB - AC) - \text{coſ.}\ BC$; but $\text{coſ.}\ (AB - AC) = 1 - 2\ \text{ſin.}\ \frac{1}{2}(AB - AC)^2$, and for the ſame reaſon, $\text{coſ.}\ BC = 1 - 2\ \text{ſin.}\ \frac{1}{2} BC^2$; ſubſtituting theſe values $2\ \text{ſin.}\ .\ AB;\ \text{ſin.}\ AC\ .\ \text{ſin.}\ \frac{1}{2} A^2 = 1 - 2\ \text{ſin.}\ \frac{1}{2}(AB - AC)^2 - 1 + 2\ \text{ſin.}\ \frac{1}{2} BC^2$; $\therefore \text{ſin.}\ \frac{1}{2} BC^2 = \text{ſin.}\ AB\ .\ \text{ſin.}\ AC\ .\ \text{ſin.}\ \frac{1}{2} A^2 + \text{ſin.}\ \frac{1}{2}(AB - AC)^2$. Let $\backsim$ expreſs the difference between A B and A C, and changing the form of the expreſſion we have $\text{ſin.}\ \frac{1}{2}(AB \backsim AC)\ .\ \sqrt{\left(1 + \frac{\text{ſin.}\ AC\ \text{ſin.}\ AB\ \text{ſin.}\ \frac{1}{2} A^2}{\text{ſin.}\ \frac{1}{2}(AB \backsim AC)^2}\right)}$: this value may be computed by logarithms, by dividing it into two equations, and making $\frac{\text{ſin.}\ \frac{1}{2} A.}{\text{ſin.}\ \frac{1}{2}(AB \backsim AC)} \sqrt{\text{ſin.}\ AC\ .\ \text{ſin.}\ AB} = \text{tang.}\ a$, then $\text{ſin.}\ \frac{1}{2} BC = \frac{\text{ſin.}\ \frac{1}{2}(AC \backsim AB)}{\text{coſ.}\ a}$. Cagnoli Trigon. p. 609.

Example. Let the diſtances of the moon and ſtar from the pole of the ecliptic be $AB = 80°$, and $AC = 30°$, their difference of longitude $A = 110°$; then $\frac{1}{2}(AB \backsim AC) = 25°$, and the reſt of the calculation (which gives $BC = 91° 1' 59''$), will be as follows :

Sin. A C 30°	9.6989700
Sin. A B	9.9933515
	9.6922215
	9.6922215
½	9 8461607
Add. ſin. ½ A 55°	9.9133645
	9.7595252
Sin. ½ (A B − A C)	9.6259483
Tang. *a* 53° 40′ 32″	0.1335769
Coſ. *a*	9.7725835
Taken from (A B − A C) Sin. ½ B C	9.8533648
= 45° 30′ 59″.4 B C	91° 1′ 59″

De Lambre's formula is ſomewhat ſhorter and more convenient, namely, $\text{ſin.}^2\ \frac{1}{2} BC = \text{ſin.}^2\ \frac{1}{2}(AB + AC) - \text{coſ.}^2\ \frac{1}{2} A,\ \text{ſin.}\ AB,\ \text{ſin.}\ AC$.

Demonſtration. $\text{Coſ.}\ BC = \text{coſ.}\ A\ .\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC + \text{coſ.}\ AB\ .\ \text{coſ.}\ AC$, or $1 - 2,\ \text{ſin}^2\ \frac{1}{2} BC = 2\ .\ \text{coſ.}^2\ \frac{1}{2} A\ .\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC\ .\ \text{ſin.}\ AB - \text{ſin.}\ AC + \text{coſ.}\ AB\ .\ \text{coſ.}\ AC = 2\ \text{coſ.}^2\ \frac{1}{2} A\ .\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC + \text{coſ.}\ (AB + BC) = 2\ \text{coſ.}^2\ \frac{1}{2} A\ .\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC + 1 - 2,\ \text{ſin.}^2\ \frac{1}{2}(AB + BC)$; hence, $\text{ſin.}^2\ \frac{1}{2} BC = \text{ſin.}^2\ \frac{1}{2}(AB + AC) - \text{coſ.}^2\ \frac{1}{2} A\ .\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC$: make $\frac{1}{2}\ AB + AC = m$, and $\text{coſ.}^2\ \frac{1}{2} A\ .\ \text{ſin.}\ AB\ .\ \text{ſin.}\ AC = \text{ſin.}^2\ n$; and then $\text{ſin.}^2\ \frac{1}{2} BC = \text{ſin.}^2\ m - \text{ſin.}\ 2\ n = \text{ſin.}\ \overline{m + n},\ \text{ſin}\ (m - n)$.

Example.

Sin. A C	9.6989700	Sin. *n*		9.6047520
Sin. A B	9.9933515	*n* = 23° 44′ 1″.5		
		m = 55		
Sum	19.6923215			
Its half	9.8461607	*m* + *n*	78° 44′ 1″.5	9.9915494
Coſ. ½ A	9.7585913	*m* − *n*	31 15 58.5	9.7151805
	9.6047520			19.7067299
		Sin. ½ BC	45 30 59.4	9 8533649

Distance *of the Sun from the Moon's Node*, or *Apogee*, is an arc of the ecliptic intercepted between the ſun's true place, and the moon's node, or apogee. See Node.

Distance, *Curtate*. See Curtate.

Distance *of the Baſtions*, in *Fortification*, is the ſide of the exterior polygon.

Distance, in *Geography*, is the arc of a great circle interſected between two places.

To find the diſtance of two places A and B (*Plate* I. *Geogr. fig.* 1.) far remote from each other. Aſſume two ſtations, C and D, from which both the places A and B may be ſeen; and with a proper inſtrument find the angles A D C, C D B, A C D, and D C B; and meaſure the diſtance C D.

Then, in the triangle A C D, we have two angles given, A C D and A D C, together with a ſide; from which, by an eaſy rule in trigonometry, delivered under the article Triangle, we find A D.

So alſo, in the triangle C D B, the baſe D C, and the angles at the ſame, being given, B D is found.

Laſtly, in the triangle A D B, having the ſides A D and D B, together with the included angle A D B; the diſtance required, A B, is found by the rules given for the reſolution of triangles.

The height of a remote object being known, to find its diſtance, when the eye firſt deſcries it; and, again, the height of the eye being given, to find the diſtance to which the eye can reach on the ſurface of the ſea or land. Add the height of the eye A B (*Plate* I. *Geometry, fig.* 14.) to the ſemidiameter of the earth B C, by which you have A C; and ſince, in the right-angled triangle A D C, the ſides A C and D C are given, the angle D C A is found by the common rule for reſolution of triangles, the quantity of which angle forms the arc D B; which arc, converted into feet, or the like, gives the diſtance required.

Suppoſe, *e. g.* the height of the eye A B five feet, which is ſomewhat leſs than in a man of ordinary ſtature; ſince B C is 19695539, A C will be 19695544; and the angle D A B will be found 89° 57′ 43″: conſequently, D C B, or the arc D B, is 2′ 17″, or 137″; and, therefore, ſince 1°, or 3600″, make 343752 Paris feet, D B is $13081\frac{2}{3}$ feet.

After the ſame manner we find the diſtance D B, to which an object of a given altitude A B may be ſeen, and, conſequently, we know what diſtance we are off from an object of a given altitude, when we firſt diſcover the top thereof. See Horizon.

Distances, in *Geometry*, are meaſured by the chain, decempeda, and the like. See Chain, &c.

Distances, *Inacceſſible*, are found by taking bearings thereto from the two extremes of a line, whoſe length is given. See Plain-table, Theodolite, &c.

Distance, in *Navigation*, is the number of miles, or leagues, that a ſhip has ſailed from any point. See Sailing.

Distance, *Apparent*, in *Optics*, that diſtance which we judge an object to be from us when ſeen afar off, being commonly very different from the true diſtance; becauſe we are apt to think all very remote objects, whoſe parts cannot well be diſtinguiſhed, and which have no other object in view near them, to be at the ſame diſtance from us, though perhaps the one is thouſands of miles nearer than the other, as is the caſe with regard to the ſun and moon.

M. De la Hire enumerates five circumſtances, which aſſiſt us in judging of the diſtance of objects; *viz.* their apparent magnitude, the ſtrength of the colouring, the direction of the two eyes, the parallax of the objects, and the diſtinctneſs of their ſmall parts. Dr. Smith maintains, that we judge of diſtance principally or ſolely, by the apparent magnitude of objects; and concludes univerſally, that the apparent diſtance of an object ſeen in a glaſs, is to its apparent diſtance ſeen by the naked eye, as the apparent magnitude to the naked eye is to its apparent magnitude in the glaſs: but Alhazen long ſince obſerved, that we do not judge of diſtance merely by the angle under which objects are ſeen; and Mr. Robins clearly ſhews the hypotheſis of Dr. Smith to be contrary to fact, in the moſt common and ſimple caſes. Thus, if a double convex glaſs be held upright before ſome luminous object, as a candle, there will be ſeen two images, one erect, and the other inverted: the firſt is made ſimply by reflection from the neareſt ſurface: the ſecond, by reflection from the farther ſurface, the rays undergoing a refraction from the firſt ſurface both before and after the reflexion. If this glaſs has not too ſhort a focal diſtance, when it is held near the object, the inverted image will appear larger than the other, and alſo nearer; but if the glaſs be carried off from the object, though the eye remain as near to it as before, the inverted image will be diminiſhed ſo much faſter than the other, that it will, at length, appear very much leſs than it, but ſtill nearer. Here, ſays Mr. Robins, two images of the ſame object are ſeen under one view, and their apparent diſtances immediately compared; and it is evident that thoſe diſtances have no neceſſary connection with the apparent magnitude. This experiment may be made ſtill more convincing, by ſticking a piece of paper on the middle of the lens, and viewing it through a ſhort tube. He obſerves farther, that the apparent magnitude of very diſtant objects, is neither determined by the magnitude of the angle only under which they are ſeen, nor is the exact proportion of that angle compared to their true diſtance, but is compounded alſo with a deception concerning the diſtance; ſo that, if we had no idea of difference in the diſtance of objects, each would appear in magnitude proportional to the angle under which it was ſeen; and if our apprehenſion of the diſtance was always juſt, our idea of their magnitude would be, in all diſtances, unvaried; but in proportion as we err in our conception of their diſtance, the greater angle ſuggeſts a greater magnitude. By not attending to this compound effect, Mr. Robins apprehends that Dr. Smith was led into his miſtake.

Montucla alſo, without being appriſed of what Mr. Robins had written, made ſimilar objections to the hypotheſis of Dr. Smith. Dr. Porterfield has made ſeveral remarks on the five methods of judging concerning the diſtance of objects above recited from M. De la Hire; and he has added to them, the conformation of each eye. (See *Circle of* Dissipation.) This, he ſays, can be of no uſe to us, with reſpect to objects that are placed without the limits of diſtinct viſion. But the greater or leſs confuſion with which the object appears, as it is more or leſs removed from thoſe limits, will aſſiſt the mind in judging of its diſtance: the more confuſed it appears, the farther will it be deemed. However, this confuſion hath its limits; for when an object is placed at a certain diſtance from the eye, to which the breadth of the pupil bears no ſenſible proportion, the rays proceeding from a point in the object may be conſidered as parallel; in which caſe, the picture on the retina will not be ſenſibly more confuſed, though the object be removed to a much greater diſtance. The moſt univerſal, and often the moſt ſure means of judging of the diſtance of objects, he ſays, is the angle made by the optic axes: our two eyes are like two different ſtations, by the aſſiſtance of which diſtances are taken; and this is the reaſon why thoſe perſons who have loſt the ſight of one eye ſo frequently miſs their mark in pouring liquor into a glaſs, ſnuffing a candle, and ſuch other actions as require that diſtance be exactly diſtinguiſhed. With reſpect to the method of judging by the apparent magnitude of objects, he obſerves, that this can only ſerve, when we are otherwiſe acquainted with their real magnitude. Thus he accounts for the deception to which we are liable in eſtimating diſtances, by any extraordinary magnitudes that terminate them; as in travelling towards a large city, caſtle, or cathedral, we fancy them to be nearer than they really are. Hence alſo animals and ſmall objects ſeen in a valley, contiguous to large mountains, or on the top of a high mountain or building, appear exceeding ſmall. Dr. Jurin accounts for the laſt recited phenomenon, by obſerving that we have no diſtinct idea of diſtances in that oblique direction, and therefore judge of them merely by their pictures on the eye. Dr. Porterfield obſerves, with reſpect to the ſtrength of colouring of different objects, that if we are aſſured they are of a ſimilar colour, and one appears more bright and lively than the other, we judge the brighter object to be the nearer. When the ſmall parts of objects appear confuſed, or do not appear at all, we judge that they are at a greater diſtance, and *vice verſâ*; becauſe the image of any object, or part of an object, diminiſhes as the diſtance of it increaſes. Finally, we judge of the diſtance of objects by the number of intervening bodies whereby it is divided into ſeparate and diſtinct parts; and, the more this is the caſe, the greater will the diſtance appear.

pear. Thus, diſtances upon uneven ſurfaces appear leſs than upon a plane, becauſe the inequalities do not appear, and the whole apparent diſtance is diminiſhed by the parts that do not appear in it: and thus the banks of a river appear contiguous to a diſtant eye, when the river is low and not ſeen. Accidens de la Vue, p. 358. Smith's Optics, vol. i. p. 52. and Rem. p. 51. Robins's Tracts, vol. ii. p. 230, 247, 251. Porterfield on the Eye, vol. i. p. 105, vol. ii. p. 387, &c. See Prieſtley's Hiſt. of Viſion, p. 205. and p. 689, &c. See VISIBLE.

DISTANCE *of the Picture*, in *Perſpective.* If, from the point of ſight, a ſtraight line be drawn perpendicular to the picture, the point in which that line cuts the picture, is called the centre of the picture; and the diſtance between that centre and the point of ſight is called the diſtance of the picture. The choice of a proper diſtance from the eye to the picture is of great importance to the pleaſing repreſentation of an object, which cannot be ſeen to advantage, if the angle which it ſubtends exceed 40°.

In the examples that are given by writers of perſpective to illuſtrate the art, we frequently find the repreſentation of objects very diſtorted and unnatural. This inconvenience it is very difficult, and, in many caſes, impoſſible to avoid; for, as all the auxiliary lines are in proportion to the diſtance of the eye from the picture, this diſtance is unavoidably aſſumed too ſmall, otherwiſe the vaniſhing lines and points, and other lines connected with the demonſtration, would exceed the limits of the paper. Therefore, learners ſhould be aware of this circumſtance, and not miſtake an example for imitation, a defect which it would have been deſirable to have avoided.

DISTANCE *of a Vaniſhing Line.* If a ſtraight line be drawn from the point of ſight, perpendicular to a vaniſhing line, the point where it interſects it is called the centre of the vaniſhing line; and the diſtance of this centre from the point of ſight, is the diſtance of the vaniſhing line.

The diſtance of a vaniſhing line is always the hypothenuſe of a right-angled triangle, of which the two ſides are the diſtance of the picture, and the diſtance of the centre of the picture from the centre of the vaniſhing line. *Example* (*Plate* I. *Perſpective, fig.* 1.) Let C be the centre of the picture, V *v* any vaniſhing line; through C draw C E parallel to V *v*, making C E equal to the diſtance of the picture; draw C *c* perpendicular to V *v*, and join E *c*: *c* will be the centre of the vaniſhing line, V *v* and E *c* its diſtance, being the hypothenuſe of the right-angled triangle E C *c*, in which E C is the diſtance of the picture, and C *c* the diſtance of the centre of the picture from the centre of the vaniſhing line.

DISTANCE, *Points of.* It is by means of the points of diſtance, that we are enabled, in perſpective, to aſſign to the repreſentation of lines, their proportion with reſpect to the original.

The points of diſtance are always laid off on the vaniſhing-line of the original plane, on which the original line to be repreſented is ſuppoſed to be ſituated. They are ſo called, becauſe they are placed at the ſame diſtance from the vaniſhing point, as the diſtance of the vaniſhing point from the point of ſight. It moſt frequently occurs in practice, that the points of diſtance are laid off on the horizontal line, and the proportions derived from them on the ground-line, or interſecting line. Thus in *Plate* I. *Perſpective, fig.* 2. which is the perſpective repreſentation of a cube, whoſe ſide is *a b*; V *v* is the horizontal line, or vaniſhing line, of the baſe of the cube; V the vaniſhing point of the line, or edges of the cube *a m*, *b n*; E the point of ſight. Then with the centre V, and diſtance V E, deſcribe the arc E D, the point D, where it interſects the horizontal line, is the point of diſtance of the vaniſhing point V.

If now $\alpha\beta$ on the ground-line be taken equal to the original line or ſide of the cube, and D β be drawn from the point of diſtance, the point *m*, where it interſects α V, will determine the length *a m*, which is to be given to the repreſentation of the ſide of the cube.

In the ſame manner we find the point of diſtance *d* correſponding to the vaniſhing point *v*; and the mitre or diagonal point of diſtance D *m*, correſponding to the diagonal vaniſhing point *m v*, and it will be ſeen by inſpection of the figure, how all theſe points of diſtance may be uſed to determine the proportion of lines which tend to their correſponding vaniſhing points. Thus if *a* μ be taken equal to the diagonal of the ſquare *a b*, and a line drawn from D *m* to μ, the point *x*, where it interſects *a m*, will determine *a x*, which is the perſpective repreſentation of the diagonal.

But it is by no means neceſſary that the points of diſtance ſhould be taken on the horizontal line V *v*; for the line *a m* belongs equally to the plane *a b m n*, whoſe vaniſhing line is V D ι, and interſecting line $\gamma\, a\, \beta$. Now, if V D ι be taken equal to V E, another point of diſtance D ι will be obtained, which will equally ſerve to proportion the line *a m*; for if we take $a\gamma = a\beta$, and join D ι and γ, the ſame interſection *m* will be obtained as before, and ſince *a m* belongs not only to the planes *a m n b*, *a m x z*, but to an infinity of others, it is evident that there muſt be an infinity of lines, upon which the points of diſtance may be equally taken. Hence any line drawn through *a* may be conſidered as the interſecting line of a plane, in which the ſtraight line *a* V is ſituated; a line drawn through V parallel to it, will be the vaniſhing line, upon which if V D be taken equal to V E, D will be the point of diſtance, by which the line *a* V may be divided into any proportional parts of the interſecting or original line. It cannot be too often recommended to the ſtudent in commencing the ſcience of perſpective, to conſider every caſe in this general manner, and to endeavour to diveſt himſelf of all partiality for the horizontal and ground-lines, which are nothing more than the vaniſhing and interſecting lines of an original plane parallel to the horizon, as will be more fully illuſtrated under perſpective and other ſubjects connected with it.

DISTASTE, or DISGUST, a loſs of appetite, or an averſion, or repugnance, to foods which are commonly eaten.

Diſtaſte is held, by phyſicians, one of the principal diſorders of the ſtomach. It ariſes from a want of ſenſation in the upper orifice of the ventricle, which may be occaſioned various ways: as by a too great abundance of food; thick, heavy humours in the ſtomach: fat viſcid aliment; obſtructions of the lacteals: ſuppreſſions of the uſual evacuations; intermiſſions of the ordinary exerciſes, a defect of the nerves, in having their natural faculty aboliſhed, or ſuſpended, as in a lethargy, and apoplexy; and according to Sylvius, by a groſs viſcid ſaliva, or a thick bile, aſcending out of the ſmall guts into the ſtomach.

DISTEMPER, in *Medicine.* See DISEASE.

DISTEMPER is uſed in *Painting*, for the working up of colours with ſomething elſe beſides mere water, or oil.

If the colours be prepared with the former of theſe, that kind of painting is called limning; and if with oil, it is called painting in oil, or ſimply painting.

If the colours be mixed with ſize, whites of eggs, or any ſuch proper glutinous, or unctuous ſubſtance, and not with oil, they then ſay, it is done in diſtemper; as thoſe of the admirable cartoons, formerly at Hampton court: and as all ancient pictures are ſaid to have been painted before the year 1410.

The beſt method of compounding the colours with the vehicles, is to mix the ſize in water; then to levigate the colours in part of it, and afterwards to put each kind into a proper pot, adding as much more of the melted ſize as will bring it to a due conſiſtence, and mixing the whole well together in the pot, with a proper bruſh or wooden ſpatula. Warm water may be afterwards added, if neceſſary, for grinding the colours, or for working. The pots muſt be tied with bladders. This method of painting is chiefly confined to ſcenes, and groſſer works, where the effect depends more upon the perſpective art, and oppoſition of the colours, than on their brightneſs.

DISTENSION, the act of ſtretching a thing; alſo a ſtate of a thing violently ſtretched, and diſtended. See Tension.

Distension, *Diſtenſio*, Διατασις, in the *Ancient Muſic*, was uſed for the differences of ſounds with relation to acute and grave. Wallis's Append. ad Ptolem. Harm. p. 154.

Nature, in this reſpect, ſtrictly ſpeaking, aſſigns no limits. But, with regard to our uſe, the ancient muſicians held, that the nature of what ſounded, and alſo of what was to judge, that is, the human ear, was to be conſidered: for, neither the human voice, nor even any inſtrument, can give intervals of diſtenſions immenſely great or ſmall, nor could the ear judge of ſuch. Ariſtoxenus fixes the leaſt interval of diſtenſion in practice, to the dieſis enharmonica. As to the greateſt, he thinks it does not exceed two octaves, and a fourth, or a fifth, if we conſider any human voice, or three octaves, if we conſider one and the ſame inſtrument. He does not deny that the extent of the voice, conſidered in different ſubjects, as in men and children, may go even beyond four octaves. Ariſtoxen. p. 21. edit. Meibom.

DISTHENE, in *Mineralogy*. See Sappane.

DISTICH, Διϛιχον, a couplet of verſes; or a piece of poetry, the ſenſe whereof is comprehended in two lines. There are excellent morals in Cato's diſtichs. See Vigneul de Marville on the Diſtichs of Cato, tom. i. p. 54, 55.

Hexameter and pentameter verſes, otherwiſe called elegiacs, are diſpoſed in diſtichs.

DISTICHIASIS, formed of δις, *twice*, and ϛιχος or ϛοιχος, *order*, *rank*, in *Medicine*, a diſorder of the eye-lids; wherein, inſtead of one, they have two rows of cilia, or hairs.

In the diſtichiaſis, over the common, and natural hairs, there grows another extraordinary row, which frequently eradicates, and tears up the former; and, pricking the membrane immediately inveſting the eye, occaſions pain, and draws defluxions upon it.

It is cured by plucking up the ſecond rows of hairs with nippers, and cauteriſing the pores out of which they iſſued.

DISTICHUS, in *Botany*, (from δις, *double*, and ϛιχος, a *row*,) two-ranked, applied to a ſtem, expreſſes that the branches ſpread in two oppoſite directions, as in the Silver Fir, *Pinus picea*. *Diſticha folia*, two ranked leaves, are ſuch as ſpread likewiſe in two rows, and yet are not regularly oppoſite at their inſertion, like the Yew, *Taxus baccata*, and the *Pinus canadenſis*. Sm. Introd. to Botany 121, 147.

DISTILLATION, is one of the great operations in *Chemiſtry*, and is performed in a great variety of ways, according to the object to be attained. It may be defined a proceſs of evaporation, or volatilization, performed in veſſels adapted to condenſe or collect the ſubſtance volatilized. Diſtillation would naturally divide itſelf into three claſſes, according as the ſubſtance obtained is ſolid, fluid, or gaſſeous; but it not unfrequently happens, that the products of the ſame operation are collected in all three of theſe ſtates, ſo that the ſubject may be more uſefully conſidered in a practical view, as being performed with ſimple or with compound apparatus.

Diſtillation, where the ſole or principal product is ſolid, is equally termed *ſublimation*, and in general is performed with a very ſimple apparatus. In a vaſt number of operations, both in the ſmall and large way, a ſingle veſſel is ſufficient for ſublimation. Thus, in ſubliming camphor from the rough material, a large glaſs globe is the only veſſel employed. The rough camphor and other materials are dropped in, leaving the greater part of the veſſel empty, and the bottom alone is heated, by which the vapour of the camphor riſes to the upper part, which is comparatively cool, and there concretes into a hard tough cake, which moulds itſelf into the form of the veſſel. Formerly, the veſſels called aludels were much employed in dry diſtillation, which was the caſe when the ſubſtance vaporized was not readily condenſed, and when it was required to continue the proceſs for a conſiderable time, without deranging the loweſt veſſel where the materials were heated. The aludels were a ſeries of pots, with an upper and lower opening, and fitted to each other, ſo that the vapour could paſs up from the firſt to the ſecond, the ſecond to the third, and ſo on to the uppermoſt. They are deſcribed more particularly under the article Aludel, and are repreſented in *Plate* III. *Chemiſtry*, *fig.* 14. The uſe of aludels in manufacture, however, has been very generally ſuperſeded by long lateral chambers into which the vapour is conducted, theſe being found much more convenient, particularly (among other things) on this account, that in the perpendicular range of aludels, any ſlight concuſſion is apt to cauſe the ſublimed ſubſtance to fall down again into the loweſt veſſel and defeat the end of the operation.

In chemical experiments, a Florence flaſk is often quite ſufficient for ſublimations, the bottom alone being heated by a lamp, or on a ſand-bath, and the neck looſely ſtopped. Thus, ſmall quantities of reguline arſenic, corroſive mercurial ſublimate, calomel, and many other important preparations may be made. Where a very great heat is required, an earthen retort is the beſt veſſel for ſublimation, and the ſublimed ſubſtance may be collected, either in the cooler extremity of the neck of the retort, or in any receiver beyond it which may be adapted to it. Thus zinc may be diſtilled from calamine and charcoal, or phoſphorus from phoſphoric acid and charcoal, ſimply by dipping the end of the neck of the retort in water, and the ſublimed ſubſtance, in either caſe, concretes partly within the neck and partly in the water. Where the vaporized ſubſtance, which is ſolid when cold, is paſſed through water, it concretes into a remarkably fine powder, inſtead of a hard cake, as is uſually the caſe when the receiver is dry. Advantage has ingeniouſly been taken of late of this circumſtance in the preparation of calomel, in the laboratory of Meſſrs. Howard and Company, to ſave the labour employed in levigating this important mercurial preparation, for by driving the vaporized calomel through water, it concretes into a powder which ſcarcely any mechanical operation could bring to equal in fineneſs.

Sublimation is alſo occaſionally performed either in a retort and receiver, or in an alembic and capital, as will be preſently deſcribed. This is commonly done where a part of the vaporized ſubſtance condenſes alſo into a fluid, which is to be preſerved.

The apparatus uſed in the obtaining of gaſſes, by the diſtillation of ſolids or liquids, is in general very ſimple. A retort, either of glaſs or earth, to the neck of which is luted a narrow tube for the conveyance of the gas to the pneumatic trough, is in general ſufficient. It may be obſerved, that the beſt ſhape for retorts for the diſtillation of gaſſes is that in which the neck is ſmall, long, and narrow; whereas in the diſtillation of liquids, a much more roomy neck is required.

The apparatus for the diſtillation of liquids is that which has engaged the greateſt attention from chemiſts and manufacturers; and from the conſtant uſe made of this proceſs, both in experiments, and in manufacture, it is of extreme importance. Every apparatus for this purpoſe muſt conſiſt at leaſt of two parts, *viz.* the boiler or veſſel in which the materials are heated, and the veſſel communicating with the former, in which the ſteam or vapour is condenſed into a liquid. A circumſtance occurs here alſo, which does not take place in the diſtillation of ſolids and gaſſes, which is the large quantity of latent heat that the liquid acquires when reduced to vapour, and conſequently which muſt be again expelled before the vapour can be condenſed into a liquid. Hence in diſtilling of liquids, either the condenſing veſſel muſt be made extremely large, to allow of a vaſt ſurface to be expoſed to the cooler air, or (what is always the caſe in proceſſes of this kind in the large way,) ſome particular contrivance muſt be added for cooling the vapour, which is generally effected by ſurrounding the outſide of the condenſing veſſel with a large body of cold water. It was this circumſtance indeed, that is, the prodigious quantity of heat imparted to a large body of water, by a comparatively ſmall portion of ſteam in the act of condenſation, which firſt ſuggeſted to the late Dr. Black his beautiful theory of latent heat, and furniſhed him with the moſt ſtriking illuſtration of his opinions.

Diſtillation of liquids in the large way is uſually carried on in this country in the ſtill and refrigeratory; but in many parts of the continent the alembic is preferred. The conſtruction of the alembic has been already deſcribed under that article. It eſſentially conſiſts of two parts, *viz.* the boiler, which is either cylindrical or approaching to globular, and the capital, which cloſely fits on the top of the boiler, and is ſurrounded on the outſide with, and incloſed in, a veſſel containing cold water. The advantages and defects of the alembic have been deſcribed under that article. The great defect of the old conſtruction is the ſituation of the veſſel of cold water intended to condenſe the vapour; for being directly over the boiler, if it is kept ſufficiently cold to prevent the eſcape of any of the vapour, a portion of the latter, when condenſed, falls back again into the boiler, and thus the proceſs is needleſsly prolonged. It was with the particular view of removing this defect that ſeveral chemiſts (and eſpecially Beaumé) have added to the capital of the alembic a ſerpentine or worm tub, placed beſide the boiler, into which the conducting pipe of the capital is continued in a ſpiral form, ſo as to detain the vapour for its compleat condenſation, none of which can again fall into the boiler. This led to a farther ſimplification of the whole apparatus, by entirely removing the refrigeratory over the boiler, and thus forcing the whole of the vapour uncooled into the worm pipe, where the water which ſurrounds it condenſes it into a liquid. This apparatus forms the common ſtill and cooler, or worm, now univerſally employed in the diſtillation of all kinds of ſpirits, and the preparation of diſtilled waters, and a number of other uſeful purpoſes.

The common ſtill conſiſts of a boiler, (*a*, *fig.* 1. *Plate* VII.) which may, for ſmall quantities, be made to fit looſely into any kind of furnace or ſtove, as here repreſented; but in the large way is fixed in maſonry with a fire-place beneath it, of a head or capital *b*, which conſiſts of a hollow globe fitting upon the boiler, and with its upper part drawn out into a curved pipe of decreaſing diameter, which deſcribes a compleat arch, and terminates at the upper part of the ſerpentine or worm into which it fits. The latter, *c*, is a long pipe, with a regularly decreaſing diameter, which is arranged in a ſpiral form in the middle of a large tub of cold water, *d*, by means of which the vapour is condenſed, and trickles down in a ſmall regular ſtream from the lower end of the worm *e*, where it emerges from the ſide of the tub. The boiler of the ſtill is generally made of tinned copper, as well as the lower part of the capital; but the arched termination of the latter, as well as the whole of the worm, are generally of pewter. The joining between the boiler and capital requires a ſlight luting, for which ſlips of paſted paper, or wet bladder, are moſtly ſufficient. The line of tube, from the arch of the capital to the bottom of the worm, ſhould be an uniformly deſcending ſpiral to prevent any lodgement of the diſtilled liquor, and ſome nicety is required in large ſtills, to give the worm an exact degree of ſlope, which is found by experience to be the moſt favourable to ſpeedy condenſation. The chief diſadvantage attending this apparatus is the difficulty of cleaning the ſerpentine, when any ſtrong ſmelling ſubſtance, ſuch as an eſſential oil, has been procured; and, in this reſpect, the common alembic, with the refrigeratory round the capital, has the advantage.

The management of the fire is of great importance in all diſtillations, to avoid on the one hand boiling over, or burning the ingredients by too great heat; and on the other, to keep up the fire ſtrong enough to afford an even regular evaporation into the condenſing part of the apparatus. When too much heat is uſed, there is alſo danger of the capital being blown off by the great expanſive force of the vapour which is too ſuddenly generated, and cannot be condenſed with ſufficient rapidity; or elſe the liquor in the boiler riſes up into the capital, and flows over into the ſerpentine. This latter accident is perceived by the liquor coming out from the bottom of the ſerpentine not in a clear uniform ſtream, but by guſhes, and ſtarts with a guggling noiſe, and coloured or fouled. When the ſtream of diſtilled water flows evenly, and the boiling liquor is heard to ſimmer moderately within the ſtill, the proceſs will be known to go on properly.

We may mention in this place the project of diſtilling in vacuo, which ſeems firſt to have ſuggeſted itſelf to the late Dr. Black, and which, at firſt ſight, appears a very ingenious and happy idea. The evaporation of liquids is regulated not only by the heat to which they are expoſed, but by the degree of preſſure to which they are ſubjected, the evaporation being inverſely as the preſſure. Thus, as it is well known, ether will evaporate ſo violently as to boil in vacuo, and alcohol will boil at a very moderate warmth under the ſame circumſtances. Hence it was ſuppoſed, that by diſtilling in vacuo, a vaſt ſaving of fuel would be obtained, as the temperature required would be ſo much leſs than in ordinary circumſtances. The experiment was made by Mr. Watt, and is thus related in Dr. Black's Lectures. A very ſmall ſtill was half filled with water, and then cloſely united with the receiver, ſo that every joining of the apparatus was air-tight. A ſmall hole was made in the bottom of the receiver, and a plug was fitted to it. The water being made to boil violently ſent the ſteam through the whole apparatus (there being no water in the refrigeratory to condenſe it) forcing the air out by the hole. While the whole was boiling hot, and the ſteam blowing through the hole, this was ſuddenly ſtopped by the plug, and the bottom of the ſtill was ſet in ice. This ſoon cooled its contents, and the ſteam which occupied the reſt of the apparatus collapſed into a few drops of water, leaving the ſpace which it had occupied nearly in vacuo. A lamp was now ſet under the ſtill, and in a few minutes the whole apparatus grew warm. Cold water was put into the refrigeratory, and the diſtillation went on ſlowly and evenly, though the head of the ſtill was ſcarcely warm to the hand. The temperature of the ſteam was only 100°, but on comparing the quantity of water diſtilled, with the increaſe of temperature which had been imparted to the water of the refrigeratory, by the condenſation, it was found that the latent heat of the ſteam, when produced in vacuo, was ſurpriſingly increaſed, and therefore it is obvious that a proportional increaſe of fuel is conſtantly required to cauſe the water to evaporate at all. By repeating the experiment carefully, Mr. Watt found that water would diſtil very well in vacuo at the temperature of 70°, but that in this ſtate the latent heat of the ſteam amounts to as much as nearly 1300; and therefore as the latent heat is at leaſt as much increaſed as the diſtilling temperature is diminiſhed, the additional quantity of fuel required for the former purpoſe more than counterbalances the ſaving of fuel in the latter.

The apparatus generally uſed for the diſtillation of moderate quantities, and in laboratory experiments, is the retort and receiver. The retort is made either plain or tubulated, and fitted with a ground ſtopper. It ſhould be roomy at the bend, as it is there where the vapours firſt begin to condenſe. When the plain retort is uſed, the materials to be diſtilled, if liquid ſhould be poured in by a funnel with a very long neck, that none may lodge in the neck of the retort. The bottom of the retort, where the heat is applied, is blown pretty thin, and being of uniform thickneſs, it will readily bear the heat of an Argand lamp; or even it may be ſlung upon a chain, and placed a little way above an open coal or charcoal fire, if burning clearly without much riſk of breaking. The neck of the retort *a*, *fig.* 2, *Plate* VII. may either paſs at once into that of the receiver, or ſometimes an *Adopter*, *b*, as it is called, is interpoſed to increaſe the diſtance between the retort and receiver, and all the joinings are cloſely luted. The receiver *c* ſhould be of conſiderable capacity to afford a large cool ſurface for the condenſation of the vapour, and this may be further aſſiſted by covering it with a cloth kept conſtantly wetted with cold water: the receiver is ſometimes a ſimple globe, but it is preferable even in the ſimpleſt diſtillations, to have a long tube drawn out from it at the bottom, as here repreſented, which may conveniently enter a bottle *d*, placed underneath, and thus the liquor is drawn off from the receiver, and the products of the operation may be examined at any period of the proceſs without unluting any of the veſſels; beſides which all danger of burſting the veſſels by too copious a guſh of vapour is avoided.

All the apparatus for diſtilling, however, which we have hitherto deſcribed, is only uſeful in the ſimpler proceſſes, that is, where the product of the operation is only a ſolid or fluid, and eaſily condenſible without addition. Thus the alembic or ſtill, with the refrigeratory, is devoted almoſt excluſively to the diſtillation of aromatic and other waters or ſpirits, which readily condenſe by cooling; and the ſimple retort and receiver is uſually reſerved either to experimental purpoſes, or in the large way, to the preparation of the ſtronger acids, or of phoſphorus and other ſubſtances, that require a very ſtrong heat. But the older chemiſts often felt a moſt material inconvenience in the uſe of the retort and receiver; for many diſtillations are attended with the production of a vaſt quantity of gas or vapour, either entirely uncondenſible, or which can ſcarcely be made to aſſume a liquid form without being paſſed through water or other fluids. Hence it was neceſſary either to uſe one or more enormouſly large receivers, or elſe to drill a ſmall hole in the receiver employed, or to leave the veſſels only ſlightly luted, and to avoid the riſk of burſting them by the expanſion of the confined vapour, by letting it eſcape into the open air. This often cauſed the loſs of the moſt material and intereſting product of the diſtillation, eſpecially in experiments of reſearch, when the nature of gaſeous bodies began to form ſo conſpicuous a part of the philoſophy of chemiſtry. All theſe inconveniences have been effectually remedied by the apparatus of the late Mr. Woulfe, and the various improvements upon it, which have ſince been adopted, and the utility of this apparatus, is ſo great, that the invention forms almoſt an era in chemical diſcovery. Even as early as the time of Glauber the inconvenience of the old apparatus was felt, and this ingenious chemiſt, about the year 1655, gave a method of adding to the firſt receiver a lateral ſeries of ſtone or earthen jars, connected with it and with each other by ſyphon-ſhaped tubes, whereby all the vapour which eſcaped condenſation in the receiver was obliged to paſs through theſe jars before it could eſcape into the air. Theſe jars, however, were not half filled with water, as in Mr. Woulfe's plan, but empty, and ſet in a large pan of cold water to aſſiſt the condenſation.

The great improvement made in this apparatus by the late Mr. Woulfe, and deſcribed in the Phil. Tranſ. for 1767, was to fill theſe veſſels with water into which the conducting pipes dip, and thus to compel every portion of vapour or gas to paſs through as many veſſels of water as is required before it is allowed to eſcape; and even at laſt the gas may be detained by connecting the tube from the laſt bottle with a pneumatic trough or a gas-holder.

Another contrivance, however, is eſſential to the perfection of this apparatus. When the diſtillation is nearly over, or when, from any accidental cooling, the production of gas or vapour begins to ſlacken, a degree of vacuum is always made in the retort owing to the contraction by cooling in the bulk of the vapour which it contains. This circumſtance forms a ſimilar vacuum in the receiver, to fill which a ſtrong abſorption or ſuction of the liquid takes place from the firſt bottle back into the receiver through the connecting tube. This again would cauſe an equal vacuum in the firſt bottle, were it not that an equal portion of liquid of the ſecond bottle is ſucked up into the firſt: and this again produces the ſame abſorption from the third to the ſecond, and ſo on through the whole ſeries of connected bottles, through every part of which a retrograde motion takes place; and the different products of the operation, which were collected ſeparately in the different veſſels, are thus mixed and confounded together. To remedy this defect, ſeveral contrivances have been adopted. The inventor, Mr. Woulfe, employed an intermediate empty veſſel between the receiver and the firſt water-bottle, into which the bent tube from the receiver was immerſed only to a very ſhort depth, in conſequence of which, when the abſorption took place, the liquor was poured into this intermediate veſſel, and went no further. Another mode of obviating abſorption is by letting in the external air to that part of the apparatus where the vacuum begins. This, however, cannot be done by a conſtant and free communication with the air, for in this caſe, the veſſels not being air-tight, the whole object of the apparatus, in compelling the products of diſtillation to paſs through water for condenſation, would be defeated. There muſt, therefore, be ſome contrivance by which the veſſels may be kept air-tight ſo long as the diſtillation continues, but muſt admit the atmoſphere as ſoon as ever the flow of vapour or gas ceaſes, and a vacuum is beginning to be formed. This object may be attained in ſeveral ways. The ſimpleſt is to inſert into the veſſel a long tube of narrow bore, which ſhall juſt dip into the contained liquid, and thus ſhut out the air during diſtillation, but will eaſily admit the air when a partial vacuum is formed, and the level of the liquid is a little lowered by the ſuction of a portion into the conducting tube from the adjoining veſſel. Theſe tubes, for preventing abſorption, generally occupy the middlemoſt of the three openings with which the Woulfe-apparatus bottles are uſually made, and which is ſhewn as a ſeparate figure in *Plate* VI. with the upright tube perforating the cork. The great advantage of theſe tubes is, that they are ſimple, eaſily obtained, and put together without any difficulty, nothing more being neceſſary than to bore a round hole in the cork, and lute the joinings with ſealing-wax or ſome other cement. This contrivance has the diſadvantages, however, that when any great influx of gas cauſes a preſſure within the bottle, a part of the liquor muſt be forced out of the upright tube, unleſs it be made ſo inconveniently long as to counteract any moderate preſſure: and alſo that when the bulk of the contained liquor is much increaſed during the diſtillation, the lower end of the tube dips too low to anſwer the deſired purpoſe of preventing abſorption of the liquid into the contiguous bottle.

Another contrivance, to prevent abſorption, and which has no other imperfection than its extreme fragility and liability to accident, is the tube with one or two bulbs, invented by a French artiſt, of the name of Wetter, and bearing his name. It is ſhewn with two bulbs forming the upper portion of, and cemented to the connecting tube *f*, *Plate* VI. and with a ſingle bulb and ſeparate in *Plate* VII. *fig.* 3; *e* forming the ſtopper of the receiver *a*. The Wetter's tube (which is of glaſs, like all the reſt of the Woulfe's apparatus) is bent twice to a compleat return or ſemicircle, ſo that one extremity is oppoſite to the other. The upper end is expanded into a kind of cup or bulb, and another complete bulb is blown in the ſpace between the two bends. A little mercury is then poured into the tube, enough to fill the lower bend, and thus compleatly to ſhut up all communication with the external air. If in this ſtate, there is a greater preſſure within the veſſel; to which the Wetter's tube is adapted, than that of the external air, the mercury is forced on towards the upper orifice of the tube, by its weight increaſing the preſſure within the veſſel, and it is not till this preſſure is ſo great as to force all the mercury into the upper bulb, that any gas can eſcape from the veſſel into the air. On the other hand, if abſorption takes place within the veſſel, and, in conſequence, a partial vacuum begins to form, the preſſure of the external air then drives all the mercury into the other bulb (or that which is between the two bends); and as this fluid does not fill the cavity, the air from without paſſes by its ſide, and ruſhes into the veſſel to reſtore the equilibrium. This ſimple and ingenious contrivance, therefore, unites almoſt every requiſite, but unfortunately its length and the ſtreſs on particular parts render it extremely liable to be broken, more eſpecially where it is hermetically ſealed to, and forms a part of a bent conducting tube as in F, *Plate* VI. The danger of breaking is alſo much increaſed whilſt it is made to fit into any glaſs veſſel by grinding. The ſeries of veſſels which forms the compound Woulfe's diſtilling apparatus in the above plate may be here briefly deſcribed, as it is well arranged and fitted for the moſt important experiments. A is a ſand-trough fixed over a furnace, and containing the tubulated retort B, in the neck of which is fitted the acid-holder C. This is a glaſs phial furniſhed with a glaſs ſtop-cock, accurately ground to fit both the phial and the neck of the retort. Its uſe is to allow the operator to drop any acid or other liquid down from the phial into the retort, for the purpoſe of diſengaging gas or other vapour from the contents of the retort, without admitting any particle of external air, which in delicate experiments of reſearch is of importance. D is a tubulated receiver, ſupported by the wooden ſtand E: F is the conducting and the Wetter's tube in one piece, as already deſcribed. When therefore any vacuum occurs, either in the retort or the receiver, the external air ruſhes in through the Wetter's tube, and prevents any regurgitation of liquor from the bottle G, into the receiver: G, I, L, are bottles with three tubulures, connected with each other by the bent tubes H, K; M is a tube proceeding from the laſt bottle, and which is bent of the proper form to be introduced under a jar inverted over water or mercury, into which may paſs any gas which has not been condenſed either in the receiver, or by paſſing through the liquid of any of the bottles. N is a convenient box, which ſerves both as a ſtand for the Woulfe bottles, and as a ſecure place to keep them in when not uſed. It may be added that if any abſorption be apprehended of the liquor from any one of the bottles into the other, (which however can hardly happen independently of a vacuum beginning in the retort and receiver) this may be provided againſt by fitting the middle opening with a tube, (as here repreſented ſeparately) which muſt juſt dip below the ſurface of the liquor of the bottles.

Several ingenious compound diſtilling apparatuſes have been contrived, which ſhould anſwer the end of conveying vapour through any ſeries of liquids for the purpoſe of condenſation, without having the fragility of the Woulfe's apparatus of contiguous bottles on the ſame level and connected with bent tubes, for it ſhould be added, that it is extremely difficult where the two extremities of the tubes are cloſely ground to fit the bottles, to give that preciſe degree of bend to the middle of the tubes which ſhall keep the ſtoppered ends in their places, without leaving a dangerous ſtreſs on any part of ſuch fragile ſubſtances.

Fig. 28, *Plate* V. is a ſtrong and uſeful kind of Woulfe's apparatus, invented by the late Dr. Hamilton. Its conſtruction is obvious by mere inſpection. The retort A is to be ſupported and heated either on a ſand bath, or on a ſtand over a lamp, and the diſtilled matters paſs into the ſucceſſive receivers C, C, C, C, into the laſt three of which water is to be put, whilſt that which is neareſt to the retort is to be left empty. If this receiver is tubulated, and a Wetter's tube fixed to the opening, or if the retort is tubulated and provided with the Wetter's tube, all abſorption will be prevented.

Fig. 3, *Plate* VII. is a uſeful and ſafe Woulfe's apparatus, invented by Mr. Knight of Foſter-lane, London. A, B, C, D, repreſents four veſſels, each ground into the mouth of that below it. E, E, E, are glaſs tubes, the middles of which are ground into the neck of each veſſel, and of ſufficient length to allow the upper end to riſe above the liquor, while the lower deſcends nearly to the bottom of the veſſel below: one of theſe tubes is repreſented ſeparately in *fig.* 4. The veſſel A is kept empty, and ſerves as a receiver to contain any liquid diſtilled from the retort which enters at the orifice F, and it is alſo furniſhed with a Wetter's tube G, to prevent the abſorption of any liquid up from the lower veſſels, when a vacuum is formed by the cooling of the retort or receiver. The veſſels B, C, and D, are filled with the liquor intended to be impregnated with the vapour or gas, that diſtils over and which paſſes by the tubes ſucceſſively through the whole range of veſſels. The lower one, D, has the bent tube H to carry off any unabſorbable gas, and it is made broad and firm at the bottom, beſides being fitted into a heavy wooden ſtand (not here repreſented,) to leſſen the danger of being overſet. This apparatus unites every requiſite, and it has the great advantage of not being eaſily deranged, and if any part is broken, it may be replaced without much difficulty.

Some other modes of ſaturating liquids with gaſſes in compound diſtillations, will be mentioned under the article Nooth's Apparatus.

Distillation, *Brewing for.* See Brewing.

Distillation *of ſalt water,* in order to obtain freſh. See *Salt*-Water.

Distillation *of wood.* See Pyroligneous *acid.*

DISTILLED Spirits. See Spirits.

Distilled *Waters,* in *Pharmacy.* When any vegetable matter is boiled with water in any veſſel fitted to collect and condenſe the vapour, a diſtilled water is obtained, which is, in almoſt every inſtance, ſomewhat impregnated with odorous or ſapid particles which it has extracted from the vegetable and carried up with it in the proceſs. But the difference in degree of impregnation, according to the ſubſtance employed, is extreme. Sometimes only a faint and nauſeous taſte is given, which ſoon goes off; but in other inſtances the water is highly ſcented and taſteful.

The firſt occurs where the plant is of the herbaceous and nearly inſipid kind, or only bitter without being aromatic; but where the plant is rich in eſſential oil, or ſtrongly aromatic, the water partakes largely of theſe properties.

A vaſt variety of diſtilled waters have been uſed in pharmacy, moſt of them obtained from the vegetable, but ſome from the animal kingdom.

Of the vegetable waters, many were obtained from the inodorous herbaceous plants, all of which are now diſuſed in this country as being entirely unfit and uſeleſs, but appear to be ſtill common in many parts of the continent, and eſpecially in France, and therefore they require ſome little notice in this place.

The method of preparing them is thus given by Beaumé, taking plantain water as an example. Any quantity of the freſh plantain is taken and put into an alembic or ſtill, ſo as to fill about half its capacity. The plant is then covered with water, the capital is luted on with paſted paper, the worm-tub is filled with cold water, and the alembic is rapidly heated to the boiling point, and is kept at the ſame degree the whole time. The diſtilled water of plantain then begins to come over, and the proceſs is continued till about a quarter as much liquor is obtained as there was put of water in the alembic.

In the like manner, all the diſtilled waters of the ſucculent plants are obtained.

Some have recommended the expreſſed juice of the plant to be uſed inſtead of the plant itſelf, but this is not neceſſary, though in one reſpect it might be uſeful, as it would prevent all riſk of empyreuma which ſometimes takes place in the common way, by the adherence of part of the entire plant to the bottom of the ſtill.

When the entire plant is uſed, the ſtill ſhould not be more than two-thirds full, as the plants ſwell extremely on the firſt boiling, which might cauſe the liquor to boil over, or by ſtopping the canal of the ſtill-head, might endanger the veſſel's blowing up.

All the waters diſtilled from the inſipid ſucculent plants, have a kind of herbaceous ſmell, which is ſo ſimilar in all, as to make it difficult to diſtinguiſh which plant has been uſed. The diſtilled water has beſides, when firſt prepared, a ſmell and taſte which have been called empyreumatic, though it does not depend on any ſcorching of the materials, ſince it is equally perceived, when a water-bath is uſed, and conſequently when the plant has not been expoſed to a greater heat than that of boiling water. This peculiar empyreuma goes off, on expoſing the water to a gentle heat for two or three days in bottles looſely corked. It alſo diſappears, as Beaumé has obſerved, on freezing the water.

All theſe waters, when kept for ſome months, begin to grow turbid, and undergo ſome kind of fermentation, or ſpontaneous action, after which they depoſit a number of flocculi apparently mucilaginous, but which have not been examined with accuracy, and after a while, they ſhew ſenſible ſigns of containing ſometimes an acid, at others ammonia, and in about a year's time they begin to become offenſive and mouldy. If, therefore, they are uſed in medicine, they ſhould not be kept for many months.

The diſtilled waters from the ſucculent inodorous plants are, however, totally diſcarded from the preſent pharmacopœias, at leaſt in this country, and it does not appear that we have ſuſtained any loſs by their removal. It ſtill remains, however, as a matter worthy of inveſtigation, whether the inſipid plants, that poſſeſs very decided medicinal properties, ſuch as the digitalis, and the numerous tribe of narcotics, may not yield a powerful diſtilled water from which benefit may be obtained. But for all uſeful purpoſes (as far as we yet know) the infuſion and extract, or tincture of theſe plants, or the dried plantain ſubſtance, anſwer every end that can be expected, and are prepared with much leſs trouble, and are probably much more durable.

A conſiderable number of inſipid diſtilled waters (or nearly ſo) were formerly obtained by ſubmitting ſeveral of the gelatinous animal ſubſtances to diſtillation, ſuch as frog's ſpawn, ſnails, &c., in which caſe the intermede of the water-bath was eſſential. Theſe waters are inſipid, but have a ſlight animal ſmell, and change in courſe of time. They were ſuppoſed to be uſeful in nephritic and internal hæmorrhagic complaints, and were employed pretty abundantly externally, as coſmetics. They are all now very properly expunged from the pharmacopœias of this country.

The diſtilled waters that are actually kept in our ſhops are thoſe which are prepared from the aromatic vegetables, from moſt of which an eſſential oil in ſubſtance may alſo be obtained at the ſame time; and as the water taſtes and ſmells ſtrongly of the oil peculiar to the plant, and alſo as a water very ſimilar to the diſtilled water, may generally be made by diſſolving ſome of the oil in plain water, there can be no doubt but that the diſtilled waters of all the aromatic vegetables owe their ſtrong ſmell and taſte to the eſſential oil which they hold in ſolution. Some rules are to be obſerved in the diſtillation of theſe waters; the ſubject of diſtillation ſhould be firſt thoroughly macerated water, to open its texture and make it yield its eſſential oil more abundantly. When the herbaceous plants are uſed, ſuch as peppermint for example, they become ſufficiently macerated in the time that it requires to bring the water to a boiling heat, ſo that no previous preparation is neceſſary, it being ſufficient to put them into the ſtill without the requiſite quantity of cold water. But the woods and other hard parts of plants ſhould be macerated for ſome time before diſtillation, being previouſly well bruiſed and their texture broken down. It was formerly the cuſtom to ferment them before diſtillation, and pearl-aſhes were added to aſſiſt in breaking down the texture of the ſubſtance. In moſt caſes, however, this previous ſtep is needleſs, and ſometimes hurtful, and it is now nearly abandoned. The quantity of water required, of courſe, muſt vary according to the nature of the ſubſtance uſed. Herbaceous plants, recently gathered, require only two or three times their weight. When previouſly dried, the ſtill may be filled to three-fourths of its capacity, with the plants moderately preſſed, and ſo much water added as will fully cover them. The fire ſhould be raiſed expeditiouſly at firſt, as a long continued heat is apt to impair the aromatic flavour. The water which firſt comes over is almoſt always milky and turbid, owing to an excefs of eſſential oil above the quantity which it can hold in clear ſolution, that it carries up with it; and this exceſs of oil, when the diſtilled water cools gradually, collects at top in the form of a thin film, or ſubſides to the bottom when its ſpecific gravity is the greateſt. As the water diſtils over it becomes clearer and proportionably leſs aromatic to the taſte, till at laſt, when perfectly limpid, it becomes nearly inſipid; and the fire ſhould then be withdrawn.

The ſame proceſs is employed in the extraction of the *eſſential oils* from plants, as will be mentioned under that article; only in this caſe, as much of the materials and as little water as poſſible are employed; and the water of the refrigeratory is kept ſomewhat warm, otherwiſe much of the oil would condenſe too ſoon, and fall back into the boiler.

The diſtilled aromatic waters, as well as thoſe from the inſipid plants, have at firſt an unpleaſant flavour, which is the ſame in all, and may be eaſily diſtinguiſhed through the ſtrong aromatic taſte proper to the individual plant. This unpleaſant taſte goes off in a few days if the water is kept in a looſely corked bottle. That the waters may keep better, it is uſual to add abont a twentieth of their weight of ſpirit of wine.

After all the aromatic water has come over, if the proceſs be ſtill continued, an acidulous liquor ſometimes riſes, which is ſtrong enough to corrode ſlightly the ſtill head, to which circumſtance Quincy, with great probability, aſcribes the anthelmintic virtues which ſome of theſe waters appear to poſſeſs.

Beaumé has alſo remarked, that in continuing the diſtillation with a hot fire, after the water has run limpid and nearly taſteleſs, there ſometimes riſes a ſecond portion of oil, which is ſtrongly empyreumatic, and has but little of the odour of the plant, and is leſs fluid than the firſt oil. It ſhould therefore never be mixed with the aromatic water. This oil appears to be ſimilar in nature to that which is collected in abundance in the diſtillation of ſome kinds of brandy, as mentioned under that article; but its nature has not been properly examined, ſo that it is doubtful whether it be a fixed oil driven over by the continuance of the heat, or a portion of the proper eſſential oil altered in the proceſs. Beaumé has obtained this oil from thyme, roſemary, and lavender.

Some plants that abound in fragrance, and yield a very aromatic water, afford very little, if any, eſſential oil in common diſtillation. The roſe is a ſtriking inſtance.

The only diſtilled waters retained by the London and Edinburgh colleges are thoſe prepared from orange peel, ſweet fennel, roſe leaves, peppermint, pennyroyal, ſpearmint, lemon peel, cinnamon, caſſia cinnamon, dill ſeeds, and pimento.

DISTILLER, a perſon who diſtils ſpirits for ſale. By 43 G. III. c. 69, every diſtiller or maker of low wines or ſpirits for ſale, or exportation, within England, ſhall take out a licence, which ſhall be charged with the yearly ſum of 10*l.*; and every rectifier of ſpirits within England ſhall pay for ſuch licence a duty of 5*l.*; and ſuch licence ſhall be renewed annually before the end of the year, on pain of forfeiting, if a common diſtiller, 200*l.*; if a molaſs diſtiller or rectifier, 30*l.*; 24 G. III. c. 41. No perſon ſhall be deemed a rectifier or compounder who ſhall not have an entered ſtill capable of containing, excluſive of the head, 120 gallons; which ſhall have ſuitable tubs and worms, and be uſed for rectifying Britiſh ſpirits for ſale, 26 G. III. c. 73. By 19 G. III. c. 50. every ſuch diſtiller ſhall cauſe to be put up in large characters, over the outward door of every place uſed for making or keeping of Britiſh-made ſpirits, the words *Diſtiller, Rectifier,* or *Compounder* of *Spirituous Liquors,* on pain of 100*l.*; and if any perſon ſhall buy any ſuch ſpirits of any perſon not having ſuch words over his door, he ſhall forfeit 50*l.* By 21 G. III. c. 55, if any diſtiller or dealer ſhall buy any Britiſh made ſpirits (except, as in the former caſe, at the public ſales of condemned ſpirits by the commiſſioners of exciſe) he ſhall forfeit 500*l.* By 19 G. III. c. 50, no perſon ſhall be permitted to make entry of any workhouſe or place, or of any ſtill or utenſil for making, diſtilling, or keeping of low wines or ſpirits, unleſs he ſhall occupy a tenement of 10*l.* a year, aſſeſſed in his own name, and paying the pariſh rates: and by 21 G. III. c. 55, in order to prevent private diſtillations, every perſon who ſhall make or diſtil any low wines or ſpirits, whether for ſale or not for ſale, ſhall be deemed a common diſtiller for ſale, and ſhall enter his ſtill and veſſels at the next office of exciſe; and every perſon making or keeping any waſh fit for diſtillation, and having in his cuſtody any ſtill, ſhall be deemed a common diſtiller for ſale, and be liable to the ſeveral duties, and ſubject to the ſurvey of the officers. No common diſtiller or maker of low wines, ſpirits, or ſtrong waters for ſale, ſhall ſet up any tun, caſk, waſh-back, copper, ſtill or other veſſel, for making or keeping any worts, waſh, low wines, ſpirits, or ſtrong waters; nor alter nor enlarge the ſame, nor have any of them private or concealed, or any private warehouſe, cellar, &c. for making or keeping any the ſaid liquors, without firſt giving notice at the next office of exciſe, on pain of 20*l.*; and he in whoſe occupation any of the ſame ſhall be, ſhall forfeit 50*l.*; 8 and 9 W. c. 19. And by 24 G. II. c. 40. every diſtiller ſhall, 10 days before he diſtils or makes any ſpirituous liquors, enter every veſſel, &c. at the next office of exciſe; on pain of 50*l.* for every ſtill or veſſel uſed and not entered. And every diſtiller ſhall, four days before he begins to brew any grain, &c. make entry at the next exciſe office, of all coppers, veſſels, &c. inſerting in ſuch entry the day on which he intends to begin, and the uſe to which ſuch veſſel is to be applied; which ſhall not be altered on pain of forfeiting 100*l.* with the liquor, which may be ſeized by any officer of exciſe, 26 G. III. c. 73. And by 21 G. III. c. 55, no perſon ſhall make uſe of any veſſel, room, &c. for making waſh for the diſtillation of low wines and ſpirits, without giving notice at the next office of exciſe, on pain of 50*l.* for every veſſel, room, &c. uſed without notice. Nor ſhall any perſon withdraw his entry whilſt any duty is depending, or any veſſels are ſtanding, except by changing it on the day of its being withdrawn, 23 G. III. c. 70., 26 G. III. c. 73. No perſon is allowed to have any ſtill or number of ſtills, which ſingly or together contain leſs than 100 gallons, under the penalty of 100*l.* for every ſtill; and the waſh-ſtill ſhall contain at leaſt 400 gallons, excluſive of the head, under the ſame penalty, 2 Geo. III. c. 5. and 14 Geo. III. c. 73.

Diſtillers are to ſhew to the officer every ſtill or other veſſel entered; and the veſſels are to be marked by the gauger; and defacing the mark, or rubbing out, incurs a penalty of 20*l.* 26 Geo. II. c. 40.

Diſtillers who uſe private pipes, &c. for conveyance of diſtilled liquor, forfeit 100*l.* 10 and 11 W. c. 4. They ſhall alſo make holes in the breaſt of the ſtill for taking gauges and ſamples, and provide locks on the ſtill-heads, the holes, diſcharge-cocks, and furnace-door, under a penalty of 50*l.* and of 200*l.* for breaking or wilfully damaging ſuch lock or faſtening, after it has been ſecured by the officer, 12 Geo. III. c. 46. 14 Geo. III. c. 73.

The diſtiller ſhall provide proper ladders for the officer to examine each ſtill, and aſſiſt in ſetting them up, on pain of 200*l.* 23 G. III. c. 70.

Diſtillers are required to give notice to the officer of exciſe, before they receive any wine, cider, &c. or any kind of fermented waſh, on pain of 50 *l.* and alſo before they charge or open the ſtill, expreſſing and deſcribing the number and marks of the waſh-batches uſed; and they are prohibited from charging the ſtill with any other, under a penalty of 100 *l.* 24 G. II. c. 40; 12 G. III. c. 46; 14 G. III. c. 73.

Diſtillers, in preparing griſt for waſh, that uſe more than in the proportion of one quarter of wheat to two quarters of any other grain, forfeit 50 *l.* 33 G. II. c. 9.

If any corn diſtiller, or maker of low wines or ſpirits from corn or grain, ſhall make uſe of any molaſſes, coarſe ſugar, honey, or any compoſition or extract of ſugar, in brewing or preparing his waſh for diſtillation, or receive ſuch materials into his cuſtody, exceeding 10lbs. in weight, he ſhall forfeit 100 *l.*; and officers may take ſamples of the waſh in any veſſel, paying for the ſame at the rate of 1 *s.* 6*d.* a gallon; and if the diſtiller ſhall obſtruct him, he ſhall forfeit 100 *l.* 23. G. III. c. 70.

Officers are to attend at the ſtill-houſe, after due notice, to ſee that the waſh-ſtills are properly filled, and when they are fully charged to lock and ſecure them. And if any perſon ſhall open any ſtill-head, &c. after they have been ſo locked, and before they are opened by the officer of exciſe, or ſhall wilfully damage any lock or faſtening, he ſhall forfeit 200*l.* 12 G. III. c. 46.

Removing or concealing waſh, &c. in the poſſeſſion of any diſtiller, incurs a forfeiture of the ſame; and ſuch diſtiller, and the perſon employed to remove, or who ſhall receive the ſame, ſhall ſeverally forfeit 10*s.* for every gallon of it; and no wort, waſh, &c. ſhall be put into the ſtill, or removed from the back or veſſel in which it was fermented, till the ſame has been gauged; in the penalty of 200*l.* and double duty.

The officer ſhall every three months, if required, take an account of the ſtock of all diſtillers and rectifiers, and if any unfair increaſe ſhall be found, the ſame ſhall be forfeited, and may be ſeized; and the perſon in whoſe ſtock ſuch exceſs ſhall be found ſhall forfeit 50*l.* Rectifiers are to mark the ſtrength and quality of mixed ſpirits on the outſide of the caſk, and in default thereof, or if untruly marked, the ſame ſhall be forfeited, and alſo the caſks, and may be ſeized; and the rectifier ſhall forfeit 50*l.* 26 G. III. c. 73.

By 27 G. III. c. 31, made perpetual by 41 G. III. c. 97, it was enacted, that all ſpirits ſhould be deemed and taken to be of the ſtrength indicated by Clarke's hydrometer, but by 43 G. III. c. 97. the lords of the treaſury may diſcontinue the uſe of this hydrometer, and direct any other to be uſed in lieu of it. All Britiſh ſpirits of the third extraction, or which have been twice diſtilled from low wines, and had flavour communicated to them, ſhall be deemed "Britiſh brandy;" if no flavour has been communicated to them, the ſame ſhall be deemed "rectified Britiſh ſpirits." If of the ſecond extraction, or once diſtilled from low wines, the ſame ſhall be deemed "raw Britiſh ſpirits." And all Britiſh ſpirits diſtilled with juniper berries, carraway ſeeds, aniſe ſeeds, or other ſeeds, or ingredients uſed in the compounding of ſpirits, ſhall be deemed "Britiſh compounds." And all Britiſh ſpirits of a greater ſtrength than one to two over hydrometer proof, ſhall be deemed "ſpirits of wine." Officers ſhall take an account of the ſtock of rectifiers and compounders every three months at leaſt, and if any increaſe of quantity, under certain limitations, be found, the quantity in exceſs ſhall be forfeited, and may be ſeized; and ſuch perſon ſhall forfeit 50*l.* And if any Britiſh ſpirits or compounds are ſent out of a greater ſtrength than one in five under hydrometer proof, the ſame ſhall be forfeited, and treble value, or 50*l.* in the whole; and the ſame may be ſeized, with the caſks and veſſels containing it. 30 G. III. c. 37. The diſtiller ſhall weekly make entry of all waſh by him uſed for the making of low wines and ſpirits within each week, on pain of 10*l.*; and within a week after ſhall pay off the duties, on pain of double duty. 19 G. III. c. 50. All permits for removing Britiſh ſpirits ſhall correſpond with the requeſt notes, and delivered with ſuch ſpirits to the buyer, on the forfeiture of the ſame to ſuch buyer, and double the price including the duties: and ſuch buyer may be admitted to prove, that ſuch ſpirits were delivered without a lawful permit: but no buyer ſhall be allowed to avail himſelf of ſuch forfeiture, unleſs complaint is made within fourteen days after the delivery of the ſpirits. 26 G. III. c. 73.

Retailers of diſtilled liquors, or ſuch as ſell the ſame in leſs quantity than two gallons, muſt take out a licence, for which they are to pay annually a ſum correſponding to the rent of the premiſes which they occupy; if the rent of ſuch retailer be 15*l.* or upwards, 5*l* 2*s.*; at 20*l.* and upwards, 5*l.* 10*s.*; at 25*l.* and upwards, 5*l.* 18*s.*; at 30*l.* or upwards, 6*l.* 6*s.*; at 40*l.* or upwards, 6*l.* 14*s.*; and at 50*l.* or upwards, 7*l.* 2*s.* This licence, which is to be renewed annually, on the penalty of 50*l.*, is to be granted only to thoſe who keep taverns, victualling-houſes, inns, coffee-houſes, or ale-houſes; who, within the limits of the head office of exciſe in London, pay 10*l.* a year rent and pariſh rates, and in places where the occupiers are not rated 12*l.* a year; and who, in other parts of the kingdom, pay to church and poor. They muſt firſt be licenſed to ſell ale in the places where they dwell.

By 16 G. II. c. 8. retailers of ſpirituous liquors, without licence, were ſubject to a penalty of 10*l.*; and by 24 G. II. c. 40. all liquors found in the cuſtody of ſuch perſons, or within ſix calendar months after conviction, were to be ſeized. And by 13 G. III. c. 56, and 30 G. III. c. 38, ſuch retailers are to forfeit 50*l.*, ſubject to mitigation ſo as not to be reduced below 5*l.* Every perſon, who ſhall retail leſs than two gallons, ſhall enter his warehouſes, ſhops, &c. and his ſpirituous liquors, on pain of 20*l.* for every place, and 40*s.* for every gallon not entered; and alſo the liquors and caſks. 9 G. II. c. 23. 30 G. III. c. 38. By 19 G. III. c. 69: every importer or dealer in ſpirituous liquors, ſhall cauſe to be painted, on a conſpicuous part of the houſe, ſhop, or cellar, &c. uſed by him, the words *Importer of*, or *Dealer in*, *Spirituous Liquors*, on pain of 50*l.* Any importer or dealer buying of a perſon, who has not theſe words over the door of his ſhop, &c. ſhall forfeit 100*l.* Any perſon, who hath not made entry of his liquors, and who hath theſe words over his door, ſhall forfeit 50*l.* No ſpirituous liquors ſhall be brought into a place of ſale, without previous notice to the officer of exciſe, and leaving with him a certificate, expreſſing that all the duties are paid, the quantity and quality, the name of the ſeller, &c. on pain of forfeiting 20*l.*, and alſo the liquor and caſks. 9 G. II. c. 23. Retailers ſhall not increaſe the quantity of their liquors, on pain of 40*s.* a gallon; and the liquors ſo mixed with water, or any other liquors, ſhall be ſeized and forfeited. 9 G. II. c. 23. By 21 G. III. c. 55. the ſtock increaſed ſhall be forfeited, a quantity equal to the increaſed quantity ſhall be ſeized by the officer, and the perſon offending ſhall forfeit 20*l.* The officer may, at all times, by day or night, enter into warehouſes, ſhops, or other places, to take an account of the quantity and quality; and if any retailer hinder the officer, he ſhall forfeit 50*l.* 9 G. II. c. 23. No licenſed retailer ſhall have any ſhare in a diſtillery or rectifying houſe, or be concerned in ſuch trade, on pain of 200*l.* 26 G. III. c. 73.

Hawkers of ſpirituous liquors in the ſtreets, &c. are liable to a forfeiture of 10*l.* 9 Geo. II. c. 23. 11 Geo. II. c. 26. Perſons giving away ſpirituous liquors, or paying wages in them, ſhall be deemed retailers. 9 Geo. II. c. 23. Keepers of gaols, workhouſes, &c. ſelling ſpirituous liquors, or knowingly ſuffering them to be ſold, except ſuch as are preſcribed by a phyſician, ſurgeon, or apothecary, forfeit for the firſt offence 100*l.* and for the ſecond their office. Perſons bringing any ſuch liquors into any place of that kind may be apprehended, and on conviction committed to the houſe of correction or priſon for any time, not exceeding three months, unleſs they immediately pay a fine, not exceeding 20*l.* nor leſs than 10*l.* Debts for ſpirituous liquors cannot be recovered, unleſs they have been contracted, or the liquors delivered at one time to the value of 20*s.* or upwards: and diſtillers knowingly ſelling or delivering diſtilled liquors to unlicenſed retailers, forfeit 10*l.* and treble their value; and the retailer, convicting the diſtiller, is entitled to a ſhare of the penalty, and is himſelf indemnified. Perſons riotouſly reſcuing offenders, or aſſaulting informers, and their aiders or abettors, are guilty of felony, and liable to ſeven years' tranſportation. 24 Geo. II. c. 40. If any perſon ſhall obſtruct any officer in the execution of his duty, in relation to this act, he ſhall forfeit 200*l.* 23 Geo. III. c. 81. No liquor exceeding one gallon ſhall be removed without a permit. 6 Geo. I. c. 21. Britiſh ſpirits made from corn are allowed on exportation as merchandize, a bounty or drawback of 3*l.* 12*s.* *per* ton. 5 Geo. III. c. 5. 27 Geo. III. c. 13. And by 6 Geo. II. c. 17. for ſpirits drawn from Britiſh corn, a drawback was to be allowed at the port of ſhipping, of 4*l.* 18*s.* *per* ton, in full of all drawbacks: and by 23 Geo. II. c. 9, there was to be an additional drawback of 24*l.* 10*s.* a ton, on all Britiſh made ſpirits exported; provided that they are not exported in caſks containing leſs than a hundred gallons, and in veſſels of leſs burden than a hundred tons, except to Africa and Newfoundland, whither they may be exported in any veſſels not leſs than ſeventy tons. 6 Geo. III. c. 46. The 43 Geo. III. c. 69, which conſolidates the duties, &c. of exciſe, continues all advances, bounties, and drawbacks, which are particularly directed to be made by any act or acts of parliament in force, on or immediately before 5th of July, 1803, except ſo far as ſuch allowances may be varied or repealed by the ſaid act. By 39 and 40 Geo. III. c. 73, ſpirits diſtilled in England for exportation to Scotland, are exempted from the exciſe duties in England. And by 43 Geo. III. c. 69. for every gallon, Engliſh wine meaſure, of ſpirits, not exceeding in ſtrength that of one to ten over hydrometer proof, and ſo in proportion for any higher degree of ſtrength, made in England and thence imported into Scotland, payment is to be made by the importer before landing, of 4*s.*; and by c. 81. an additional duty of 2*s.*: for every ſuch gallon manufactured in Scotland and brought from thence into England, 5*s.* 6½*d.*; and by c. 81. an additional duty of 2*s.* 5*d.* For every gallon of ſuch ſpirits of greater ſtrength than one to ten over hydrometer proof, and not exceeding 3*l per cent.* over and above one to ten over hydrometer proof, 7*s.* 5½*d.* and a ſurcharge. And all duties and drawbacks under theſe acts ſhall be proportionate to the actual quantity. No ſpirits ſhall be ſent from Scotland to England, or from England to Scotland by land, or in veſſels of leſs than 70 tons burden, or in caſks containing leſs than 100 gallons, on forfeiture of the ſame, together with caſks or package; and alſo the veſſels, boats, horſes, cattle, and carriages employed, which may be ſeized. 28 Geo. III. c. 46. And if any diſtiller, rectifier, compounder, or dealer in ſpirits, or ſervant belonging to any ſuch perſon, ſhall obſtruct any officer in the execution of this act, he ſhall forfeit 200*l.*

DISTILLERY, the art of diſtilling brandy and other ſpirits. This art was firſt brought into Europe by the Moors of Spain about the year 1550: they learned it of the African Moors, who had it from the Egyptians; and the Egyptians are ſaid to have practiſed it in the reign of the emperor Diocleſian, though it was unknown to the ancient Greeks and Romans. Anderſon's Hiſt. of Commerce, vol. i. p. 83. See Fermentation, and Malt *Diſtillery.*

DISTINCT Notion, or *idea*, according to M. Leibnitz, is, when we can enumerate marks and characters enough whereby to recollect a thing.

Such, *e. gr.*, is this; that a circle is a figure bounded with a curve line that returns into itſelf; all the points whereof are equally diſtant from one middle point. Or, it is that wherein the mind perceives a difference from all other ideas.

Distinct *Baſe*, in *Optics*, is that diſtance from the pole of a convex glaſs, in which objects, beheld through it, appear diſtinct, and well defined: ſo that the diſtinct baſe coincides with what we otherwiſe call the focus.

The diſtinct baſe is cauſed by the collection of the rays proceeding from a ſingle point in the object, into a ſingle point in the repreſentation; and therefore concave glaſſes which do not unite, but ſcatter and diſſipate the rays, can have no real diſtinct baſe.

Distinct *Viſion.* See Vision.

DISTINCTION, a diverſity in things, or conceptions.

Logicians define diſtinction, an aſſemblage of two, or more words, whereby diſparate things, or their conceptions, are denoted.

There are three kinds of diſtinctions, taken from the three different modes of exiſtence; the firſt real; the ſecond modal; and the laſt rational.

Distinction, *Real*, is that between things which may exiſt or be conceived to exiſt, apart from each other: ſuch is that between two ſubſtances, or the modes of two ſubſtances.

Distinction, *Modal*, is that between ſeveral things, one whereof may exiſt without the other; but not, *vice verſâ*, the other without that: ſuch is that between the mind, and an act of will; between wax, and its hardneſs; water, and its freezing, &c.

Distinctio *Rationis*, or *Rational* Distinction, is that between ſeveral things, which are really one and the ſame, and whereof one cannot exiſt without the other, nor, *vice verſâ*, the other without this: ſuch is that between a thing and its eſſence; between the eſſence, and properties, &c.

Of this diſtinction ſome authors admit two kinds; the one barbarouſly called rationis ratiocinatæ, having ſome foundation in things; as when we diſtinguiſh the juſtice of God from his mercy: the other called rationis ratiocinantis, which has no foundation at all; and therefore is, by many, quite rejected.

Though others contend that there is no diſtinctio rationis, but is, at the ſame time, a real diſtinction: thus, ſay they, God, and juſt God, are, to each other, as milk, and white milk; and a juſt God, and merciful God, as white milk, and ſweet milk. But when I ſay, milk is diſtinguiſhed from white milk, or white milk from ſweet milk, the diſtinction falls between whiteneſs and ſweetneſs, which is a real diſtinction. See Realists.

Distinction, *Metaphyſical*, called alſo by the ſchoolmen alietas, alteritas, and diverſitas, is a non-agreement of being, whereby this entity is not that, or one thing is not another.

DISTINCTIO, or Distinguo, in the *Schools*, an expedient to evade an argument, or to clear up and unfold an ambiguous propoſition, which may be true in one ſenſe, and falſe in another. The reſpondent was hard preſſed, but he diſengaged himſelf by a diſtinguo. Moliere makes T. D. ſay to his miſtreſs, who had told him, he muſt ſubmit to the will of a perſon he loved; "Diſtinguo, Mademoiſelle, pour l'intereſt de ſon amour, Concedo; contre ſa paſſion, Nego."

DISTORTION, in *Surgery*, a twiſting or partial diſlocation of any member, &c. This ſpecies of deformity may be occaſioned by a ſpaſmodic contraction in one or more muſcles, drawing the affected part to either ſide; or it may be produced by a paralyſis of the ſame muſcles, in which caſe the affected part will be relaxed, ſo as to ſeem contracted on the oppoſite ſide. The palſied muſcles having loſt their action, will be counterbalanced and ſurmounted by the natural action of their antagoniſt muſcles; and, if this kind of diſtortion be in the mouth, a perſon will laugh, talk, or move the lips, &c. chiefly or entirely on the ſound ſide.

Diſtortions may be produced in the bones of growing perſons, and eſpecially in their ſpine, from mere careleſſneſs; *i. e.* by often leaning ſideways, or uſing the limbs very unequally. A wanton habit of ſquinting has been ſometimes known to occaſion a fixed contortion of the eye; but the ſame malady may be alſo cauſed by a partial palſy in one of the muſcles attached to the globe of the eye, as now and then occurs after a ſevere fever.

The diſeaſe, called a wry-neck, is frequently produced by the rigid and permanent contraction of a muſcle named ſterno-cleido-maſtoideus, which admits of relief by a ſurgical operation. See Wry-Neck, Paralysis, Sprain, Luxation, Vari, Valgi, and Spinal-Stays.

A twiſting of the limbs may ariſe, as it often does in children, from a preternatural laxity of the membranes inveſting a joint, and allowing a ſub-luxation of the bones; or the ſame effect may take place from a violent and ſudden over-ſtretching of the ligaments. The term ſprain applies, when, in conſequence of any exertion, or turning of a limb towards one ſide, a very ſevere pain is felt at the moment of the diſtortion. This accident may alſo occur in conſequence of a perſon ſuddenly reaching at any object which is too far diſtant, ſo that the limbs muſt be too much extended, or when he ſuddenly turns his head in any particular direction, &c. The limb is immediately afterwards affected with violent pain, which continues for a longer or ſhorter period, whereby the motion of the limb is more or leſs interrupted. Frequently a ſwelling is produced at the joint, which proves very obſtinate, and in the worſt caſes goes on to ſuppuration, during which the ſkin generally retains its natural colour. In ſuch caſes there is probably an effuſion of a fluid into the burſæ, or into the ſheaths of the tendons, which has not been re-abſorbed.

The moſt abſurd and pernicious practice which can be employed in theſe caſes, is to attempt to extend the limb, as is done by many, who thereby always aggravate the complaint. The beſt method is to keep the limb quiet, and frequently to rub it with ſome diſcutient application, ſuch as a ſolution of ſal-ammoniac, the linim. ſaponis, or ſpir. vin. camphorat. &c.; and to cover it with compreſſes dipped in theſe ſubſtances. We may alſo apply leeches, if the inflammation and pain run high.

Mr. Theden has particularly called the attention of practitioners to the diſtention of tendons, and diſplacement of muſcular fibres. His practice in theſe caſes is to lay the patient upon his healthy ſide, and to rub with his finger (previouſly wetted with ſome proper application) the affected muſcle at the part where the pain is felt, ſometimes longitudinally, and ſometimes croſſwiſe; and at times he directs an aſſiſtant to move the painful limb backwards and forwards, the frictions being continued all the while. As ſoon as by this treatment he hits the proper ſpot, an immediate cure is effected. He recommends at the ſame time to uſe his vulnerary waſh, or a ſolution of balſ. vitæ externally with ſal ammoniac.

Mr. Ponteau terms this accident *an actual diſlocation of the muſcles*, and ſpecifies three caſes in which it may take place. In the firſt caſe, when one of the flexor muſcles of the foot contracts either alone, or more violently than the neighbouring and aſſiſtant muſcles, it may be forced out of its place; or, when a relaxed muſcle is ſituated between two others that contract, it may be forced by theſe out of its ſituation; finally, ſuch a diſlocation may be produced, when at a time when the body or any limb is in a very uncommon and forced poſition, the muſcle naturally alſo contracts in a very preternatural direction. Long and ſlender muſcles are moſt ſubject to this accident. As a means of cure, he directs us to relax the diſlocated muſcle, and then to reduce it into its proper poſition by frictions applied to the whole of the painful part in the manner recommended by Mr. Theden. The relaxation of the diſlocated muſcle is always effected by placing the patient in that poſition in which he is ſenſible of leaſt pain. The weakneſs of the limb which remains behind, after the diſcuſſion of the inflammation, is to be removed by the uſe of the ſhower-bath; the ſwathing of the limb is alſo of great uſe. In no caſe is it allowed to uſe emollient fomentations, and ſtill leſs greaſy ointments, as thereby the complaint will be rendered worſe, and even fatal conſequences ſometimes may enſue.

Diſtortions of various kinds may take place in the lower extremity, either at the knee-joint, or at the ankle, or the joint of the foot. Of the latter ſpecies of diſtortions two kinds are diſtinguiſhed, namely, that in which the foot is turned preternaturally inwards (Vari) or outwards (Valgi). When the feet are turned preternaturally inwards, the patient is alſo ſaid to be club-footed.

All theſe kinds of diſtortions are either congenital, or they gradually ariſe in weak rickety children, eſpecially when they are too early compelled to walk or ſtand. Theſe deformities may often be avoided, by avoiding a poſture in which the weight of the body reſts upon the deformed part. When the knee-joint or the ankle is diſtorted, it is in many caſes impoſſible to force the bones into their natural form by means of machines; and it will ſometimes be far better to leave the cure to nature, whilſt the rachitic affection is counteracted by proper remedies, and all the *lædentia* avoided.

The machine invented by Mr. Gavin Wilſon, is ſaid to be of uſe in remedying diſtortions of the leg. This conſiſts of a ſheath of ſtrong leather, open in front, into which the diſtorted leg is placed. The ſtrength of the ſheath is increaſed by means of iron hoops. When the leg has been placed in this machine, the foot is ſecured to the ſole of it, by a ſtrap, and is alſo drawn either to one ſide or the other, according to the nature of its diſtortions by two other ſtraps, in a gradual manner.

As a means of remedying diſtortions of the foot, Mr. Benjamin Bell has recommended the uſe of a pair of ſhoes, of ſoft leather, hooped round with iron, and attached to an iron frame. For ſupporting weak legs and remedying deformities,

formities, Mr. Gooch recommends a machine compoſed of three ſemi-circular elaſtic ſteel hoops, which are to be applied to the ſmall of the leg, go half round the foot, and are ſecured by means of leathern ſtraps held by round buttons. A machine, ſimilar to that of Mr. Gooch, has been invented by Mr. Meinſhauſen; but of this no delineation has hitherto been given. Mr. Lentin has alſo effected a perfect cure in a caſe of a child, whoſe heel was drawn upwards by the tendo achillis in ſuch a manner, that he could not make it touch the ground when he ſtood, by means of a machine ſimilar to a preſs, combined with the uſe of the warm bath and oily frictions.

To the cure of club-feet, as they are termed, Mr. Sheldrake has been very attentive, and has publiſhed a great deal in the Med. and Phyſ. Journal.

Mr. Venel, of Germany, has alſo been particularly active, and his method has been followed by Meſſrs. Ehrmann and Brückner, with the beſt ſucceſs. As in theſe caſes it is principally requiſite that the extenſion of the contracted and ſtiff muſcles and ligaments ſhould not be performed too ſuddenly, but in a ſlow and gradual manner, the continued uſe of emollient remedies ſhould be combined with a moderate and gradually augmented extenſion of the parts. All the contracted muſcles and ligaments muſt be rubbed, throughout their whole length, for the ſpace of half an hour, thrice a day, with ſome emollient application. During the application of the frictions, the limb muſt be extended gradually, but ſteadily, and in proportion as the patient can bear it. Mr. Brückner recommends particularly for frictions, animal ſubſtances, ſuch as the fat of geeſe, ducks, and other fowls; alſo the oil which is obtained by boiling ox's and ſheep's feet in water. Before rubbing in the ointment, he ordered the patient to be placed, morning and evening, in a lukewarm bath, for the ſpace of twenty minutes, immediately after which he rubbed the ointment into the calf of the leg, and on the inſide of the ankle.

The extenſion of the contracted ſoft parts is performed by the hands alone, after each time of the frictions, and afterwards ſupported and promoted by the application of bandages or machines. The extenſion of the feet is performed after each friction, and in the following manner, after the patient has drawn on his ſtockings: If the operator has the right foot before him, he lays hold of the heel in ſuch a manner, that his thumb reſts upon the fore-part of the joint, and the points of his fingers internally on the heel, and on the inner ſide of the ankle. With the right hand he lays hold of the fore-part of the foot, applying his thumb to the ſole under the ball, and the hollow of his hand acroſs upon the back of the foot, outwards and backwards. The points of the fingers he preſſes upon the root of the foot. In operating upon the left foot the hands are reverſed. In performing the extenſion, the operator keeps the hand, with which he holds the heel, ſteady, and preſſes the bone of the heel outwards with the points of his fingers, and with the other hand he endeavours to preſs the inner margin of the foot downwards, and to turn the ſole downwards; and at the ſame time the anterior part of the foot is preſſed, as much as poſſible, outwards and upwards, and the root of the foot downward, ſo as to extend the whole foot. The extenſion muſt be performed in a gradual manner, and as ſoon as the patient exhibits ſymptoms of pain, it muſt be intermitted; but the extending operations muſt be performed ſeveral times in ſucceſſion, after ſhort intervals.

When theſe operations have been continued for ſeveral weeks, there is obſerved, as the firſt favourable ſymptom, a ſlight tumeſcence of the whole foot, together with a greater flexibility, and this is the period when a bandage or machine may be beneficially employed, in order to extend the foot permanently and uniformly. But with new-born infants, it is not neceſſary to uſe all theſe preparations. The pediluvia, frictions, and extenſion muſt be repeated daily, even during the uſe of the machine. Children who have already begun to walk, muſt relinquiſh the uſe of their legs during the progreſs of the cure, and either ſit or be carried.

The bandages muſt be adapted, 1ſt, to check the voluntary motion of the foot, to turn it outwards, lengthen it, draw down the heel, or elevate the fore part of the foot towards the leg, and, in general, counteract all the contracted muſcles; 2dly, the preſſure, by means of which this is to be effected, muſt be ſuch that it can gradually be increaſed, in proportion as, in conſequence of the emollient applications and diſtention, the preternatural tenſion abates; but it muſt be permanent and operate without occaſioning pain. The bandaging is to be performed by means of the following apparatus: take a ſquare piece of linen, about a foot and a half long, fold it into a triangle, and roll the two angles, that lie over each other, together in ſuch a manner, as to form a bandage ſomething more than an inch in breadth, and pointed at both ends. In rolling up the right foot, this bandage is to be applied over the tendo achillis, about half a foot from its extremity, its corners being held by an aſſiſtant. The bandage muſt then be carried round the ankle, and the ends brought forward again on the inner ſide of the ankle, after which it is to be carried obliquely over the back of the foot and the middle of the inner margin of the foot to the ſole, which being done, it is to be drawn tight on the outer ſide, ſo as to extend the foot and turn it outwards. When now the tight bandage is drawn upwards over the outer edge of the foot, this edge may be raiſed a little, and thus the ſole, which is directed inwards, be preſſed down. After this, another turn is made, exactly in the ſame manner, round the fore part of the foot, by which means we are ſtill better enabled to give the foot the above-mentioned direction. When this has been done, the one corner of the bandage is drawn obliquely upwards, and the other obliquely downwards; and both are tied together with a ſtrong knot upon the back of the foot. The two ends of the bandage are then carried once more round the region of the ankles, and tied together. Both the breadth and length of this bandage muſt be adapted to the ſize of the foot, and altered in proportion as the child grows larger. Over the bandage another ſtrong piece of cloth muſt be tied, and this muſt be changed for a dry one, as often as it is wet through, in order that the bandage may be kept clean.

Venel's apparatus was not applied by Mr. Brückner till he had produced a perceptible flexibility of the foot by the means above-mentioned. During the uſe of the apparatus, the pediluvia muſt be continued to be employed twice a day. In warm weather, the patient ſhould wear thread, and in cold weather cotton ſtockings; which ſhould be frequently changed and kept free from holes, as otherwiſe the bandages would be injured.

When the feet have been reſtored to their natural form by the uſe of the machines, but have not yet acquired their proper ſtrength, we muſt employ remedies adapted to increaſe the tone of the fibres, and invigorate the nerves. With this view, the luke-warm baths muſt gradually be changed for cold ones, in which the patient muſt keep his feet, after being previouſly well cooled, for the ſpace of five minutes every day. After the uſe of the bath, the feet ſhould be wiped dry, and rubbed with a piece of fine flannel till they become warm; after which they may be waſhed with brandy or ſome other ſpirituous application.

But in order that the feet may retain the form which has been reſtored to them, till the relaxed parts are completely ſtrengthened, and the antagoniſm of the muſcles of the leg brought to a perfect equilibrium, the *retaining machine (Haltung's machine)* muſt now be applied. In this the patient muſt confine his feet till the proper poſition has become perfectly habitual to them, and till they have acquired their proper ſtrength. The feet muſt become able to turn themſelves outwards with greater eaſe than inwards; when this has been effected, we may proceed with ſafety to teach the child to walk. During the firſt months he ſhould never be ſuffered to walk without ſome perſon to watch him; and every evening he ought to keep his feet for ſome time in the retaining machine.

During the whole firſt year the patient ought to wear half-boots, laced together over the whole back of the leg towards the middle of the fore-parts, ſo as to fit every where cloſe to the leg. The ſhoe ſhould have no heel, and the outer edge of the ſole ought to be twice as high as the inner, throughout its whole length. The quarters, as they are termed, ought to be made of ſtiff leather. On that part of the external margin of the ſole which lies under the heel, and on the quarters above it, a plate of iron is fixed, and attached below to the ſole-leather. In the middle of the place is a hole with a ſcrew, which receives the inferior extremity of the iron rod. This rod is three lines in diameter, flat on the inner ſide, and ſo long as to reach over the head of the fibula. At the upper extremity a plate of iron, an inch and a half in breadth, and three quarters of an inch in height, is fixed. This plate is hollowed out at its inner ſide, in order that it may fit the better to the upper and outer ſide of the leg, at the ſide of the knee. At one extremity there are ſeveral holes, for the purpoſe of ſewing a leathern ſtrap to it, and at the other there is a peg with a button, to which the ſtrap, after having been carried down under the knee, is attached. The rod riſes upwards immediately behind the outer point of the ankle. Over the peg, which is inſerted into the ſcrew-ſocket, the rod is bent outwards, ſo that its upper extremity ſtands at the diſtance of at leaſt an inch from the knee. When therefore this extremity is preſſed towards the leg, by drawing the ſtrap tight, the foot is compelled to turn itſelf outwards.

After the uſe of theſe boots has been diſcontinued, it will be proper that the child ſhould wear ſhoes with high quarters, not faſtened with buckles, but with ſtrings, and with ſoles higher at the outer than the inner ſide. This inequality of the ſhoes may be gradually diminiſhed with every new pair, till the ſole is perfectly even.

Mr. Brünninghauſen has deſcribed another very ſimple and convenient machine, which, combined with the remedies that have already been mentioned, may undoubtedly produce the moſt beneficial effects. It is made of ſtrong tinned iron or copper; and conſiſts of a ſole formed according to the ſhape of the foot, with a margin half an inch high. From this a long flat piece of the ſame iron plate proceeds upwards, along the inner ſide of the leg, as far as the knee. At the lower extremity of this plate a ſtrap is attached, which paſſes over the heel and the oppoſite edge of the foot, where it is drawn through an oblong ſlit, from whence it is carried over the back of the foot, at the ſide of the firſt turn, through a third fiſſure, under the ſole; and then through a fourth fiſſure, and at laſt over the roots of the toes again to the outer edge of the foot, where it is drawn through a fifth ſlit, and ſecured by means of a ſmall hook.

It is to be underſtood, that the tarſus muſt be drawn downwards and outwards, which this machine does by means of the firſt turn of the ſtrap over the heel. The metatarſus muſt be drawn inwards and backwards, which is performed by the ſecond turn of the ſtrap. Theſe two turns of the ſtrap muſt be drawn the tighteſt, and never looſened, for which purpoſe the ſtrap is ſecured by means of two ſmall hooks on the margin of the ſole-plate. The fourth turn paſſes under the ſole, in order that the fifth may draw the point of the foot a little outwards.

We ſhall finally mention another mode of treatment, recommended by Dr. Sommer, of Riga, of which a more ample account is given in Loder's "*Journal fuer die Chirurgie.*" Having bathed the foot, and rubbed it with gooſe-greaſe, he takes a piece of linen of the proper ſize, with which he bandages the whole leg, from within to without, and from the toes to the knee; after which he ties a piece of ſtiff ſole-leather to the foot, in ſuch a manner that a ſtrap, attached to that part of the leather which lies on the inner ſide of the foot, having been doubled round, paſſes over the back of the foot, and is drawn through a hole on the outer ſide of the ſole; whilſt another ſtrap, which is faſtened cloſe to the firſt, after having alſo been doubled round, paſſes round the heel, proceeds over the flat part of the foot, and is drawn through a hole on the inner margin of the ſole; and both ſtraps are tied together below, in ſuch a manner however as not to compreſs the foot too much. This being done, he applies, on the inner ſide of the leg, a wooden rod, with its two pegs at the bottom inſerted into two holes in the ſole, after which he applies a ſtrap under the knee, ſomewhat looſely, in order that the rod may remain moveable, which he ties together on the outer ſide of the rod. The ſtrap attached to the outer ſide of the ſole is then drawn through the ſtrap on the rod juſt mentioned, and tied to another which is likewiſe attached to the outer ſide of the ſole. When theſe ſtraps are drawn tight, the wooden rod is puſhed downwards, and preſſes upon the ſole, by which means the foot is at once extended, turned outwards, and retained in this poſition.

DISTORTION *of the Eye*, is called ſquinting, or ſtrabiſmus. See DIPLOPIA and STRABISMUS.

DISTORTOR ORIS, in *Anatomy*, one of the muſcles of the mouth, called alſo zygomaticus. It is deſcribed in the article DEGLUTITION.

DISTRACTION, in *Medicine*, ſometimes denotes the act of pulling a fibre, membrane, or the like, beyond its natural extent: and what is capable of this enlargement, is ſaid to be diſtractile.

DISTRAIN, in *Law*. *To* DISTRAIN, or *Diſtrein*, is to attach, or ſeize on one's goods, for the ſatisfaction of a debt. See the next article.

DISTRESS, DISTRICTIO, is the taking of a perſonal chattel out of the poſſeſſion of the wrong-doer, into the cuſtody of the party injured, to procure a ſatisfaction for the wrong committed. The term *diſtreſs* is alſo, in our law-books, applied to the thing taken by this proceſs, as well as to the proceſs itſelf. The moſt uſual injury for which a diſtreſs may be taken is that of non-payment of rents. (See RENT.) This was held as an univerſal principle, that a diſtreſs may be taken for any kind of rent in arrear; the detaining of which beyond the day of payment is an injury to him that is entitled to receive it. Likewiſe, for neglecting to do ſuit to the lord's court, (Bro. Abr. title Diſtreſs, 15.) or other certain perſonal ſervice (Co. Litt. 46.), the lord may diſtrain, of common right. Alſo, for amercements in a court-leet a diſtreſs may be had of common right; but not for amercements in a court-baron, without a ſpecial preſcription to warrant it. (Brownl. 36.) Another injury for which diſtreſſes may be taken, is where a man finds beaſts of a ſtranger wandering in his grounds, *damage-feaſant;* that is, doing him hurt or damage, by treading down his graſs, or the like; in which caſe the owner of the ſoil may diſtrain them till ſatisfaction be made him for the injury ſuſtained. Laſtly, for ſeveral duties and penalties inflicted by ſpecial acts of parliament, (as for aſſeſſments made by commiſſioners of ſewers, ſtat. 7 Ann. c. 10. or for the relief of the poor, ſtat. 43 Eliz. c. 2.) remedy by diſtreſs and ſale is given: with regard to which it may be obſerved, that ſuch diſtreſſes are partly analogous to the ancient diſtreſs at common law, as being repleviable and the like. (4 Burr. 589); but more reſembling the common law proceſs of execution, by ſeiſing and ſelling the goods of the debtor under a writ of *fieri facias*, which ſee.

As to the things which may be diſtrained, or taken in diſtreſs, it may be laid down as a general rule, that all chattels perſonal are liable to be diſtrained, unleſs particularly protected or exempted. Inſtead, therefore, of mentioning the things that are diſtrainable, it will be more eaſy to recount the things which are not ſo, with the reaſon of their particular exemptions. (Co. Litt. 47.) As every thing which is diſtrained is preſumed to be the property of the wrong-doer, it will follow that ſuch things, in which no man can have an abſolute and valuable property (as dogs, cats, rabbits, and all animals *feræ naturæ*) cannot be diſtrained. But if deer (which are *feræ naturæ*) are kept in a private incloſure for the purpoſe of ſale or profit, this circumſtance reduces them to a kind of ſtock or merchandize, that they may be diſtrained for rent. Moreover, whatever is in the perſonal uſe or occupation of any man is, for the time, privileged and protected from any diſtreſs; as an axe with which a man is cutting wood, or a horſe while a man is riding him. But horſes drawing a cart, and alſo the cart, may be diſtrained for rent-arrere, if a man be not upon the cart (1 Vent. 36.); and it hath been ſaid, that if a horſe, though a man be riding him, be taken *damage-feaſant*, or treſpaſſing in another's ground, the horſe may be diſtrained and led away to the pound. (1 Sid. 440.) However, all the authorities upon this point are collected together in Hargr. Co. Litt. 47; and the clear reſult of them is, that ſuch a diſtreſs is illegal. Again, valuable things in the way of trade ſhall not be liable to diſtreſs: as a horſe ſtanding in a ſmith's ſhop to be ſhod, or in a common inn; or cloth at a taylor's houſe; or corn ſent to a mill or market. All theſe are protected or privileged for the benefit of trade; and are ſuppoſed in common preſumption not to belong to the owner of the houſe, but to his cuſtomers. But, generally ſpeaking, whatever goods and chattels the landlord finds upon the premiſes, whether they, in fact, belong to the tenant or a ſtranger, are diſtrainable by him for rent; for otherwiſe a door would be open to infinite frauds upon the landlord; and the ſtranger has his remedy by action on the caſe againſt the tenant, if by the tenant's default the chattels are diſtrained, ſo that he cannot render them when called upon. With regard to a ſtranger's beaſts which are found on the tenant's land, the following diſtinctions are, however, taken. If they are put in by conſent of the owner of the beaſts, they are diſtrainable immediately afterwards for rent-arrere by the landlord. (Cro. Eliz. 549.) So alſo if the ſtranger's cattle break the fences, and commit a treſpaſs by coming on the land, they are diſtrainable immediately by the leſſor for his tenant's rent, as a puniſhment to the owner of the beaſts for the wrong committed through his negligence. (Co. Litt. 47.) But if the lands were not ſufficiently fenced ſo as to keep out cattle, the landlord cannot diſtrain them, till they have been *levant* and *couchant* on the land; that is, have been long enough there to have lain down and roſe up to feed; which, in general, is held to be one night at leaſt; and then the law preſumes, that the owner may have notice whither his cattle have ſtrayed, and it is his own negligence not to have taken them away. Yet, if the leſſor or his tenant were bound to repair the fences and did not, and thereby the cattle eſcaped into their grounds, without the negligence or default of the owner; in this caſe, though the cattle may have been *levant* and *couchant*, they are not diſtrainable for rent, till actual notice is given to the owner, that they are there, and he neglects to recover them (Lutw. 1580); for the law will not ſuffer the landlord to take advantage of his own or his tenant's wrong. There are alſo other things privileged by the ancient common law; as a man's tools and utenſils of his trade, the axe of a carpenter, the books of a ſcholar, and the like; which are ſaid to be privileged for the ſake of the public, becauſe the taking of them away would diſable the owner from ſerving the commonwealth in his ſtation. So, beaſts of the plough, *averia carucæ*, and ſheep, are privileged from diſtreſſes at common law (ſtat. 51 Hen. III. c. 4.); while dead goods, or other ſort of beaſts, which Bracton calls *catalla otioſa*, may be diſtrained. But, as beaſts of the plough may be taken in execution for debt, ſo they may be for diſtreſſes by ſtatute, which partake of the nature of executions. (4 Burr. 589.) And, perhaps, the true reaſon, why theſe and the tools of a man's trade were privileged at the common law, was, becauſe the diſtreſs was then merely intended to compel the payment of the rent, and not as a ſatisfaction, for the non-payment; and, therefore, to deprive the party of the inſtruments and means of paying it, would counteract the very end of the diſtreſs (4 Burr. 588.) Moreover, nothing ſhall be diſtrained for rent, which may not be rendered again in as good a plight as when it was diſtrained; for which reaſon milk, fruit, and the like, cannot be diſtrained; a diſtreſs at common law being only in the nature of a pledge or ſecurity, to be reſtored in the ſame plight when the debt is paid. So, anciently, ſheaves or ſtacks of corn could not be diſtrained; becauſe ſome damage muſt needs accrue in their removal; but a cart loaded with corn might; as that could be ſafely reſtored.

But now by ſtatute 2 W. and M. c. 5. corn in ſheaves or cocks, or looſe in the ſtraw, or hay in barns or ricks, or otherwiſe, may be diſtrained, as well as other chattels. Laſtly, things fixed to the freehold may not be diſtrained, as caldrons, windows, doors, and chimney pieces; for they ſavour of the realty. For this reaſon alſo corn growing could not be diſtrained; till the ſtatute 11 Geo. II. c. 19. impowered landlords to diſtrain corn, hops, graſs, or other products of the earth, and to cut and gather them when ripe. The goods of a carrier are privileged, and cannot be diſtrained for rent, though the waggon containing them is put into the barn of a houſe, or on the road. 1 Salk. 249.

The next inquiry pertaining to this ſubject is, how diſtreſſes may be taken, diſpoſed of, or avoided? The law of diſtreſſes, ſays judge Blackſtone, is greatly altered in late years. Formerly they were regarded as a mere pledge or ſecurity for payment of rent or other duties, or ſatisfaction for damage done. And ſo the law continues with regard to diſtreſſes of beaſts taken *damage feaſant*, and for other cauſes, not altered by act of parliament; over which the diſtrainor has no other power than to retain them till ſatisfaction is made. But diſtreſſes for rent-arrere being found by the legiſlature to be the ſhorteſt and moſt effectual method of compelling the payment of ſuch rent, many beneficial laws for this purpoſe have been made in the laſt century; which have much altered the common law, as laid down by our ancient writers. In diſcuſſing this part of the ſubject, it will be ſuppoſed that the diſtreſs is made for rent; and the differences between ſuch diſtreſs, and that taken for other cauſes, will be ſpecified. All diſtreſſes muſt be made by *day*, unleſs in the caſe of *damage-feaſant;* an exception being made in this caſe, leſt the beaſts ſhould eſcape before they are taken. (Co. Litt. 142.) When a perſon intends to make a diſtreſs, he muſt, by himſelf or his bailiff, enter on the demiſed premiſes; formerly during the continuance of the leaſe, but now, (ſtat. 8 Ann. c. 14) if the tenant holds over, the landlord may diſtrain within ſix months after the determination of the leaſe; provided his own title or intereſt, as well as the tenant's poſſeſſion, continue at the time of the diſtreſs. If the leſſor does not find ſufficient diſtreſs on the premiſes, formerly he could not reſort any where elſe; and therefore, knaviſh tenants made a practice to convey away their goods and ſtock, fraudulently, from the houſe or lands demiſed, in order to cheat their landlords. But now (ſtat. 8 Ann. c. 14. 11 Geo. II. c. 19.) the landlord may diſtrain any goods of his tenant, carried clandeſtinely off the premiſes, wherever he finds them within thirty days after, unleſs they have been *bona fide* ſold for a valuable conſideration: and all perſons privy to, or aſſiſting in ſuch fraudulent conveyance, forfeit double the value to the landlord. The landlord may alſo diſtrain the beaſts of his tenant, feeding upon any commons or waſtes, appendant or appurtenant to the demiſed premiſes. The landlord might not formerly break open a houſe, to make a diſtreſs, for that is a breach of the peace. But when he was in the houſe, it was held, that he might break open an inner door (Co. Litt. 16. Comberb. 17.); and now (ſtat. 11 Geo. II. c. 19.) he may, by the aſſiſtance of the peace officers of the pariſh, break open, in the day-time, any place, whither the goods have been fraudulently removed, and locked up to prevent a diſtreſs; oath being firſt made, in caſe it be a dwelling-houſe, of a reaſonable ground to ſuſpect that ſuch goods are concealed in it. Where a man is entitled to diſtrain for an entire duty, he ought to diſtrain for the whole at once; and not for part at one time, and part at another. (2 Lutw. 1532.) But if he diſtrains for the whole, and there is not ſufficient on the premiſes, or he happens to miſtake in the value of the thing diſtrained, and ſo takes an inſufficient diſtreſs, he may take a ſecond diſtreſs to complete his remedy. (Cro. Eliz. 13. ſtat. 17 Car. II. c. 7. 4 Burr. 590.) Diſtreſſes muſt be proportioned to the thing diſtrained for. By the ſtatute of Marlbridge, 52 Hen. III. c. 4. if any man takes a great or unreaſonable diſtreſs, for rent-arrere, he ſhall be heavily amerced for the ſame. Or if (2 Inſt. 107.) the landlord diſtrains two oxen for twelve-pence rent; the taking of *both* is an unreaſonable diſtreſs; but if there were no other diſtreſs nearer the value to be found, he might reaſonably have diſtrained *one* of them; but for homage, fealty, or ſuit and ſervice, as alſo for parliamentary wages, it is ſaid that no diſtreſs can be exceſſive. (Bro. Abr. tit. Aſſiſe. 291 Prerogative. 98.) For as theſe diſtreſſes cannot be ſold, the owner, upon making ſatisfaction, may have his chattels again. The remedy for exceſſive diſtreſſes is by a ſpecial action on the ſtatute of Marlbridge; for an action of treſpaſs is not maintainable upon this account, it being no injury at the common law. (1 Ventr. 104. Fitzgib. 85. 4 Burr. 590.)

When the diſtreſs is thus taken, the next object of conſideration is the diſpoſal of it. For which purpoſe the things diſtrained muſt in the firſt place be carried to ſome pound, and there impounded by the taker. But, in their way thither, they may be *reſcued* by the owner, in caſe the diſtreſs was taken without cauſe, or contrary to law: as if no rent be due; if they were taken upon the high way, or the like; in theſe caſes the tenant may lawfully make reſcue. (Co. Litt. 160, 161.) But if they be once impounded, even though taken without any cauſe, the owner may not break the pound and take them out; for they are then in the cuſtody of the law. (Co. Litt. 47.) See POUND.

When impounded, the goods were formerly only in the nature of a pledge or ſecurity to compel the performance of ſatisfaction; and upon this account it has been held (Cro. Jac. 148.) that the diſtrainor is not at liberty to work or uſe a diſtrained beaſt. And thus the law ſtill continues with regard to beaſts taken damage-feaſant, and diſtreſſes for ſuit or ſervices; which muſt remain impounded, 'till the owner makes ſatisfaction; or conteſts the right of diſtraining by replevying the chattels. (See REPLEVY.) This kind of diſtreſs, though it puts the owner to inconvenience, and is therefore a puniſhment to *him*, yet, if he continues obſtinate and will make no ſatisfaction or payment, it is no remedy at all to the diſtrainor. But for a debt due to the crown, unleſs paid within forty days, the diſtreſs was always ſaleable at common law. (Bro. Abr. tit. Diſtreſs. 71.) And for an amercement at a court-leet, the lord may alſo ſell the diſtreſs, (8 Rep. 41.); partly becauſe, being the king's court of record, its proceſs partakes of the royal prerogative, (Bro. *ubi ſupra.* 12 Mod. 330.); but principally, becauſe it is in the nature of an execution to levy a legal debt. And, ſo in the ſeveral ſtatute-diſtreſſes, already mentioned, which are alſo in the nature of executions; the power of ſale is likewiſe uſually given, to effectuate and complete the remedy. And in like manner, by ſeveral acts of parliament, (2 W. & M. c. 5. 8 Ann. c. 14. 4 Geo. II. c. 28. 11 Geo. II. c. 19.), in all caſes of diſtreſs for rent, if the tenant or owner do not, within five days after the diſtreſs is taken, and notice of the cauſe thereof given to him, replevy the ſame with ſufficient ſecurity, the diſtrainor, with the ſheriff or conſtable, ſhall cauſe the ſame to be appraiſed by two ſworn appraiſers, and ſell the ſame towards ſatisfaction of the rent and charges; rendering the overplus, if any, to the owner himſelf. And, by theſe means, a full and entire ſatisfaction may now be had for rent in arrere, by the mere act of the party himſelf, *viz.* by diſtreſs, the remedy given at common law, and ſale conſequent thereon, which is added by act of parliament. If any diſtreſs and ſale ſhall be made, for rent in arrear and due, when none is really due, the owner ſhall recover double value, with full coſts. 2 W. Seſſ. 1. c. 5.

The taking of a diſtreſs was formerly reckoned a hazardous kind of proceeding, on account of the many particulars that attended it: for if any irregularity was committed, it vitiated the whole, and made the diſtrainors treſpaſſers *ab initio.* (1 Ventr. 37.) But now by the ſtatute 11 Geo. II. c. 19. it is provided, that for any unlawful act done, the whole ſhall not be unlawful, or the parties treſpaſſors *ab initio;* but that the party grieved ſhall only have an action for the real damage ſuſtained; and not even that, if tender of amends is made before any action is brought. Blackſt. Comm. Book iii.

DISTRESS, *perſonal,* is made by diſtraining a man's moveable goods, and ſeizing all the profits of his lands and tenements, from the teſte, or date of the writ, for the defendant's contempt in not appearing to an action brought againſt him when he was ſummoned, or attached; and the iſſues ſo returned by the ſheriffs, are forfeited to the king, and eſtreated into the exchequer.

DISTRESS, *real,* is made on immoveable goods. It differs from an attachment in this, that it cannot be taken by any common perſon, without the compaſs of his own fee ; except it be preſently after the cattle, or other things are driven, or borne off the ground, on purpoſe to avoid diſtreſs.

Diſtreſs is alſo divided into *finite* and *infinite*.

Distress, *finite*, is that limited by law, how often it ſhall be made to bring the party to trial of the action; *viz*. once, twice, &c.

Distress, *infinite*, is without limitation, till the party appears ; as againſt a jury, which refuſes to appear upon certificate of aſſiſe, the proceſs is *venire facias*, *habeas corpus*, and *diſtreſs infinite*. See Distringas.

Laſtly, diſtreſs is again divided into *grand diſtreſs*, by Fitzherbert called *magna diſtrictio*; and *ordinary diſtreſs*.

Distress, *grand*, is that made of all the goods and chattels the party has within the county.

DISTRIBUTION, the act of dividing a thing into ſeveral parts, in order to the diſpoſing each in its proper place. See Division.

Distribution, in *Architecture*. Distribution *of the plan*, denotes the dividing, and diſpenſing the ſeveral parts and members, which compoſe the plan of a building.

Distribution *of ornaments*, is an equal, orderly placing of the ornaments in any member, or compoſition of architecture. See Ornament.

Distribution, in *Law*, the ſurplus of an eſtate, or *pur autre vie*, is diſtributable by adminiſtrators. See Administrator.

For the diſtribution of the eſtates of inteſtates, ſee Intestate.

Distribution, in *Logic*, is a kind of diviſion which diſtinguiſhes an univerſal whole into its ſeveral kinds or ſpecies. The rules of good diſtribution are much the ſame as thoſe of diviſion.

Distribution, *manual*, and *quotidian*, in *Eccleſiaſtical Matters*, denotes certain ſmall ſums of money, appointed by the donors or founders thereof, to be diſtributed to ſuch of the canons of a chapter as are actually preſent, and aſſiſtant at certain offices.

Distribution, in *Painting*, denotes the diſpoſition of the objects and lights in a picture. See Clair-Obscure.

Distribution, in *Printing*, the taking of the form aſunder, ſeparating the letters, and diſpoſing them in the caſes again, each in its proper cell.

Distribution, in *Rhetoric*, is a kind of description ; or a figure whereby an orderly diviſion and enumeration is made of the principal qualities of a ſubject.

For example, He has underſtanding to ſee our faults, juſtice to reſtrain them, and authority to puniſh them. Their throat is an open ſepulchre ; they flatter with their tongues ; the poiſon of aſps is under their lips ; their mouth is full of curſing and lies ; and their feet are ſwift to ſhed blood.

DISTRIBUTIVE, that *diſtributes*, from *dis*, *aſunder*, and *tribuere*, *to give*.

Distributive *juſtice*, is that whereby we give every perſon what belongs to him. See Justice.

Distributives, in *Grammar*. See Numerals.

DISTRICT, in *Law*, the territory, or extent of juriſdiction, of a judge. A judge or officer cannot act out of his own diſtrict. See Judge. Diſtrict alſo denotes the place wherein a man has the power of diſtraining ; or, the circuit, or territory, wherein one may be compelled to appear.—Where we ſay, *hors de ſon fee ;* others ſay, *extra diſtrictum ſuum*. Brit. c. 20.

DISTRINGAS, a writ directed to the ſheriff, or other officer, commanding him to diſtrain one for a debt to the king ; or for his appearance at a certain day. There is a *diſtringas* againſt peers, and perſons entitled to privilege of parliament, under ſtat. 10 Geo. III. c. 50 ; by which the effects (in law called the *iſſues*) levied may be ſold to pay the plaintiff's coſts, and it has been held that this ſtatute extends to all writs of *diſtringas*.

In detinue after judgment, the plaintiff may have a *diſtringas* to compel the defendant to deliver the goods by repeated diſtreſſes of his chattels. (1 Ro. Abr 737. Raſt. Entr. 215.) See Distress, Execution, Parliament, and Process.

Distringas *juratores*, a writ directed to a ſheriff, whereby he is commanded to diſtrain upon a jury to appear and to return iſſues on their lands, &c. for non-appearance. Where an iſſue in fact is joined to be tried by a jury, which is retained by the ſheriff in a panel upon a *venire facias* for that purpoſe ; there goes forth a writ of *diſtringas juratores* for the ſheriff to have their bodies in court, &c. at the return of the writ. (1 Lil. Abr. 483.) This writ ought to be delivered to the ſheriff in ſuch time, that he may warn the jury to appear four days before the writ is returnable, if the jurors live within 40 miles of the place of trial ; and eight days if they live farther off. (Id. 484.) There may be an *alias*, or *pluries diſtringas jur'*, where the jury doth not appear. See Jury, and Trial.

DISTURBANCE, a ſpecies of real injury, which is uſually a wrong done to ſome incorporeal hereditament, by hindering or diſquieting the owners in their regular and lawful enjoyment of it. (Finch. L. 187.) Of this injury there are five ſorts, *viz*. diſturbance of *franchiſes*, diſturbance of *common*, diſturbance of *ways*, diſturbance of *tenure*, and diſturbance of *patronage*.

Disturbance *of franchiſes* happens, when a man has the franchiſe of holding a court-leet, of keeping a fair or market, of free-warren, of taking toll, of ſeizing waifs or eſtrays, or (in ſhort) any other ſpecies of franchiſe whatſoever ; and he is diſturbed, or incommoded in the exerciſe of it. As if another by diſtreſs, menaces, or perſuaſions, prevails upon the ſuitors not to appear at any court ; or obſtructs the paſſage to any fair or market ; or hunts in my free-warren ; or refuſes to pay me the accuſtomed toll ; or hinders me from ſeiſing the waif or eſtray, whereby it eſcapes, or is carried out of my liberty :—in every caſe of this kind, there is an injury done to the legal owner : his property is damnified : and the profits ariſing from his franchiſe are diminiſhed. To remedy which, as the law has given no other writ, he is therefore entitled to ſue for damages by a ſpecial action *on the caſe* ; or, in caſe of toll, may take a diſtreſs, if he pleaſes. (Cro. Eliz. 558.)

Disturbance *of Common* is any act, by which the right of another to his common is incommoded, or diminiſhed. This may happen, where one, who hath no right of common, puts his cattle into the land ; and thus robs the cattle of the commoners of their reſpective ſhares of the paſture. Or, if one who hath a right of common, puts in cattle which are not commonable, as hogs and goats ; which amounts to the ſame inconvenience. But the lord of the ſoil may (by cuſtom, or preſcription, but not without) put a ſtranger's cattle into the common. (1 Roll. Abr. 396.) ; and alſo, by a like preſcription for common appurtenant, cattle that are not commonable may be put into the common. (Co. Lit. 122.) The lord of the ſoil may alſo juſtify making burrows in it, and putting in rabbits, ſo as that they do not increaſe to ſo large a number as totally to deſtroy the common. (Cro. Eliz. 876. Cro. Jac. 195. Lutw. 108.) But, in general, in caſe the beaſts of a ſtranger, or the uncommonable cattle of a commoner, be found upon the land, the lord, or any of the commoners, may diſtrain them damage-feaſant (9 Rep. 112) ; or the commoner may bring an action *on the caſe* to recover damages,

mages, provided that the injury done be conſiderable; ſo that he may lay his action with a *per quod*, or allege, that *thereby* he was deprived of his common. But for a trivial treſpaſs the commoner has no action; but the lord of the ſoil only, for the entry and treſpaſs committed. 9 Rep. 112.

Another diſturbance of common is by *ſurcharging* it; or putting more cattle in it than the paſture and herbage will ſuſtain, or the party hath a right to do. This injury by ſurcharging can, properly ſpeaking, only happen where the common is appendant, or appurtenant (ſee Common), and, of courſe, limitable by law; or where, when *in groſs*, it is expreſsly limited and certain; for where a man hath common *in groſs*, *ſans nombre*, or *without ſtint*, he cannot be a ſurcharger. However, in this latter caſe, there muſt be left ſufficient for the lord's own beaſts (1 Roll. Abr. 399.); for the law will not ſuppoſe that, at the original grant of the common, the lord meant to exclude himſelf.

The uſual remedies for ſurcharging the common are, either by diſtraining ſo many of the beaſts as are above the number allowed, or elſe by an action of treſpaſs; both which may be had by the lord; or, laſtly, by a ſpecial action on the caſe for damages, in which any commoner may be plaintiff. (Freem. 273.) But the ancient and moſt effectual method of proceeding is by writ of *admeaſurement* of *paſture*. See Admeasurement, Common, and Surcharge.

There is another diſturbance of common, when the owner of the land, or other perſon, ſo incloſes, or otherwiſe obſtructs it, that the commoner is precluded from enjoying the benefit, to which he is by law entitled. This may be done, either by erecting fences, or by driving the cattle off the land, or by ploughing up the ſoil of the common. (Cro. Eliz. 198.) Or it may be done, by erecting a warren in it, and ſtocking it with rabbits, in ſuch numbers, that they devour the whole herbage, and thus deſtroy the common. In this caſe, though the commoner may not deſtroy the rabbits, yet the law looks upon this as an injurious diſturbance of his right, and has given him his remedy by action againſt the owner. (Cro. Jac. 195.) This kind of diſturbance amounts to a diſſeiſin, and if the commoner chuſes ſo to conſider it, the law has given him an *aſſiſe* of *novel diſſeiſin*, againſt the lord, to recover the poſſeſſion of his common. (F. N. B. 179.) Or it has given a writ of *quod permittat*, againſt any ſtranger, as well as the owner of the land, in caſe of ſuch a diſturbance to the plaintiff as amounts to a total deprivation of his common; whereby the defendant ſhall be compelled to permit the plaintiff to enjoy his common as he ought. (Finch. L. 275. F. N. B. 123.) But if the commoner does not chuſe to bring a *real* action to recover ſeiſin, or to try the right, he may, (which is the eaſier and more uſual way,) bring an action on the caſe for his damages, inſtead of an *aſſiſe*, or a *quod permittat*. (Cro. Jac. 195.) There are caſes, indeed, in which the lord may incloſe and abridge the common; for which, as they are no injury to any one, ſo no one is intitled to any remedy. See Common *pur Cauſe de Vicinage*.

Disturbance *of Ways* is very ſimilar, in its nature, to the laſt, and principally happens, when a perſon, who hath a right to a way over another's grounds, by grant, or preſcription, is obſtructed by incloſures, or other obſtacles, or by ploughing acroſs it; by which means he cannot enjoy his right of way, or, at leaſt, not in ſo commodious a manner as he might have done. If this be a way annexed to his eſtate, and the obſtruction is made by the tenant of the land, this brings it to the ſpecies of injury, called *Nuſance*, which ſee. But if the right of way, thus obſtructed by the tenant, be only *in groſs*, (that is, annexed to a man's perſon, and unconnected with any lands or tenements,) or, if the obſtruction of a way belonging to an houſe or land is made by a ſtranger, it is then, in either caſe, merely a diſturbance; for the obſtruction of a way *in groſs* is no detriment to any lands, or tenements, and, therefore, does not fall under the legal notion of a nuſance, which muſt be laid *ad nocumentum liberi tenementi*, (F. N. B. 183.); and the obſtruction of it by a ſtranger can never tend to put the *right* of way in diſpute;—the remedy, therefore, for theſe diſturbances is not by aſſiſe, or any real action, but by the univerſal remedy of action on the caſe, to recover damages. Hale on F. N. B. 183. Lutw. 111. 119.

Disturbance *of Tenure*, is the breaking of that connection which ſubſiſts between the lord and his tenant, and to which the law pays ſo high a regard, that it will not ſuffer it to be wantonly diſſolved by the act of a third perſon. To have an eſtate well tenanted, is an advantage that every landlord muſt be very ſenſible of; and, therefore, the driving away of a tenant from off his eſtate is an injury of no ſmall conſequence. So that if there be a tenant at will of any lands or tenements, and a ſtranger, either by menaces and threats, or by unlawful diſtreſſes, or by fraud and circumvention, or other means, contrives to drive him away, or inveigle him to leave his tenancy, this the law very juſtly conſtrues to be a wrong and injury to the lord, (Hal. Anal. c. 40. 1 Roll. Abr. 108.), and gives him a reparation in damages againſt the offender by a ſpecial action on the caſe.

Disturbance *of patronage* is an hindrance or obſtruction of a patron to preſent his clerk to a benefice. This injury was diſtinguiſhed at common law from another ſpecies of injury, called *uſurpation*, which ſee. Diſturbers of a right of advowſon may be theſe three perſons; the pſeudo-patron, his clerk, and the ordinary: the pretended patron, by preſenting to a church to which he has no right, and thereby making it litigious or diſputable; the clerk, by demanding or obtaining inſtitution, which leads to and promotes the ſame inconvenience; and the ordinary, by refuſing to admit the real patron's clerk, or admitting the clerk of the pretender. Theſe diſturbances are vexatious and injurious to him who hath the right; and therefore, if he be not wanting to himſelf, the law (beſides the writ of right of advowſon, which is a final and concluſive remedy) hath given him two inferior poſſeſſory actions for his relief; an Assise of *darrein preſentment*, and a writ of Quare *impedit* (which ſee reſpectively), in which the patron is always the plaintiff, and not the clerk. For the law ſuppoſes the injury to be offered to him only, by obſtructing or refuſing the admiſſion of his nominee; and not to the clerk, who hath no right in him till inſtitution, and of courſe can ſuffer no injury. Beſides theſe poſſeſſory actions, there may be alſo had a writ of right of advowſon, which reſembles other writs of right: the only diſtinguiſhing advantage of which now is, that it is more concluſive than a *quare impedit*; ſince to an action of *quare impedit* a recovery had in a writ of right may be pleaded in bar. There is no limitation with regard to the time within which any actions reſpecting advowſons are to be brought; at leaſt none later than the times of Richard I. and Henry III.; for by ſtatute 1 Mar. ſt. 2. c. 5, the ſtatute of limitations, 32 Hen. VIII. c. 2, is declared not to extend to any writ of right of advowſon, *quare impedit*, or aſſiſe of *darrein preſentment*, or *jus patronatus*. And this upon very good reaſon; becauſe it may very eaſily happen, that the title to an advowſon may not come in queſtion, nor the right have an opportunity to be tried, within two years; which is the longeſt period of limitation aſſigned by the ſtatute of Henry VIII. In a writ of *quare impedit*, which is almoſt the only real action that remains in common uſe, and alſo in the aſſiſe of *darrein preſentment*, and writ of right, the patron only, and not the clerk, is allowed to ſue the diſturber. But, by virtue of ſeveral acts of parliament (ſtat. 3 Jac. I. c. 5. 1 W. & M. c. 16. 12 Ann. ſt. 2. c. 14. 11 Geo. II. c. 17.), there is one ſpecies of preſentations, in which a remedy, to be ſued in the temporal courts, is put into the hands of the clerks preſented, as well as of the owners of the advowſon: *i. e.* the preſentation to ſuch benefices, as belong to Roman catholic patrons; which, according to their ſeveral counties, are veſted in and ſecured to the two univerſities of this kingdom. And particularly by the ſtatute of 12 Ann. ſt. 2. c. 14. § 4. a new method of proceeding is provided, *viz.* that, beſides the writs of *quare impedit*, which the univerſities as patrons are entitled to bring, they, or their clerks, may be at liberty to file a bill in equity, againſt any perſon preſenting to ſuch livings, and diſturbing their right of patronage, or his *ceſtui que truſt*, or any other perſon whom they have cauſe to ſuſpect: in order to compel a diſcovery of any ſecret truſts, for the benefit of papiſts, in evaſion of thoſe laws whereby this right of advowſon is veſted in theſe learned bodies: and alſo (by the ſtat. 11 Geo. II. c. 17.) to compel a diſcovery whether any grant or conveyance, ſaid to be made of ſuch advowſon, were made *bonâ fide* to a proteſtant purchaſer, for the benefit of proteſtants, and for a full conſideration; without which requiſites every ſuch grant and conveyance of any advowſon or avoidance is abſolutely null and void. This is a particular law, and calculated for a particular purpoſe: but in no other inſtance does the common law permit the clerk himſelf to interfere in recovering a preſentation, of which he is afterwards to have the advantage. When the clerk is in full poſſeſſion of the benefice, the law gives him the ſame poſſeſſory remedies to recover his glebe, his rents, his tithes, and other eccleſiaſtical dues, by writ of entry, aſſiſe, ejectment, debt, or treſpaſs (as the caſe may happen) which it furniſhes to the owners of lay property. Yet he ſhall not have a writ of right, nor ſuch other ſimilar writs as are grounded upon the mere right; becauſe he hath not in him the entire fee and right (F. N. B. 49.); but he is entitled to a ſpecial remedy called a writ of Juris *utrum*, which ſee. Blackſt. Com. book iii.

DISTURBER, an appellation given by the law to a biſhop who refuſes or neglects to examine and admit the patron's clerk without good reaſon aſſigned, or notice given; and he ſhall not have any title to preſent by lapſe; for no man ſhall take advantage of his own wrong. (2 Roll. Abr. 369.) Alſo if the right of preſentation be litigious or conteſted, and an action be brought againſt the biſhop to try the title, no lapſe ſhall incur till the queſtion of right be decided. (Co. Litt. 344.) See Lapse.

DISVELOPED, in *Heraldry*, is uſed much in the ſame ſenſe with diſplayed. Thus colours, ſaid in an army to be flying, are, in heraldry, ſaid to be diſveloped.

DISUNITE, in the *Manege*, is uſed for a horſe that drags his haunches, that gallops falſe, or upon an ill foot. See Gallop.

DITCH, in *Agriculture*, ſignifies a trench or opening cut in the ground, moſtly round the fences of fields, in order to keep the hedge-plants free from ſtagnant moiſture, and at the ſame time prevent their being injured by cattle, &c. They are however ſometimes made large and wide, ſo as to form diviſion fences, and act as drains to the adjoining lands. See Fence.

Ditches are formed very differently in different ſituations, but the chief things to be conſidered in making of them, are the nature of the ſoil, and their being conſtructed ſo as to convey off the water as expeditiouſly as poſſible.

In caſes where the under-ſtratum or ſub-ſoil is of the ſpringy kind, and the land of the hilly ſort, it has been adviſed, in order to prevent the danger of the ſprings working through under the banks, and thereby letting down the faces of them, together with the layer of plants into the ditches, to make them in the direction of the hills, by which this inconvenience is in a great meaſure prevented.

In all low vale diſtricts, where the lands lie flat, the ditches ſhould be deep, wide, and kept conſtantly well cleaned out, as from ſuch ſituations being apt to be naturally too cold and moiſt, every poſſible endeavour ſhould be had recourſe to to free them from ſurface water, which Mr. Marſhall has well remarked, "if it ſtand only an hour upon the ſoil, or in immediate contact with it, adds more or leſs to its natural coldneſs."

The forming of theſe ſorts of ditches is too much neglected in many low parts of the kingdom, as the coarſe, rank, ruſhy herbage of the lands ſufficiently ſhews.

The earthy material which is collected in cleaning out many ditches of this nature, from its containing the putrid recrements of different animal and vegetable matters, is found to conſtitute, when mixed, by frequent turning over, with mild lime, and after this has been well blended, incorporating a little dung with the whole maſs, an excellent manure for all ſorts of light ſoils, either as a top-dreſſing or for being turned into them.

Ditch, or *Foſſé*, in the *Military Art*, is a very large excavation made for the purpoſe of preventing an enemy from approaching the walls of a fortified place; and eſpecially to obviate any attempts which might otherwiſe be made, to ſurpriſe by an eſcalade.

In many inſtances, the ditch ſurrounding the body of the place may be compared to a ſmall river; being from 25 to 50 yards in width, and uſually not leſs than eight or ten feet in depth. Where fortreſſes are built on the borders of large running waters, the ditch is uſually filled by their influx, through channels of maſonry, in which proper flood-gates, &c. are fixed, ſo as to let in the water at pleaſure.

Ditches may be either wet or dry: the former are beſt calculated for the prevention of a ſurpriſe, and of deſertion; but when the water is ſtagnant, the health of the garriſon may be conſiderably affected: add to this, that the revetement, or facing, of the ſcarp, and counterſcarp, are in general ſapped and weakened by too long a continuance of moiſture. Dry ditches ſhould be well turfed at the bottom, ſo as to afford a good paſture, and to prevent the ſoil from cracking, or being ſun-ſcorched. Theſe afford a more ready communication with the outworks than wet ditches; the latter requiring numerous bridge's, which may be deſtroyed by the ſhot from the beſiegers' batteries; occaſioning very ſerious inconvenience, and eventually ſubjecting the outworks to capture.

There is frequently a ſmall ditch made in the middle of the great *foſſé* which ſurrounds the body of the place: this is called the *cunette*, or *cuvette*; and for the moſt part may be taken at 15 feet in breadth, by ſix or eight in depth. This ſerves as the main channel, whereby the water let in at the ſluices is made to flow uniformly at every face or front; and being lined with maſonry built perpendicularly, forms a conſiderable check on all attempts to paſs the ditch by fording when the beſiegers have been able to draw off the main body of water therefrom. The *cunettes*, or minor ditches, rarely paſs in front of the curtains, being principally formed oppoſite the faces of the baſtions: they often contain large ſupplies of excellent fiſh; and in Aſia are ſometimes rendered, in a manner, impaſſable, owing to the number of alligators they contain, and which are maintained for the purpoſe of deterring the garriſon from deſertion, and from the clandeſtine acquirement of ſpirituous liquors. For further particulars regarding the dimenſions, uſes, defences, &c. of the ditch, we refer the reader to the head of FORTIFICATION; in which it will be found a prominent feature.

DITCH-*water*. See WATER.

DITCHING, in *Agriculture*, a term ſignifying the practice of forming hedge and ditch fences. It likewiſe implies the operation of making up or cleaning out theſe ſorts of fences.

DITFORT, in *Geography*, a town of Germany, in the circle of Upper Saxony, belonging to the abbey of Quedlingburg; 4 miles N. E. of it.

DITHMAR, or DIETHUMAR, in *Biography*, a German prelate and hiſtorian, was the ſon of Sigefrid, count of Saye, and born in the year 976. Having embraced the monaſtic life, he was made biſhop of Merſburg, by the emperor Henry II. in 1018; and he died in 1028, in high reputation for ſanctity. His Latin chronicle, containing, in ſeven books, the hiſtory of the emperors Henry I. Otho I. II. III. and Henry II. has been ſeveral times reprinted, and is accounted a faithful narrative. Moreri.

DITHMAR, JUSTUS-CHRISTOPHER, an eminent juriſt and antiquary, was born, in 1677, at Rottenburg in Heſſe, and after having diſtinguiſhed himſelf by his ſtudies under his father, who was ſchool maſter and miniſter in his native town, he removed to the univerſity of Marpurg, where he applied to theology and the oriental languages, and thence to Leyden. He afterwards travelled in Germany and Holland, as preceptor to one of the ſons of the preſident Van Danckelmann, and by the intereſt of that family he became profeſſor, firſt of hiſtory, and then of the law of nature, at Frankfort on the Oder, where he alſo delivered lectures on the management of the domains and public finances. He died at Frankfort in 1737. Some of the moſt important of his learned works, which are numerous, are "Gregorii VII. Pontif. Vita," 8vo.; "Hiſtoria Belli inter Imperium et Sacerdotium," 8vo.; "Delineatio Hiſtoriæ Brandenburgenſis," 4to.; "Chytræi Marchia Brandenb. ad noſtra tempora continuata," 8vo.; "C. Corn. Taciti Germania, cum perpetuo et pragmatico Commentario;" "Diſſert. de abdicatione regnorum, aliorumque dignitatum illuſtrium," 4to. "A Collection of Diſſertations on various ſubjects of public and natural law and hiſtory," 8vo.; and "An Introduction to Political Economy, with a catalogue of the beſt books on the ſubject," 8vo. which is a popular work in Germany, and uſed in ſeveral of the univerſities. Moreri.

DITHYRAMBIC, ſomething that relates to the dithyrambus. We ſay, a dithyrambic verſe, dithyrambic poet, dithyrambic heat, &c. A compound dithyrambic word, Mr. Dacier obſerves, has ſometimes its beauty and force. Some moderns call compoſitions which are in the taſte of an ode, only not diſtinguiſhed into ſtrophes, and conſiſting of all kinds of verſe indifferently, dithyrambic odes.

Dithyrambic poetry owes its birth to Greece, and the tranſports of wine. It ſavours ſtrongly of its original; as admitting of no rules, but the ſallies of a fiery imagination. And yet art is not quite excluded; but delicately applied to guide and reſtrain the dithyrambic impetuoſity, and only indulge it in flights that are pleaſing. In effect, what our poets ſay of the ode, is more true of the dithyrambic than of the ode, that its diſorder is an effect of art.

Dithyrambic poetry muſt have required dithyrambic melodies; and we are told that this Greek ſong, in honour of Bacchus, was ſung in the Phrygian mode, and partook of all the fire and joviality, which the god to whom it is addreſſed inſpires. Rouſſeau, with a Sardonic ſmile, ſays, "We muſt not talk with the modern literati on this ſubject, who are always ſo wiſe and guarded, who cry out againſt the riot and diſorder of dithyrambics. It is certainly very indecorous to get drunk, particularly in honour of a divinity; but I had rather be drunk myſelf than have no other proof of my wiſdom and ſobriety, than that which meaſures with cold and inſipid reaſon, the actions of a man inflamed with wine.

"Take love, and wine, from ſocial and convivial ſongs, and what remains but ſatire and politics? no great ſtimulants to good humour or good fellowſhip."

Dithyrambics and nomes were equally hymns ſung in honour of the gods. The nomes were for Apollo, as the dithyrambics were for Bacchus.

The abbé Vatry, in an excellent memoir on the origin and progreſs of tragedy, Mem. de Litt. tome xv. ſays, that all the etymologies of the term dithyrambic are ſo forced, that he is firmly of opinion the word is not Greek, and that both the name and thing were brought from Egypt with the worſhip of Bacchus; for the Greeks are by no means agreed concerning the perſon who firſt made them acquainted with Bacchus; ſome affirming it to have been Cecrops, ſome Melampus, and ſome Orpheus; but all unite in deriving the worſhip of this god from the Egyptians.

The learned Redi's dithyrambic poem, entitled "Bacco in Toſcano," is one of the moſt ſpirited and pleaſing productions in the Italian language; and the notes with which the author has illuſtrated his verſes, abound with learning, ſcience, and hiſtorical information.

DITHYRAMBUS, Διθυραμϐος, in the *Ancient Poetry*, a hymn in honour of Bacchus, full of tranſport, and poetical rage.

The meaſure, which is what diſtinguiſhes this kind of poetry, is ſaid to have been invented by Dithyrambus, a Theban; but Pindar attributes it to the Corinthians; and the modern etymologiſts furniſh us with another origin of the word.

In effect the verſe might be called thus from the god it was conſecrated to, who himſelf was named Dithyrambus; either on account of his having been brought twice into the world, according to the fable of Semele and Jupiter, or by reaſon of his having triumphed twice; from δὶς, *twice;* and θριαμϐος, *triumph.* Be this as it will, the ancients, we are told by Ariſtotle and Horace, gave the appellation dithyrambus to thoſe verſes wherein none of the common rules or meaſures were obſerved; much like thoſe called by the French vers libres, by the Italians verſi ſciolti, and by the modern Greeks politici, a name they gave to proſe, which theſe verſes reſemble more than poetry.

We have now no remains of the dithyrambi of the ancient poets, ſo that we cannot ſay preciſely what their meaſure was; all we know is, that it is very bold and irregular. The poets not only took the liberty to forge new words for the purpoſe, but they made double and compound words, which contributed very much to the magnificence of the dithyrambus.

Horace has ſometimes imitated them. Dacier, F. Commire, and ſome other modern writers, have compoſed Latin pieces of all kinds of verſe, indifferently, according as the ſubject and words preſented themſelves, without any order, or diſtribution into ſtrophes, and call them dithyrambi. See PINDARIC.

DITHONES, in *Ancient Geography*, a people of Illyria, in Dalmatia. Pliny.

DITKIRCHEN, in *Geography*, a town of Germany, in the circle of the Lower Rhine, in the electorate of Treves, on the Lahn; 17 miles W. of Wetzlar.

DITMANING, a ſmall town of Bavaria, with an old caſtle on the river Saltze.

DITMANSDORF, a town of Germany, in the archduchy of Auſtria; 2 miles S. of Schrattenſaal.

DITMARSH, or Ditmarsch, one of the ſubdiviſions of the duchy of Holſtein, belonging to Denmark, between the rivers Elbe and Eyder. Together with Holſtein Proper and Stormar, it was formerly called *Nordalbingia*, or Saxony beyond the Elbe. It is about 35 Engliſh miles long, and ſcarcely 20 broad.

This country was anciently under the government of the earls of Stade, who held it as a fief of the empire. Rudolphus, the laſt of theſe earls, having been murdered by the inhabitants of Ditmarſh, in 1144, the county of Stade devolved to Henry the Lion, duke of Saxony, who, in 1148, marched againſt the inſurgents, but having been put under the ban of the empire, it was only in 1180 that Hartwig, archbiſhop of Bremen, who took poſſeſſion of the county of Stade, reduced the rebels to obedience. They ſoon revolted again, and ſought the protection of Waldemar, biſhop of Sleſwick; after which they renewed their allegiance to the ſee of Bremen.

The earls of Holſtein frequently attacked Ditmarſh, but were never able to conquer the country. Chriſtian I. king of Denmark, received Ditmarſh from the emperor Frederick III. as a fief, to be incorporated with the duchy of Holſtein; but the inhabitants refuſed their allegiance, and applied to pope Sixtus IV., by whoſe decree they once more ſubmitted to the ſee of Bremen, in 1476.

In the year 1500, John, king of Denmark, waged an unſucceſsful war againſt Ditmarſh: but at length Frederick II. and the dukes John and Adolphus of Holſtein, conquered this country in 1559, and divided it among themſelves. In the year 1773, the whole province of Ditmarſh reverted to Denmark, by the exchange of the Weſtphalian counties of Oldenburg and Delmenhorſt.

Ditmarſh is divided into South and North Ditmarſh. The former conſiſts of Marſhland and Geeſtland. The Marſhland, or the Marches, extends along the banks of the Elbe, and is protected by ſtrong dikes and embankments. The ſoil, which has been gained from the ſea, is uncommonly fertile, and is called koog or kog. The dikes are nineteen feet high, and under the immediate inſpection of government. They are kept at a very great expence. In the year 1634, the water ruſhed through the dikes, and ſwept away whole villages, with their churches, mills, cattle, and ſheep. Fifteen hundred individuals periſhed in this inundation. The Marſhland has ſeven pariſhes; its two principal places are the towns of Meldorf and Brunſbüttel, which has a ferry over the Elbe, not far from Hamburg.

The Geeſtland is the higher part of South Ditmarſh, on the ſhore of the Baltic. It has five pariſhes. Its moſt remarkable place is Hemmingſtedt, where the inhabitants of Ditmarſh gained that ſignal victory over the Danes, in which they took the famous Daniſh banner, called the Dannebrog.

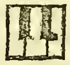
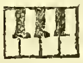
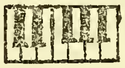
North Ditmarſh counts nine pariſhes. Its principal towns are Lunden and Heyde.

DITOMBIO, a river of Piedmont, which riſes two miles N. E. from Orta, paſſes through the Novareſe, and divides into two rivers, the Albona and the Gogna.

DITONE, Ditonum, in *Muſic*, an interval comprehending two tones, a greater and a leſs. See Interval, and Tone.

The word is formed of δις, *twice*, and τονος, *tone*.

The ratio of the ſounds that form the ditone is of 4 to 5, or $\frac{4}{5} = 197\,\Sigma + 4f + 17\,m$, which is the *major third:* and that of the ſemi-ditone, of 5 to 6. F. Parran makes the ditone the fourth kind of ſimple concords: others make it the firſt diſcord, dividing the ditone into eighteen equal parts, or commas, the nine on the acute ſide go to the greater tone. Salomon de Caux.

Dr. Callcot, in his "Plain Statement of Earl Stanhope's Temperament," has applied this term to the five lower keys of each ſeptave (or octave) of the clavier, or range of finger keys on harpſichords, piano-fortes, organs, &c.; the ditone is , and the tritone , which, together, make up the ſeptave, or . See Septave and Finger-*Key*.

Ditone, *Greateſt*, is an interval whoſe ratio is $\frac{64}{81}$, $= 208\,\Sigma + 4f + 18\,m$, which is the diſſonant major third of Galileo, and alſo the comma-redundant major third, which ſee.

Ditone, *Leaſt*, is an interval whoſe ratio is $\frac{81}{100}$, $= 186\,\Sigma + 4f + 16\,m$, which is the comma-deficient major third, which ſee.

DITONICO, Diatonic, according to Zarſino, is the pure and natural diatonic genus, or the diatonic of Didymus; in which not one of the ſounds is in the leaſt altered; ſuch is the plain chant of the church. But the genus diatonum ditonicum of Ptolemy, which coincides with the diatonic of Pythagoras, and reſults from that diviſion of a monochord bearing the name of Euclid's ſection of the canon, is expreſſed by $\frac{256}{243} \times \frac{9}{8} \times \frac{9}{8} = \frac{4}{3}$. But theſe ancient ſyſtems have been juſtly laid aſide ſince the invention of a temperament, as being unfit for the execution of muſical compoſitions in ſeveral parts. Smith's Harmon. p. 33.

DITONICUM, Diatonum. See Genus.

DITRIGLYPH, in *Architecture*, the ſpace between two triglyphs. Se Triglyph.

DITRIHEDRIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek δις, *twice*, τρεις, *three*, and ἑδρα, a *ſide* or *plane*. The bodies of this genus are ſpars compoſed of twice three planes, being formed of two trigonal pyramids joined baſe to baſe, without the intervention of any intermediate column. Of this genus there are five known ſpecies: 1. One with long and pointed pyramids, found in the mines of Cornwall, and ſome other parts of England. 2. One with long and broad pyramids, found looſe in the fiſſures of the alabaſter quarries of Blanckenberg, in Germany. 3. One with ſhort and broad pyramids, found in the mines of Rammelſberg. 4. One with extremely broad depreſſed pyramids, found in the alabaſter quarries at Blanckenberg, and ſometimes in the mines of Goſſelaer, in Saxony. 5. One with ſhort, but ſharp-pointed pyramids, found very frequently in the mines of the Harte Foreſt, and ſometimes on Mendip Hills with us. Hill's Foſſils, p. 218.

DITTANDER, in *Botany*. See Lepidium.

DITTANI, in *Ancient Geography*, a people of Spain, in the Tarragoneſe territory, placed by Strabo on mount Oroſpeda. They were a colony of Celts.

DITTANY, in *Botany*. See Origanum.

Dittany, *Baſtard*. See Marrubium.

Dittany, *White*. See Dictamnus.

DITTEAH, in *Geography*, a town of Hindooſtan, in the province of Bundelcund, in length above 1½ mile, and nearly as much in breadth; populous and well built; the houſes being of ſtone, and covered with tiles. It is ſurrounded by a ſtone wall, and furniſhed with gates. At the N. W. extremity is a large building, with one large and ſix ſmaller cupolas, formerly the reſidence of the rajah; but the preſent rajah has built a palace for himſelf, ſeated on an eminence without the town, on the S. E. ſide, and commanding a view of the country. Cloſe to this hill is a pretty extenſive lake. The inhabitants are robuſt and handſome, and preſent the appearance of opulence and content; but they bear the character of a warlike people. The diſtrict yields a revenue of nine or ten lacks of rupees annually, ſubject to the payment of a tribute to the Mahrattas, the amount of which varies with their power to exact it. Aſ. Reſearches, vol. vi. p. 22.

DITTERBACH, a town of Bohemia, in the circle of Chrudim; ſeven miles S. E. of Politzka.

DITTERS, Charles, in *Biography*, the favourite, ſays Gerber, of the German nation, was born in 1730. He began his career as a muſician by the violin, as a performer on which inſtrument he was admitted into the imperial chapel at Vienna; and when he followed the emperor Joſeph to Frankfort, on his election of king of the Romans, he eclipſed all his rivals. At that time he bore his family name of Ditters; but in 1770, the emperor, as a reward for his merit and talents, elevated him to the rank of nobility by the title of Ditterſdorf, and at the ſame time appointed him ranger of the foreſts in his Sileſian domains. On his arrival in Sileſia, the prince biſhop of Breſlau nominated him director of his chapel, or choral band, and from that time he reſided alternately in Sileſia and Vienna. In 1792, he lived in a ſplendid manner on his own property in Auſtria, which was very conſiderable.

In 1772, we heard his muſic performed at Vienna among the beſt compoſers of that period; and at Bruſſels his ſymphonies were in the higheſt favour at this time, and performed under the direction of that admirable director of the band, M. Fitzthumb, which we heard with very great pleaſure. Few of Haydn's ſymphonies were then known, and Vanhal and Ditters were at the head of German ſymphoniſts.

Of the works of Ditters, which are uncommonly numerous and excellent, not more than eight or ten have been printed. And theſe were not choſen for their ſuperior merit, but becauſe copies had been more eaſily obtained by the editors. The fifteen ſymphonies, compoſed from his feelings on reading the metamorphoſes of Ovid, are to be excepted; for theſe he not only led with univerſal applauſe at Vienna, but alſo by general intreaty, attended himſelf to their publication. In 1780, a new ſource of applauſe was opened to him by ſetting words to muſic. The oratorio of Eſther, "O ſia la Liberatrice del popolo Giudaico nella Percia," compoſed by him, was performed for the benefit of the widows and families of muſicians. But his moſt admired German work "Der Doctor und der Apotheker," was performed in the Vienna theatre, in 1786. Two years after this, he ſet and publiſhed, at Vienna, three other operas.

DITTLEMEN, in *Geography*, a town of Pruſſia; 3 miles S. of Inſterburg.

DITTO, in *Books of Accounts*, written contractedly D°. ſignifies *the ſame*, viz. as the preceding article.

The word is corrupted from the Italian *detto*, the ſaid; as in our law phraſe "the ſaid premiſes," meaning the ſame as were aforementioned.

DITTON, Humphrey, in *Biography*, an excellent mathematician, was born at Saliſbury in the year 1675. His father was a zealous non-conformiſt, but ſufficiently candid and liberal to acknowledge merit wherever it might be found, and accordingly placed the ſon under the care of a clergyman of the eſtabliſhment, with whom he continued till he was of an age to enter upon ſome profeſſion. At this period he undertook the charge of a diſſenting congregation at Tunbridge in Kent, which he continued to ſerve ſeveral years, till he found the labour more than equal to his ſtrength. He then reſigned the office of preacher, and, at the advice of Dr. Harris and Mr. Whiſton, devoted himſelf entirely to mathematical purſuits. In this line he ſoon acquired diſtinction, and was enabled to enrol among his friends the firſt men of the age, among whom was ſir Iſaac Newton. By the intereſt and recommendation of this able man, Mr. Ditton was elected maſter of the mathematical ſchool in Chriſt's hoſpital, the duties of which he continued to perform till his death, which happened in the year 1675, before he had ſcarcely attained to the meridian of life. His works are numerous, chiefly on mathematical ſubjects; the moſt important was his treatiſe on "Fluxions," which was publiſhed in 1706, and reprinted twenty years afterwards with additions and alterations by Mr. John Clarke. His work on "The General Laws of Nature and Motion," was highly applauded by men of the firſt eminence in ſcience and literature: it was deemed a capital introduction to the writings of Galileo, Huygens, and ſir Iſaac Newton. As a divine, Mr. Ditton is known by "A Diſcourſe on the Reſurrection of Jeſus Chriſt," which has been ſeveral times printed, and has been tranſlated into foreign languages. In conjunction with Mr. Whiſton, he laid before the commiſſioners of the board of longitude a method for the diſcovery of that difficult problem, which, being rejected, was the cauſe of ſo much uneaſineſs and chagrin, as probably to haſten his end. Dr. Kippis, in ſpeaking of the treatiſe on the reſurrection, calls it a "work of great value. According to the faſhion of the times, it is written in the mathematical form, which, perhaps, gives it too abſtract an appearance, but it would well reward a diligent peruſal: as is the caſe with many other good books, the memory of it is almoſt overwhelmed by the ſucceſſion of new publications. A perſon who ſhould apply himſelf to the ſtudy of the logic of probabilities, would find his account in reading Mr. Ditton's performance." Biog. Brit.

DITTY, a poem, a ſong. This word, probably, is derived from *ditie*, Fr. and the French from *dictum*, Lat. a ſaying, a ſentence, and not from *dicht*, Dutch.

In old French it implied an epiſtle: "Lectio Epiſtolæ beati Pauli Apoſtoli ad Titum; Saint Paus envoie cheſt ditie." Shakeſpear, Milton, and Dryden have repeatedly given reſpect and importance to this word.

> Being young, I framed to the harp
> Many an Engliſh ditty lovely well,
> And gave the tongue a helpful ornament. Hen. IV.
>
> Mean while the rural ditties were not mute,
> Temper'd to the oaten flute;
> Rough ſatyrs danc'd. Milton.

They will be ſighing and ſinging under thy inexorable windows lamentable ditties, and call thee cruel. Dryden.

DIU, in *Geography*, an iſland in the Indian ſea, near the ſouth coaſt of the country of Guzerat, and not far W. from the entrance of the gulf of Cambaya, about three miles long and one broad, with a town of the ſame name, that has a good harbour, ſubject to the Portugueſe. The town is ſmall, but well built and fortified; and in the period of the proſperity of the Portugueſe, and before Cambaya and Surat attained to reputation, it was a place of great trade, and the port was always full of ſhips. N. lat. 20° 45.′ E. long. 70° 5′.

Diu *Point*, a cape of Hindooſtan, on the ſouth coaſt of Guzerat. N. lat. 20° 43′. E. long. 69° 52′ 15.″

DIVAL, in *Heraldry*, the herb-*night-ſhade*, a plant with poiſonous berries, looking like black cherries, uſed by ſuch as blazon with flowers and herbs inſtead of colours and metals, for ſable, or black. See Sable.

DIVALIA, in *Antiquity*, a feaſt held among the ancient Romans on the twenty-firſt day of December, in honour of the goddeſs Angerona; whence it is alſo called *Angeronalia*.

On the day of this feaſt, the pontifices performed ſacrifice in the temple of Voluptia, or the goddeſs of joy and pleaſure, who, ſome ſay, was the ſame with Angerona; and ſuppoſed to drive away all the ſorrows and chagrins of life.

DIVAN, a council-chamber, or court, wherein juſtice is adminiſtered, in the eaſtern nations, particularly among the Turks.

Divan is an Arabic word, ſignifying the ſame with ſopha in the Turkiſh dialect.

There are two ſorts of divans, that of the grand ſignior, called the council of ſtate, which conſiſts of ſeven of the principal officers of the empire. The grand ſignior never gives audience to ambaſſadors, except on Tueſday, on which day the divan is aſſembled:—this council is held on the ground floor of a ſquare tower, which bears the ſame name. The vizir, the great judges of Europe and Aſia, the grand treaſurer, &c. &c. ſit on benches round the hall; and above the ſeat of the vizir, facing the entrance, is a little window, grated, and raiſed about nine or ten feet, from which the grand ſignior may hear all that paſſes; but where he cannot, as they wiſh to have it believed, either be aſſaſſinated, or aſſaſſinate. The other divan is that of the grand vizir, formerly compoſed of ſix ordinary vizirs, or pachas with three tails, whoſe reputation for wiſdom was not to be equivocal. The vizir aſked their opinion when he thought it neceſſary. To this council were likewiſe admitted the mufti and the two kodileſkers, when the law was to be conſulted. Selim, however, ſoon after his acceſſion to the throne, compoſed this council of twelve perſons, the moſt diſtinguiſhed by their office. The vizir and the mufti are preſidents of it: the one in his quality of lieutenant-general of the empire for temporal affairs: the other as vicar of the ſultan for the interpretation and depoſitary of the laws. The other ten members are the *kiaya bey*, the *reis-effendi*, the *teſterdar-effendi*, the *tehélébi-effendi*, the *terſana-émini*, the *tchiaoux-bachi*, the two *ex-reis-effendi*, and two *ex-teſterdars-effendi:* which ſee reſpectively. The captain-pacha and the kiaya of the ſultana-validai are called to the extraordinary councils; and although they are not ordinary members of the council, they are conſulted, and both of them have the greateſt influence in the deliberations, on account of the intereſt which the former preſerves with Selim, and from that which the latter has obtained with the ſultana mother.

This council, unfortunately compoſed of members that are mutual enemies, jealous of each other, and more occupied about their own intereſts than the happineſs of the ſtate, has been very far from accompliſhing the intentions of Selim. Since its creation, the ſtate of affairs has daily become worſe; the empire is menaced with a total diſſolution; the finances are exhauſted; and the danger which threatened the government has actually occurred. See Turkey.

The divan at Aleppo is compoſed of the baſhaw or pacha, Mohaſil or Difter-dar (tefterdar), Cady, Mufti, Nakeeb, and Sarda, or aga of the Janizaries, who, by their office, are members of this council; and beſides theſe it conſiſts of the principal effendis and agas, together with the ſhahbinder, or head of the merchants. The divan is aſſembled as often as emergencies require; a ſummons being carried to each member by the baſhaw's chauſes, who are inferior officers, carrying a ſhort ſtick ornamented with ſilver, and employed in attendance at the gate of the ſeraglio for carrying meſſages, &c.: but this council regularly meets every Friday at the ſeraglio. The effendis rendezvous firſt at the Mahkamy or great tribunal, whence they ride in proceſſion with the Cady. Buſineſs relating to the city and all parts of the province is tranſacted in the divan; the baſhaw always affecting to be deſirous of obtaining exact information. After the breaking up of the Friday's divan, the baſhaw uſually goes in ſtate to the moſque, attended by moſt of the members.

The word is alſo uſed for a hall, in the private houſes of the orientals. The cuſtom of China does not allow the receiving of viſits in the inner parts of the houſe, but only at the entry, in a divan contrived on purpoſe for ceremonies. Le Compte.

The divan among the Turks is a common appellation for an apartment in the ſeraglio, which is neatly fitted up, and ſerves for the reception of company, for occaſional lodging and repoſe, or for the conducting of public buſineſs. (See Seraglio.) All the houſes of the Turks of middle rank at Aleppo have a divan, with a little garden or fountain before it.

Divan-Beghi, the appellation of one of the miniſters of ſtate in Perſia.

The divan-beghi is the ſuperintendant of juſtice; his place is the laſt of the ſix miniſters of the ſecond rank, who are all under the athemadaulet, or firſt miniſter.

To the tribunal of the divan beghi appeals lie from ſentences paſſed by the governors. He has a fixed ſtipend, or appointment, of 50,000 crowns, that he may render juſtice *gratis*. All the ſerjeants, uſhers, &c. of the court, are in the ſervice of the divan-beghi. He takes cognizance of the criminal cauſes of the chams, governors, and other great lords of Perſia, when accuſed of any fault, and receives appeals from the daruga.

There are divan-beghis not only at court, and in the capital, but alſo in the provinces, and other cities of the empire.

This officer is not confined by any other law or rule, in the adminiſtration of juſtice, but the Alcoran, which alſo he interprets at pleaſure. He takes no cognizance in civil cauſes.

DIVANDUROU, in *Geography*, the name of five ſmall iſlands in the Indian ſea, near the Maldives.

DIVE, a river of France, in the department of the Vienne. It has its ſource near La Grimaudiére, paſſes by Moncontour, Baſoueil, and falls into the river Thoué, below Saint Juſt, in the department of Mayenne and Loire. Its inundations deprive agriculture of 50,000 arpens of excellent ſoil. A canal has been commenced to drain this land; it is to extend from the mouth of the Dive to Saumur, a length of nine miles, or 15 kiliometres, and will facilitate the tranſport of proviſions to Nantes.—Alſo, a river of France, in the department of Calvados, which has its ſource in the ſouth in the department of the Orne, flows almoſt due north, and after having received the waters of the Oudon, Faiſon, and La Vie, falls into the Engliſh channel near the town of Dives.

DIVER, in *Ornithology*. Several kinds of water-fowl are known by this name in different parts of England, as for example, the Mergus minutus is called the lough diver; and the Alca Alce, the ſmall black and white diver. A number of the Colymbus genus are alſo called divers by Engliſh writers.

DIVERBIA, *Lat.* a term in the Roman drama, implying the different ſpecies of cantilena uſed by the interlocutors on the ſtage.

The Greek dramas conſiſted of ſoliloquy, dialogue, and chorus; but as the chorus was never adopted in the Latin comedy, it has been imagined, that ſuch cantica, or ſoliloquies, as were full of ſentiment and paſſion, had a different, more elaborate, and refined melody and accompaniment ſet to them than the diverbia, or dialogues; and that, like the chorus of the Greek tragedy, they ſerved as interludes, or act tunes. But we have been able to meet with no ſatisfactory proof of theſe cantica, or ſongs being a part of the piece, like the Greek chorus: for though Flaccus is mentioned as compoſer of the modes or melodies, to which all the ſix comedies of Terence were ſung, no notice is taken of a different muſic for the cantica, or even interludes, if ſuch there were, uſed betweeen the acts. Some of the ſoliloquies in Terence ſeem too ſhort and trivial to be ſung to different muſic from the diverbia; and others, that are longer and more ſentimental, have no diſtinction of verſification, like the odes or choruſes of Greek tragedy, to point them out as cantica; but are all in the ſame free Iambic verſe as the diverbia.

Donatus, who flouriſhed three hundred and fifty years after Chriſt, tells us, indeed, that "though the dialogues were ſpoken, the cantica were ſet to muſic, not by the poet, but by an able compoſer." "Diverbia hiſtriones pronuntiabat: cantica verò temperabant modis, non à poetâ, ſed à perito artis muſices factis." Scholia in Terent. We ſhould therefore rather imagine that theſe cantica of the Latin comedy were real intermezzi, or interludes, wholly detached from the piece, and, perhaps, not only the productions of a different compoſer, but of a different poet. That the Tibicines exhibited between the acts ſeems evident from a paſſage in Plautus, who makes one of his characters ſay at the concluſion of the firſt act of the Pſeudolus, I muſt go in: "Tibicen vos interea hic delectaverit."

The melody of ancient declamation being then only a ſpecies of recitative, could receive nothing but a poetical rhythm, far leſs exact than one ſtrictly muſical; exact, indeed, as to long and ſhort ſyllables, but as it approached nearer to common ſpeech than air, ſo it muſt have been more lax and incommenſurate as to time, than meaſured melody, ſuch as conſtitutes air at preſent. Long and ſhort ſyllables are rigourouſly attended to in modern recitative, the words are ſtrongly accentuated, and yet the muſical meaſure, or time, is never attended to, or beaten.

M. de Voltaire, ſo much attached to the ancient drama, and ſo little to modern muſic, ſays, we can no where find ſuch an exact reſemblance of the Greek ſtage, as in the Italian opera. "The Italian recitative is preciſely the melopoeia of the ancients; and though this recitative is tireſome in ill written pieces, yet it is admirable in good ones; and the choruſes in ſome of them, which are interwoven in the ſubject, reſemble the ancient chorus ſo much the more, as they were ſet to a different kind of muſic from the recitative; for the ſtrophe, epode, and antiſtrophe, were ſung by the Greeks quite differently from the melopoeia of the reſt of the play."

"I know," continues M. de Voltaire, "that theſe tragedies, ſo bewitching by the charms of the muſic, and magnificence of the decorations, have a defect which the Greeks always avoided; a defect which has transformed the moſt beautiful, and, in other reſpects, the moſt regular tragedies that ever were written, into monſters: for what can be more abſurd than to terminate every ſcene by one of thoſe detached airs, which interrupt the buſineſs, and deſtroy the intereſt of the drama, in order to afford an opportunity to an effeminate throat to ſhine in trills and diviſions, at the expence of poetry and good ſenſe." Diſſert. ſur la Tragedie Ancienne et Moderne.

The laſt period of this quotation proves the impoſſibility of ſatisfying all parties in theatrical diſputes; for thoſe very airs which are ſo delightful to lovers of muſic, and which alone render an opera ſupportable to them, are regarded by the excluſive lovers of poetry as the only blemiſhes in this kind of drama, which render it inferior to the Greek. However, notwithſtanding the acknowledged merit of particular ſcenes of recitative in an opera, we are inclined to believe, if the airs were omitted, that the rendering this kind of ſpectacle more Grecian, would neither increaſe the number of its admirers, nor enrich the managers of the theatre.

DIVERGENCY. For the point of divergency or divergence in *Optics*, ſee *Virtual* Focus.

Divergency *of Tune*, in *Muſic*. M. Huygens and M. Sauveur long ago obſerved, that no voice or perfect inſtrument can always proceed or leap from one note to another by perfect intervals, without erring from the pitch at firſt aſſumed, and hence it is, that temperaments in the melody are unavoidable, where perfect harmony between the parts of a concert are attained, as Mr. Farey has obſerved (Philoſophical Magazine, vol. xxvii. p. 314). Mr. Maxwell, in his "Eſſay on Tune," has well conſidered this kind of diſagreement, between the intervals in muſic, which render them unfit or incompetent, to the performance of perfect melody and perfect harmony at the ſame time, and has denominated the effect which ariſes from endeavouring to perform certain melodies without falſe or tempered intervals, in varying the pitch, as above obſerved, the divergency of tune. See Harmony, and Temperament.

Divergency *of Meridians*, in *Geographical Surveying*. In proceeding from either pole of the earth towards the equator, the meridians will be found to diverge from each other, and on proceeding the contrary way, to coverge, the law of which has been conſidered under the article Convergency *of Meridians*, which ſee.

DIVERGENT, or Diverging *lines*, in *Geometry*, are ſuch whoſe diſtance is continually increaſing.

Lines which converge one way, diverge the oppoſite way.

Divergent, or Diverging, in *Optics*, is particularly applied to rays, which, iſſuing from a radiant point, or having in their paſſage undergone a refraction, or reflection, do continually recede farther from each other.

In which ſenſe the word is oppoſed to convergent, which implies the rays to approach each other; or to tend to a centre, where being arrived, they interſect; and, if continued farther, become diverging.

Concave glaſſes render the rays diverging; and convex ones, converging.

Concave mirrors make the rays converge; and convex ones, diverge. See Focus.

It is demonſtrated, in *Optics*, that as a diameter of a pretty large pupil does not exceed $\frac{1}{5}$th of a digit; diverging rays, flowing from a radiant point, will enter the pupil parallel, to all intents and purpoſes, if the diſtance of the radiant from the eye be 40,000 feet. See Light and Vision.

Diverging *hyperbola*, is one whoſe legs turn their convexities towards one another, and run towards quite contrary ways.

DIVERSIFYING, in *Rhetoric,* is of infinite ſervice to the orator; it is an accompliſhment eſſential to his character, and may fitly be called the ſubject of all his tropes and figures. Voſſius lays down ſix ways of diverſifying a ſubject. 1. By enlarging on what was briefly mentioned before. 2. By a conciſe enumeration of what had been inſiſted on at length. 3. By adding ſomething new to what is repeated. 4. By repeating only the principal heads of what had been ſaid. 5. By tranſpoſing the words and periods. 6. By imitating them. Voſſ. Rhet. lib. v. p. 281, & ſeq.

DIVERSION, in *Medicine,* the turning of the courſe or flux of humours from one part to another, by proper applications.

Diversion, amongſt *Military Men,* means the drawing off the enemy's attention, or cauſing him to weaken ſome particular point, on account of either a real, or a feigned, attack upon ſome remote part. When an army is unable to cope with another in the field, and retires behind intrenchments, or into fortified places, another army, though comparatively ſmall, attacking ſome weak point in the enemy's rear, thereby cauſing him to forego any advantage he might have gained, or inducing him to detach a portion of his force, will generally be productive of excellent effects. Diverſions are, for the moſt part, held in terrorem over ſuch coaſts as are but weakly guarded, but from which the enemy would willingly ſend reinforcements to ſome other part; or eventually commence operations againſt ſome neighbouring ſtate. Therefore, when an army either collects in ſuch a ſituation as ſhould enable it to ſeize the opportunity afforded by the enemy's withdrawing his troops; or where an army, being embarked, hovers along a coaſt, ſo as to keep him in a conſtant ſuſpence, the greateſt aid is given: it is evident, that in the latter caſe, the enemy muſt confine himſelf entirely to a defenſive ſyſtem, in lieu of quitting the coaſt to reinforce any other point. To illuſtrate this more fully, let us ſuppoſe that an army were marching from Italy to join the French in an attack upon Spain: a few thouſand men kept hovering in tranſports along the coaſt of Italy muſt neceſſarily prevent the intended co-operation; becauſe, whenever an opportunity might offer, the tranſports would diſcharge their troops; and, if circumſtances ſhould admit, would proceed for reinforcements; or probably pretend to attack, or to watch ſome other point: thus would a real and a feigned attack be carried on, in two different places, at nearly the ſame time; diſtracting and haraſſing the enemy ſo effectually as to make an effectual diverſion in favour of ſome diſtant army.

DIVERSITY. This differs from diſtinction in this, that the latter is the work of the mind; but the former is, in things themſelves, antecedent to the operation of the mind. For things that are ſeveral, are different; even though I do not conceive them. See Distinction.

The diverſity, or difference of things, therefore, ariſes from their eſſential attributes. See Identity.

Diversity, in *Painting,* conſiſts in giving every part or figure in a picture its proper air and attitude. The ſkilful painter has the penetration to diſcern the characters of nature, which vary in all men; whence the countenances and geſtures of the perſons he paints continually vary.

Diversity *of perſon, plea of,* in *Law.* See Reprieve.

DIVERTICULUM, in *Anatomy,* a luſus naturæ or preternatural formation occurring in the ſmall inteſtine. It conſiſts of a piece of gut, ſeldom exceeding three inches in length, having the ſame ſtructure and ſize as the reſt of the tube, opening by one end into the inteſtinal canal, which it joins at right angles, and terminating in a cloſed or blind extremity at the oppoſite end, which is looſe in the abdominal cavity. That theſe diverticula are a natural formation, and do not conſiſt of any morbid extenſion of the coats of the inteſtine, is proved by their being formed of the ſame tunics as the reſt of the canal. They cannot cauſe any ill conſequence. When protruded in a hernia, they might mortify and even ſeparate in a piece of an inch or two long, without affecting the paſſage of the fœces per anum. They have been ſeen in the large inteſtine, but are much more rare in that ſituation. Repreſentations may be ſeen in Ruyſch Theſ. Anat. ſeptimus, tab. 4; and Sandifort Muſeum Anat. Acad. Lugdun. Bat. tab. 107.

Diverticulum Nuckii; the opening through which the round ligament of the uterus paſſes. Nuck ſtates that the peritoneum forms a ſmall canal here in the female, bearing an analogy to the tunica vaginalis of the male, and this is the part called diverticulum Nuckii. We do not conſider this to be the common ſtructure; but there is ſometimes a ſmall and ſhort canal of peritoneum over the paſſage of the round ligament, even in the adult ſubject.

DIVERTISSEMENT, Fr. *Entertainment,* Engl. In the former it implies ſinging and dancing. With us the term is generally applied to pantomime, as a pantomime entertainment. But often at benefits, where all the theatrical attractions poſſible are thrown out to excite curioſity, entertainments of ſinging are frequently promiſed in the bills and advertiſements, without ſpecification.

DIVES, in *Geography,* a ſmall town of France, in the department of Calvados, near the mouth of the river Dive; 12 miles N. E. of Caen. It is the chief place of a canton, in the diſtrict of Pont l'Evêque, with only 410 inhabitants: but the canton contains 33 communes, and a population of 9888 individuals, on a territorial extent of 170 kiliometres. Dives muſt not be confounded with another town in the ſame department, called St. Pierre ſur Dive, which ſee.

DIVESTING, properly ſignifies undreſſing, or ſtripping off one's garment, in contradiſtinction from inveſting.

In law, it is uſed for the act of ſurrendering, or relinquiſhing one's effects. By a contract of donation, or ſale, the donor, or ſeller, is ſaid to be diſſeiſed and diveſted of his property in ſuch a commodity, and the donee, or purchaſer, becomes inveſted therewith. See Investiture.

A demiſe is a general diveſtiture, which the fathers and mothers make of all their effects, in favour of their children.

DIVIDEND, in *Arithmetic,* the number given to be divided; or that whereof the diviſion is made.

The dividend muſt always be greater than the diviſor. The dividend contains the diviſor as many times as the quotient contains unit.

Dividend *of a bankrupt's eſtate,* is that part which is diſtributed to every creditor in proportion to his debt. See Bankrupt.

Dividend, in the *Exchequer,* is one part of an indenture. 10 Ed. I. c. 11.

Dividend, in *Law,* is uſed for a dividing of fees in perquiſites between officers of courts, ariſing from writs, &c.

Dividend, in *Commerce,* the diſtribution of the profits of a ſociety or joint-ſtock company, to the members thereof, according to their reſpective ſhares in the concern. The diviſion is moſt commonly made at ſtated periods, yearly or half-yearly, and is occaſionally raiſed or reduced according to the gains or loſſes during the preceding period. The rate, at which it is to be made, is uſually determined by a general meeting of the proprietors or ſhare-holders, the reſolution, or vote of ſuch general meeting, being the authority on which orders of payment, addreſſed to the treaſurer, or ſome other officer of the company, and called dividend warrants, are iſſued to the reſpective proprietors.

In moſt public companies, the general court, or meeting of proprietors, is at liberty to declare whatever dividend they think proper; in ſome, as the Eaſt India company, the dividend cannot be increaſed, except on certain conditions; and in others, as the London and Weſt India Dock companies, the dividend is reſtricted to not exceed a certain rate *per cent. per ann.*

Dividend warrants are uſually payable on demand, and as they contain an acknowledgment of receiving the ſum expreſſed, they are liable to the ſtamp duties on receipts.

Dividend *of the public funds,* the annual intereſt paid by government to the proprietors of the public debts. The funds being properly the revenues on which the intereſt of the public debts is charged, the diviſion of the reſpective ſhares thereof to the public creditors, came to be conſidered in the ſame light, as the diviſion of the profits of public companies to their ſtockholders; both were annual payments for money advanced; and when the intereſt on the public debts was made payable at the bank of England, the mode of payment being exactly ſimilar to the payment of the dividends on bank ſtock, the order of payment was called a dividend warrant, and the intereſt ſpecified therein, became commonly denominated the dividend.

The dividends on the public funds were formerly paid quarterly at the exchequer, but they are now, with the exception of a few life annuities, all paid half yearly at the bank of England, and the South ſea houſe, the money being tranſmitted from the exchequer for this purpoſe, a few days before the dividends become due. Part of the dividends become due on the 5th January and 5th July; the others on 5th April and 10th October, and they are uſually in courſe of payment, in about a week from thoſe days. For ſome time previous to the days of payment, the transfer books are ſhut, in order to make out the dividend warrants, which being filled up in the name the ſtock ſtood in, when the books ſhut, are, of courſe, only payable to that perſon, or his attorney. At the bank of England, the dividends are paid from nine o'clock till eleven, and from one till three; but on the *3 per cent.* conſols, without any intervention, from nine o'clock till three. At the South ſea houſe, they are paid from nine till twelve o'clock.

The great augmentation of all the public funds which has taken place of late years, has been attended with a conſiderable increaſe in the number of the proprietors thereof, commonly called ſtock-holders, and as many of theſe perſons are foreigners, or others reſiding in diſtant parts, or perſons who do not chooſe to make their relatives acquainted with their property in the funds, it frequently happens, from death, abſence, or other cauſes, that dividends which have become due, remain for a conſiderable time unreceived. Theſe unclaimed dividends were at firſt of but ſmall amount, but they have ſince accumulated very conſiderably, as will appear from the following extract, from an account laid before parliament.

	£.	s.	d.
On 5th July 1739	1,090	15	4½
1743	9,711	3	3½
1747	20,476	15	11½
1751	64,421	5	4
1755	62,504	4	1½
1759	102,075	4	11¾
1763	134,688	6	6¾
1767	186,356	3	11½
1769	227,928	6	2¼
1771	257,040	13	2¾
1773	253,855	10	9¼
1775	292,551	7	8¼
On 5th July 1777	284,719	17	6¼
1779	314,885	8	3¼
1781	340,111	12	9¼
1783	361,388	5	5¼
1785	424,301	3	8¾
1787	493,144	15	3½
1789	547,366	16	6¾

In the year 1791, the magnitude of the ſum thus remaining in the hands of the bank, attracted the attention of the miniſter; and as it could not be pretended to be the property of the bank, it was thought that the public might have the uſe of the principal part thereof, ſo long as it remained undemanded. An act was accordingly paſſed, authoriſing the company to advance out of the unclaimed dividends in their hands 500,000*l.* for the public ſervice, with a proviſion, that if the ſum in their hands ſhould be reduced under 600,000*l.*, the difference ſhould be repaid them.

In conſequence of the publication of the names of the proprietors of the dividends then unclaimed, a conſiderable part of them was received, and thus the ſum advanced to government became only 376,739*l.*; and, as from an omiſſion in framing the act, no proviſion had been made for making up deficiencies to the public, as well as to the bank, whenever the whole ſum of the unclaimed dividends might riſe above, as well as whenever it ſhould fall below the ſtipulated amount of 600,000*l.*, the exceſs beyond the 376,739*l.* actually advanced, remained in the hands of the bank, and was continually increaſing.

Total amount of the unclaimed dividends at the following periods immediately preceding the dividends payable in January.

1794,	January 9th	-	£713,372
1795,	——— 9th	-	771,388
1796,	——— 9th	-	814,112
1797,	——— 10th	-	778,027
1798,	——— 11th	-	821,728
1799,	——— 12th	-	860,888
1800,	——— 10th	-	934,388
1801,	——— 9th	-	973,451
1802,	——— 9th	-	916,639
1803,	——— 10th	-	960,233
1804,	——— 9th	-	963,731
1805,	——— 9th	-	1,023,294
1806,	——— 7th	-	1,098,631
1807,	——— 8th	-	1,003,966
1808,	——— 5th	-	1,047,891

The average balance in the hands of the bank, on this account, having been in each year ſtill greater than the ſums above ſtated, a propoſition was made in 1808, that the company ſhould advance out of the unclaimed dividends the ſum of 500,000*l.* for the uſe of the public, in addition to the ſum before advanced purſuant to 31 Geo. III. c. 33, and under ſimilar conditions; but with a proviſion that the amount of unclaimed dividends remaining in the bank ſhould not at any time be reduced below 100,000*l.* As no objection could be made to this propoſal by the bank, an act was paſſed, under which it was carried into effect.

The total amount of unclaimed dividends on the annuities payable at the South ſea houſe, on the 31ſt Dec. 1802, was 107,886*l.* 15*s.* 8*d.*

The dividends of the public funds were long conſidered as exempt from any mode of taxation; all the acts of parliament, by which the different loans have been eſtabliſhed, having provided that the reſpective annuities payable on them "ſhall be free from all taxes, charges, and impoſitions whatſoever." They have, however, in common with all other deſcriptions of income, been made ſubject to the property tax, which is deducted even on the unclaimed dividends.

Stealing any dividend-warrants of the Bank, South Sea Company, Eaſt India Company, or of any other corporation, is made felony, with or without benefit of clergy in the ſame manner as if the offender had ſtolen, or taken by robbery, goods to the value of the money due on ſuch dividend-warrants. Stat. 2 Geo. II. c. 25.

Dividend, in the *Univerſity*, is that part or ſhare, which every one of the fellows equally divide among themſelves, of their annual ſtipend.

DIVIDIVI, the name of a drug brought from the Caraccas into Spain in 1769; and which, by experiments that have been made upon it at Madrid, is found to be preferable to galls in dyeing black.

DIVIDUAL, in *Arithmetic*, is uſed for that part of the dividend diſtinguiſhed by a point in working by the rule of diviſion.

DIVINATION, *rerum futurarum ſcientia*, the pretended act, or art, of foretelling future events. This art or ſcience, in which the pagans thought themſelves ſure of ſucceſs, if they proceeded according to certain eſtabliſhed rules, was founded in their ſyſtem of theology. They had deified all the parts and powers of nature, and more eſpecially the heavenly bodies; aſcribing to the latter not only life and intelligence, but a fore-perceiving motion, and a ſovereign influence on every thing here below. They had alſo other gods beſides the objects of nature, *viz.* Dæmons, from whoſe ſubordinate miniſtry and mediation, divination, prophecy, and magic were ſuppoſed to proceed. Ammian. Marcell. lib. i. c. 1. Herod. lib. ii. c. 83. Plato. in Symp. in Epinomide, in Phædra, Porphyr. ap. Euſeb. Præp. Evan. lib. iv. v. vi. & de Abſtinentia, lib. ii. Jamblich. de Myſter. Apul. Apol. Id. de Deo. Socrat. Diogen. Laert. in Vita Pythag. lib. xxxii. p. 514.

Farmer on Miracles, chap. iii. ſect. 3. See Prophecy, Enthusiasm, &c.

Divination, which is as ancient as idolatry, and formed a conſiderable part of the pagan theology, proceeded originally from the Egyptians to the Jews, Greeks, and Romans; and was divided by the ancients into artificial, and natural.

Divination, *Artificial*, is that which proceeds by reaſoning upon certain external ſigns, conſidered as indications of futurity.

Divination, *Natural*, is that which preſages things from a mere internal ſenſe, and perſuaſion of the mind, under a particular emotion or agitation, without any aſſiſtance of ſigns.

Plutarch, in his book "De Defectu Oraculorum," allows that dæmons might be appointed by the gods to preſide over divination and oracles, and to be the guardians of the temperature of thoſe exhalations, to which they are aſcribed; but at the ſame time it is aſſerted, that the ſoul is naturally endued with the faculty of divining, and that certain exhalations of the earth were the means of exciting the prophetic power or virtue. P. 418. D. and p. 453. F.

Natural divination, again, is of two kinds: the one native, the other by influx.

The firſt is founded on this ſuppoſition, that the ſoul, which was thought to be a particle of the divine air or ſpirit, taken out from God, and to have exiſted from eternity, collected within itſelf, and not diffuſed, or divided among the organs of the body, has, from its own nature and eſſence, ſome fore-knowledge of future things. Witneſs what is ſeen in dreams, extaſies, the confines of death, &c.

The ſecond is founded on this, that the ſoul receives, after the manner of a mirror, ſome ſecondary illumination from the preſence of God, and other ſpirits: and hence proceeded oracles.

Divination, *Artificial*, is alſo of two kinds: the one arguing from natural cauſes: ſuch as the predictions of phyſicians about the events of diſeaſes, from the pulſe, urine, &c. ſuch are alſo thoſe of the politician, "O venalem urbem, et mox perituram, ſi emptorem inveneris!"

The ſecond proceeds from experiments and obſervations arbitrarily inſtituted, and is moſtly ſuperſtitious.

Infinite are the ſyſtems of divination reducible to this head; by birds, the entrails of beaſts, dreams, lines of the hand, points marked at random, numbers, names, the motion of the ſieve, the air, fire, the ſortes Præneſtinæ, Virgilianæ, and Homericæ; with numerous others, the principal ſpecies whereof, and their names, are: Pſychomancy, or ſciomancy, which conſiſts in calling up the ſouls or ſhades of the deceaſed, to learn of them ſomething required, Dactyliomancy, performed by means of one or more rings. Hydromancy, performed with ſea-water. Pegomancy, with ſpring-water. Ornithomancy, or divining by the flight of birds, which was the buſineſs of the augurs. Clidomancy, performed with keys. Coſcinomancy, with a riddle, or ſieve-Cledoniſm, by words, or voice. Extiſpiſina, by the entrails of victims. Alphitomancy, or aleuromancy, by flour. Keraunoſcopia, by the conſideration of thunder. Capnomancy, by ſmoke. Alectryomancy, by cocks. Pyromancy, by fire. Lithomancy, by ſtones. Lychnomancy, by lamps. Necromancy, by the dead, or their bones, &c. Oneirocritica, by dreams. Ooſcopy, by eggs. Lecanomancy, by a baſon of water. Gaſtromancy, by the belly, or by phials. Palpitation, ſaliſſatio, παλμος, by the pulſation, or motion of ſome member. Axinomancy, by a hatchet, or cleaver. Catoptromancy, or cryſtallomancy, by a mirror. Chiromancy, by the lines of the hand. Geomancy, by the earth. Ceromancy, by figures of wax. Arithmomancy, by numbers. Belomancy, by arrows. Sycomancy, &c. all deſcribed by Cardan, in his fourth book, De Sapientia; and under their proper articles in this dictionary.

All theſe kinds of divination have been condemned by the fathers, and councils, as ſuppoſing ſome compact with the devil: though ſome of them, as well as the heathen philoſophers, contend for the ſupernatural power and efficacy of pagan divination and ſorcery. Euſeb. Præp. Ev. lib. v. c. 4. Aug. de Civ. Dei, lib. viii. c. 16. Farmer on Miracles, ubi ſupra.

Fludd has ſeveral treatiſes on the different ſpecies of divination: and Cicero has two books on the divination of the ancients, in which the ſeveral kinds of it are explained; and which he reſolves into many cauſes very different from that of an immediate revelation from ſome ſpiritual being. He has expoſed theſe ſeveral acts of ſuperſtition to ridicule; though his brother Quintus had endeavoured to ſupport them. To prove the univerſality of the practice of divination, he ſays, "Are there any people who do not receive either divination by art, *e. g.* that which is drawn from inſpecting the entrails of victims; from the interpretation of prodigies and thunders; from the uſe of auſpices; from the practice of lots and aſtrological predictions; or natural divination, which is what they obtain by dreams and by prophecy?"

It ſeems to have been one article in the creed of the ancient Britons, as well as of all the other nations of antiquity, that the gods whom they worſhipped had the government of the world, and the direction of future events in their hands; and that they were not unwilling, upon proper application, to diſcover theſe events to their pious worſhippers. (Æl. Var. Hiſt. l. ii. c. 31.) "The gods," ſays Ammianus Marcellinus (l. 21.) "either from the benignity of their own natures, and their love to mankind, or becauſe men have merited this favour from them, take a pleaſure in diſcovering impending events by various indications." This belief gave riſe to aſtrology, augury, magic, lots, and an infinite multitude of religious rites and ceremonies, by which deluded mortals hoped to diſcover the counſels of heaven, with regard to themſelves and their undertakings. (Plin. Hiſt. Nat. l. xxx. c. 1.) We learn from Pliny, that the ancient Britons were greatly addicted to divination, and excelled ſo much in the practice of all its arts, that they might have given a leſſon to the Perſians themſelves.

Having given a detail of the principal arts of divination, we ſhall obſerve, that beſides thoſe which the Britons practiſed, in common with other nations, they had one of a very horrid nature, which is thus deſcribed by Diodorus Siculus (l. v. c. 35.); "They have a great veneration for thoſe who diſcover future events, either from the flight of birds, or the inſpection of the entrails of victims, and all the people yield an implicit faith to their oracles. On great occaſions they practiſe a very ſtrange and incredible manner of divination. They take a man who is to be ſacrificed, and kill him with one ſtroke of a ſword, above the diaphragm; and by obſerving the poſture in which he falls, his different convulſions, and the direction in which the blood flows from his body, they form their predictions, according to certain rules which have been left them by their anceſtors."

In Holy Scripture, we find mention made of nine different kinds of divination: the firſt performed by the inſpection of plants, ſtars, and clouds: they are ſuppoſed to be the practiſers of this, whom Moſes calls מעונן *meonen*, of אנן, *anan, cloud*, Deuter. chap. xviii. ver. 10. 2. Thoſe, whom the prophet calls, in the ſame place, מנחש *menocheſch;* which the Vulgate, and generality of interpreters, render, *augur*. 3. Thoſe who, in the ſame place, are called מכשף *mecaſheph;* which the Septuagint and Vulgate tranſlate, *a man given to ill practices*. 4. Such authors, whom Moſes in the ſame chapter, ver. 11. calls חובר *hhober*. 5. Thoſe, who conſult the ſpirits called *Python;* or, as Moſes expreſſes it in the ſame book, אוב אשל, *thoſe who aſk queſtions of Python*. 6. Witches, or magicians, whom Moſes calls ידעני *jedeoni*. 7. Thoſe who conſult the dead, *necromancers*. 8. The prophet Hoſea, chap. iv. ver. 12. mentions ſuch as conſult ſtaves, שאל מקלי; which kind of divination may be called *rhabdomancy*. 9. The laſt kind of divination mentioned in Scripture is *hepatoſcopy*, or the conſideration of the liver. See Rhabdomancy, Magicians, &c.

DIVINE, ſomething that comes from or relates to God. The word is alſo uſed figuratively, for any thing that is excellent, extraordinary, and that ſeems to go beyond the power of nature, and the capacity of mankind.

In which ſenſe, the compaſs, teleſcope, clocks, &c. are ſaid to be divine inventions: Plato is called the divine author, the divine Plato; and the ſame appellation is given to Seneca: Hippocrates is called the divine old man, *divinus ſenex*, &c. The Arabs give the appellation divine, אלהיון *elahioun*, to their ſecond ſect of philoſophers, conſiſting of ſuch as admit a firſt mover of all things, a ſpiritual ſubſtance, free from all kind of matter; in a word, a God. By this name they diſtinguiſh them from their firſt ſect, whom they call deherioun, or thabaioun, *i.e.* worldings, and naturaliſts, as admitting of no principles beyond the material world, and nature.

The word אלהיון *elahioun* is derived from אלא *Alla*, God: ſo that the elhaioun are the divines, or theologues, as Caſtellus renders it; or, ſuch as own a God.

Divine *Law*. See Law.

Divine *Service*, *Tenure by*. See Tenure.

DIVINERS, in *Mythology*, thoſe who practiſed divination. See Auspices and Augurs.

DIVING, the art, or act of deſcending under water, to conſiderable depths, and abiding there a competent time.

In remote ages divers were kept in ſhips to aſſiſt in raiſing anchors and goods thrown overboard in times of danger; and by the laws of the Rhodians, they were allowed a ſhare of the wreck, proportioned to the depth to which they had deſcended in ſearch of it. In war, they were often employed to deſtroy the works and ſhips of the enemy. When Alexander was beſieging Tyre, divers ſwam off from the city, under water, to a great diſtance, and with long hooks tore to pieces the mole, with which the beſiegers were endeavouring to block up the harbour. (Curtius, iv. 3. Arrian de Exped. Alex. l. ii.) Thucydides (l. ii.) informs us, that the Syracuſans performed the ſame exploit.

The uſes of diving are very conſiderable, particularly in the fiſhing for pearls, corals, ſponges, &c. See Coral and Pearl-*fiſhing*.

There have been divers methods propoſed, and engines contrived, to render the buſineſs of diving more ſafe and eaſy. The great point in all theſe is to furniſh the diver with freſh air, without which he muſt either make but a ſhort ſtay, or periſh.

Thoſe who dive for ſponges in the Mediterranean, help themſelves by carrying down ſponges dipt in oil in their mouths. But conſidering the ſmall quantity of air that can be contained in the pores of a ſponge, and how much that little will be contracted by the preſſure of the incumbent air, ſuch a ſupply cannot long ſubſiſt the diver. For it is found by experiment, that a gallon of air included in a bladder, and by a pipe reciprocally inſpired and expired by the lungs, becomes unfit for reſpiration in little more than one minute of time. For though its elaſticity be but little altered paſſing the lungs, yet it loſes its vivifying ſpirit, and is rendered effete.

In effect, a naked diver, Dr. Halley aſſures us, without a ſponge, cannot remain above two minutes encloſed in water; nor much longer with one, without ſuffocating; nor without long practice, near ſo long: ordinarily perſons beginning to be ſuffocated in about half a minute. Beſides, if the depth be conſiderable, the preſſure of the water in the veſſels makes the eyes blood-ſhotten, and frequently occaſions a ſpitting of blood.

Hence, where there has been occaſion to continue long at the bottom, ſome have contrived double flexible pipes, to circulate air down into a cavity encloſing the diver, as with armour, both to furniſh air, and to bear off the preſſure of the water, and give leave to his breaſt to dilate upon inſpiration; the freſh air being forced down one of the pipes with bellows, and returning by the other of them, not unlike to an artery and vein.

But this method is impracticable when the depth ſurpaſſes three fathoms; the water embracing the bare limbs ſo cloſely, as to obſtruct a circulation of the blood in them; and withal preſſing ſo ſtrongly on all the junctures where the armour is made tight with leather; that if there be the leaſt defect in any of them, the water ruſhes in, and inſtantly fills the whole engine, to the great danger of the diver's life.

Diving-*bell*, is a machine contrived to remedy all theſe inconveniences. The invention of the diving-bell, or *Campana urinatoria*, is generally aſſigned to the 16th century. The firſt information we have reſpecting the uſe of the diving bell in Europe is that of Taiſnier, quoted by Schottus in his "Technica Curioſa," (l. vi. c. 9.) He relates, that at Toledo, in Spain, in the year 1538, he ſaw, in the preſence of the emperor Charles V. and about 10,000 ſpectators, two Greeks let themſelves down under water, in a large inverted kettle, with a burning light, and riſe up again, without being wet. It appears that this art was then new to the emperor and the Spaniards, and that the Greeks were careful to make the experiment in order to prove the poſſibility of it. After this period the uſe of the diving-bell ſeems to have become ſtill better known. It is deſcribed more than once in the works of lord Bacon, who explains its effects, and remarks that it was invented to facilitate labour under water.

In the latter part of the 16th century the diving-bell was ſometimes employed in great undertakings. When the Engliſh, in the year 1588, diſperſed the invincible armada of Spain, ſome of the ſhips were wrecked near the iſle of Mull, on the weſtern coaſt of Scotland, and they were ſaid to contain great riches. This report occaſioned ſeveral attempts to procure part of the loſt treaſure. In the year 1665, a perſon was ſo fortunate as to bring up from the bottom ſome cannon, which, however, were not ſufficient to defray the expences. Some years after attempts of the like kind were renewed. In the year 1683, William Phipps, a native of America, having formed a project for ſearching a rich Spaniſh ſhip ſunk on the coaſt of Hiſpaniola, and having obtained from Charles II. a ſhip furniſhed for the undertaking, ſet ſail; but being unſucceſsful returned in great poverty, though with a firm conviction of the practicability of his ſcheme. Applying without effect to James II. he raiſed a ſubſcription from private perſons, and the duke of Albemarle, ſon of general Monk, advanced a conſiderable ſum to enable him to make the neceſſary preparations for a new voyage. In 1687 he determined to try his fortune once more in a ſhip of 200 tons burden, having previouſly engaged to divide the profit according to the 20 ſhares of which the ſubſcription conſiſted. After many unavailing attempts, he at length ſucceeded in bringing up, from the depth of ſix or ſeven fathoms, treaſure amounting to 200,000*l.* ſterling, with which he returned to England. Of this ſum he himſelf got about 16, others ſay 20,000*l.*, and the duke of Albemarle 90,000*l.* Phipps received from his majeſty the honour of knighthood, was afterwards high ſheriff of New England, and died at London, greatly reſpected, in 1693. In conſequence of this ſucceſsful adventure, the duke of Albemarle obtained the governorſhip of Jamaica, in order to try his fortune with other ſhips ſunk in that neighbourhood; but nothing further was found worth the labour of ſearching for it. In England, however, ſeveral companies were formed, and obtained excluſive privileges of fiſhing up goods on certain coaſts, by means of divers. The moſt conſiderable of theſe was that which, in 1688, tried its ſucceſs at the iſle of Mull, at the head of which was the earl of Argyle. The divers went down to the depth of 60 feet under water, remained there ſometimes a whole hour, and brought up gold chains, money, and other articles; which, however, when collected, were of little importance. (Martin's deſcription of the Weſtern Iſlands, 8vo. 1716, Campbell's Political Survey of Britain, 4to. 1774.) The following circumſtance proves that this machine was little known in the firſt half of the 16th century. Among the figures that occur, without explanation, in the oldeſt edition of Vegetius on the art of war, there is repreſented a method of catching fiſh with the hands, at the bottom of the ſea. The apparatus for this purpoſe conſiſts of a cap, fitted ſo cloſely to the head of the diver, that no water can make its way into the cavity of it, and from the cap ariſes a long leather pipe, the opening of which floats on the ſurface of the water. If the perſon who drew this figure had been acquainted with the diving-bell, he would certainly have delineated it rather than this uſeleſs apparatus. Of the old figures of a diving machine, that which approaches neareſt to the diving-bell is in a book on Fortification by Lorini (Ven. 1609. fol.); who deſcribes a ſquare box bound round with iron, which is furniſhed with windows, and has a ſtool affixed to it for the diver: but the Italian does not appear to be the inventor of it. In 1617, Francis Keſsler gave a deſcription of his water-armour, intended alſo for diving, but which cannot be uſed for that purpoſe. In 1671, Witſen taught, in a better manner than any of his predeceſſors, the conſtruction and uſe of the diving bell; though he is much miſtaken in ſaying that it was invented at Amſterdam. In 1679. appeared, for the firſt time. Borelli's well-known work, "De Motu Animalium," in which he not only deſcribed the diving-bell, but alſo propoſed another, the impracticability of which was evinced by James Bernouilli, (Acta Erudit. 1683, Decemb. and Bernouilli Oper.) But further and more important improvements have been ſince made in this machine by Halley, Triewald, &c.; of which we ſhall give ſome account in the ſequel of this article. In this machine the diver is ſafely conveyed to any reaſonable depth, and may ſtay more or leſs time under the water, as the bell is greater or leſs.

It is moſt conveniently made in form of a truncated cone, the ſmalleſt baſe being cloſed, and the larger open. It is to be poiſed with lead, and ſo ſuſpended, that it may ſink full of air, with its open baſis downward, and as near as may be in a ſituation parallel to the horizon, ſo as to cloſe with the ſurface of the water all at once.

Under this covercle the diver ſitting, ſinks down with the included air to the depth deſired: and if the cavity of the veſſel can contain a ton of water, a ſingle man may remain a full hour, without much inconvenience, at the depth of five or ſix fathoms.

But the lower you go, ſtill the more the included air contracts itſelf, according to the weight of the water that compreſſes it; ſo that at the depth of thirty-three feet the bell becomes half full of water: the preſſure of the incumbent water being then equal to that of the atmoſphere; and at all other depths, the ſpace occupied by the compreſſed air in the upper part of the bell, will be to the under part of its capacity filled with water, as thirty-three feet to the depth of the ſurface of the water in the bell below the common ſurface thereof. And this condenſed air, being taken in with the breath, ſoon inſinuates itſelf into all the cavities of the body, and has no ill effect, provided the bell be permitted to deſcend ſo ſlowly as to allow time for that purpoſe.

One inconvenience that attends it is found in the ears, within which there are cavities which open only outwards, and that by pores ſo ſmall, as not to give admiſſion even to the air itſelf, unleſs they be dilated and diſtended by a conſiderable force. Hence, on the firſt deſcent of the bell, a preſſure begins to be felt on each ear, which, by degrees, grows painful, till the force overwhelming the obſtacle, what conſtringes theſe pores, yields to the preſſure, and letting ſome condenſed air ſlip in, preſently eaſe enſues. The bell deſcending lower, the pain is renewed, and afterwards it is again eaſed in the ſame manner.

But the greateſt inconvenience of this engine is, that the water entering it, contracts the bulk of air into ſo ſmall a compaſs, that it ſoon heats, and becomes unfit for reſpiration: ſo that there is a neceſſity for its being drawn up to recruit it; beſides the uncomfortable abiding of the diver, who is almoſt covered with water.

To obviate the difficulties of the diving-bell, Dr. Halley, to whom we owe the preceding account, contrived ſome farther apparatus, whereby not only to recruit and refreſh the air from time to time, but alſo to keep the water wholly out of it at any depth; which he effected after the following manner.

His diving-bell, (ſee *Plate.* II. *Hydraulics, fig.* 18.) was of wood, three feet wide at top, five feet at bottom, and eight feet high, containing about ſixty-three cubic feet in its concavity, coated externally with lead, ſo heavy that it would ſink empty, a particular weight being diſtributed about its bottom R, to make it deſcend perpendicularly, and no otherwiſe. In the top was fixed a meniſcus glaſs D, concave downwards, like a window, to let in light from above; with a cock, as at B, to let out the hot air; and a circular ſeat, as at L M, for the divers to ſit on: and, below, about a yard under the bell, was a ſtage ſuſpended from it by three ropes, each charged with a hundred weight, to keep it ſteady, and for the divers to ſtand upon to do their buſineſs. The machine was ſuſpended from the maſt of a ſhip by a ſprit, which was ſecured by ſtays to the maſt-head, and was directed by braces to carry it overboard clear of the ſide of the ſhip, and to bring it in again.

To ſupply air to this bell when under water, he had a couple of barrels, as C, holding thirty-ſix gallons each, caſed with lead, ſo as to ſink empty, each having a bung-hole at bottom, to let in the water as they deſcended, and let it out again as they were drawn up again. In the top of the barrels was another hole, to which was fixed a leathern pipe, or hoſe, well prepared with bees-wax and oil, long enough to hang below the bung-hole; being kept down by a weight appended; ſo that the air, driven to the upper part of the barrel by the incroachment of the water, in the deſcent, could not eſcape up this pipe, unleſs the lower end were lifted up.

Theſe air-barrels were fitted with tackle, to make them riſe and fall alternately, like two buckets; being directed in their deſcent by lines faſtened to the under edge of the bell; ſo that they came readily to the hand of a man placed on the ſtage to receive them: and who taking up the ends of the pipe as ſoon as they came above the ſurface of the water in the barrels, all the air included in the upper part thereof was blown forcibly into the bell; the water taking its place.

One barrel thus received and emptied; upon a ſignal given, it was drawn up, and at the ſame time the other let down; by which alternate ſucceſſion freſh air was furniſhed ſo plentifully, that the learned doctor himſelf was one of five, who were all together in nine or ten fathoms depth of water for above an hour and a half, without the leaſt inconvenience; the whole cavity of the bell being perfectly dry.

All the precaution he obſerved was, to be let down gradually about twelve feet at a time, and then to ſtop, and drive out the water that had entered, by taking in three or four barrels of freſh air, before he deſcended farther. And, being arrived at the depth intended, he let out as much of the hot air that had been breathed, as each barrel would replace with cold, by means of the cock B, at the top of the bell, through whoſe aperture, though very ſmall, the air will ruſh with ſo much violence, as to make the ſurface of the ſea boil.

Thus, he found any thing could be done that was required to be done underneath. And by taking off the ſtage, he could, for a ſpace as wide as the circuit of the bell, lay the bottom of the ſea ſo far dry as not to be overſhoes therein. Beſides, that by the glaſs-window ſo much light was tranſmitted, that, when the ſea was clear, and eſpecially when the ſun ſhone, he could ſee perfectly well to write or read, much more to faſten, or lay hold of any thing under him that was to be taken up. And by the return of the air-barrel he often ſent up orders written with an iron pen on a plate of lead, directing how he would be moved from place to place.

At other times, when the water was troubled and thick, it would be as dark as night below; but in ſuch caſes he was able to keep a candle burning in the bell.

Dr. Halley obſerves, that they were ſubject to one inconvenience in this bell; they felt at firſt a ſmall pain in their ears, as if the end of a tobacco-pipe were thruſt into them; but after a little while there was a ſmall puff of air, with a little noiſe, and they were eaſy. This he ſuppoſes to be occaſioned by the condenſed air ſhutting up a valve leading from ſome cavity in the ear, full of common air; but when the condenſed air preſſed harder, it forced the valve to yield, and filled every cavity. One of the divers, in order to prevent this preſſure, ſtopped his ear with a pledgit of paper; which was puſhed in ſo far, that a ſurgeon could not extract it without great difficulty.

The ſame author intimates, that by an additional contrivance he has found it practicable for a diver to go out of the bell to a good diſtance from it; the air being conveyed to him in a continued ſtream by ſmall flexible pipes, which ſerve him as a clue to direct him back again to the bell. For this purpoſe, one end of one of theſe pipes, kept open againſt the preſſure of the ſea, by a ſmall ſpiral wire, and made tight without, by painted leather and ſheep's guts drawn over it, being open, was faſtened in the bell, as at P, to receive air, and the other end was fixed to a leaden cap on the man's head, reaching down below his ſhoulders, open at bottom, to ſerve him as a little bell, full of air, for him to breathe at his work, which would keep out the water from him when at the level of the great bell, becauſe of the ſame denſity as the air in the great bell. But when he ſtooped down lower than the level of the great bell, he ſhut the cock F, to cut off the communication between the two bells. Phil. Tranſ. Abr. vol. iv. part ii. p. 188, &c. vol. vi. p. 550, &c.

The air in this bell would ſerve him for a minute or two; and he might inſtantly change it, by raiſing himſelf above the great bell, and opening the cock F. The diver was furniſhed with a girdle of large leaden weights, and clogs of lead for the feet, which, with the weight of the leaden cap, kept him firm on the ground; he was alſo well clothed with thick flannels, which being firſt made wet, and then warmed in the bell by the heat of his body, kept off the chill of the cold water for a conſiderable time, when he was out of the bell.

Mr. Martin Triewald, F.R.S. and military architect to his Swediſh majeſty, contrived to conſtruct a diving-bell on a ſmaller ſcale, and leſs expence, than that of Dr. Halley, and yet capable of anſwering the ſame intents and purpoſes. This bell, A B (*fig.* 19.) ſinks with leaden weights D, D, ſuſpended from the bottom of it. It is made of copper, and tinned all over on the inſide; three ſtrong convex lenſes G, G, G, only two of which, G, G, are ſeen, defended by the copper-lids H, H, H, illuminate this bell. The iron plate E ſerves the diver to ſtand upon, when he is at work; this is ſuſpended by chains F, F, F, two of which only are viſible, at ſuch a diſtance from the bottom of the bell, that when he ſtands upright, his head is juſt above the water in the bell, where he has the advantage of air fitter for reſpiration, than when he is much higher up; but as there is occaſion for the diver to be wholly in the bell, and conſequently his head in the upper part of it, Mr. Triewald has contrived, that, even there, after he has breathed the hot air as long as he well can, by means of a ſpiral copper tube *b c*, placed cloſe to the inſide of the bell, he may draw the cooler and freſher air from the lowermoſt parts; for which purpoſe a flexible leather-pipe, about two feet long, is fixed to the upper end of the tube at *b*; and to the other end of the pipe is faſtened an ivory mouth-piece, for the diver to hold in his mouth, by which to reſpire the air from below. We ſhall only remark, that as air rendered effete by reſpiration, is ſomewhat heavier than common air, it muſt naturally ſubſide in the bell; but it may probably be reſtored by the agitation of the ſea-water, and thus become fitter for reſpiration. Phil. Tranſ. Abr. vol. vii. p. 634 or Deſaugliers' Exper. Phil. vol. ii. p. 220, &c.

A great improvement in the diving-bell was made by the late Mr. Spalding of Edinburgh. This conſtruction ſeems deſigned to remedy ſome inconveniences of Dr. Halley's, which are very evident and of a very dangerous tendency; theſe are, 1ſt, by Dr. Halley's conſtruction, the ſinking or riſing of the bell depends on the people who are at the ſurface of the water. As the bell, when in the water, has a very conſiderable weight; the raiſing of it not only requires a great deal of labour, but there is a poſſibility of the rope breaking, by which it is raiſed, and thus every perſon in the bell would inevitably periſh. 2d. There are, in many parts of the ſea, rocks which lie at a conſiderable depth, the figure of which cannot poſſibly be perceived from above. There is danger that ſome of their ragged prominences may catch hold of the edge of the bell in its deſcent, and thus overſet it, before any ſignal can be given to thoſe above, which would infallibly be attended with the deſtruction of the people in the bell: and as it muſt always be unknown, before trial, what kind of a bottom the ſea has in any place, it is plain, that without ſome contrivance to obviate this laſt danger, the deſcent, in Dr. Halley's diving-bell, is not at all eligible. How theſe inconveniences are remedied by Mr. Spalding's new contrivance will be eaſily underſtood from the following deſcriptions. A B C D, (*fig.* 20.) repreſents a ſection of the bell, which is made of wood; *e, e,* are iron hooks, by means of which it is ſuſpended by ropes Q B E *e*, and Q A F *e*, joining at Q, as expreſſed in the figure: *c, c,* are iron hooks, to which are appended leaden weights, that keep the mouth of the bell always parallel to the ſurface of the water, whether the machine, taken altogether, is lighter or heavier than an equal bulk of water. By theſe weights alone, however, the bell would not ſink; another is therefore added, repreſented at L, and which can be raiſed or lowered at pleaſure, by means of a rope paſſing over a pulley *a*, and faſtened to the ſides of the bell. As the bell deſcends, this weight, called by Mr. Spalding the balance weight, hangs down a conſiderable way below the mouth of the bell. In caſe the edge of the bell is caught by any obſtacle, the balance weight is immediately lowered down, ſo that it may reſt upon the bottom; by this means the bell is lightened, ſo that all danger of over-ſetting it is removed. From being lighter without the balance-weight than an equal bulk of water, it is evident, that the bell will riſe as far as the length of the rope affixed. By another ingenious contrivance, Mr. Spalding rendered it poſſible for the divers to raiſe the bell, with all the weights appended to it, even to the ſurface, or to ſtop at any particular depth, as they think proper; and thus they would ſtill be ſafe, even though the rope deſigned for pulling up the bell was broken. For this purpoſe, the bell is divided into two cavities, both of which are made as tight as poſſible. Juſt above the ſecond bottom E F, are ſmall ſlits on the ſides of the bell, through which the water, entering as the bell deſcends, diſplaces the air originally contained in its cavity, which flies out at the proper orifice of the cock H. When this is done, the divers turn the handle, which ſtops the cock, ſo that if any more air gets into the cavity A E F B, it could no longer be diſcharged through the orifice H, as before. When this cavity is full of water, the bell ſinks; but when a conſiderable quantity of air is admitted, it riſes. If, therefore, the divers have a mind to raiſe themſelves, they turn the ſmall cock I, by which a communication is made between the upper and under cavities of the bell; the conſequence of this is, that a quantity of air immediately enters the upper cavity, forces out a quantity of water contained in it, and thus renders the bell lighter by the whole weight of the water, which is thus diſplaced. If a certain quantity of air is admitted into the upper cavity, the bell will deſcend very ſlowly; if a greater quantity, it will neither aſcend or deſcend, but remain ſtationary: and if a larger quantity of air be ſtill admitted, it will riſe to the top. It is to be obſerved, however, that the air that is juſt let into the upper cavity muſt be immediately replaced from the air barrel, and the air is to be let out very ſlowly, or the bell will riſe to the top with ſo great a velocity, that the divers will be in danger of being ſhaken out of their ſeats: but by following theſe directions, every poſſible accident may be prevented, and the people may deſcend to very great depths without the leaſt apprehenſion of danger. The bell alſo becomes ſo eaſily manageable in the water, that it may be conducted from one place to another, by a ſmall boat, with the greateſt eaſe, and with perfect ſafety to thoſe who are in it.

Inſtead of wooden ſeats uſed by Dr. Halley, Mr. Spalding made uſe of ropes ſuſpended by hooks *b, b, b,* and on theſe ropes the divers may ſit without any inconvenience. There are two windows made of thick ſtrong glaſs, for admitting light to the divers. N repreſents an air caſk with its tackle, and C P the flexible pipe through which the air is admitted to the bell. In the aſcent and deſcent of this caſk, the pipe is kept down by a ſmall appended weight, as in Dr. Halley's machine: R is a ſmall cock, by which the hot air is diſcharged as often as it becomes troubleſome. Mr. Spalding is of opinion, that one air barrel, capable of containing thirty gallons, is ſufficient for an ordinary machine.

Several other machines have been contrived, to anſwer the purpoſe of the diving bell, one of which, *fig.* 21, was invented in 1753, by —— Rowe, eſq. of which an account was publiſhed in the Univerſal Magazine.

The engine is a trunk, or hollow veſſel of copper or braſs of ſufficient ſtrength to reſiſt the preſſures of deep waters, and dimenſions to contain the body of a man, ſuppoſed to enter therein, feet foremoſt, at A A, bent at the bearing of his knees at B, for the more convenient going between rocks and great ſtones. At *a*, and on the other ſides, are holes for his arms to paſs through, and a glaſs for his ſight at *b*: *d* repreſents a ſleeve made of ſoft leather, lined with fine cloth, exactly to fit the diver's arm, and faſtened to the body of the engine at *a*, where the arms come through, which is likewiſe defended by a ſoft quilting, to prevent the arms from being hurt by preſſure, and the ſleeves from being thruſt into the engine; A A repreſents a cover to fit the head of the engine, faſtened down with ſcrews, and leather between the borders, ſo as to prevent leaking in any depth of water; D repreſents a plate of lead, to be faſtened before the engine in a ſtraight line, paſſing between the arms, not only as a proper weight to ſink the engine, but as a balance thereto: whereby the diver will always be kept in a proper poſture for working, and more ſo by means of a block or cradle, ſuppoſed to be faſtened over the lead, by which means the diver has not only the power of handling what is at the bottom, but may at any time reſt his arms from work; *g* is the engine rope by which it is let down and hauled up again from the bottom, *h* is called the life-line, with a knot at *i*, ſo that the handle at *f* may always remain at a due diſtance for the diver to take hold thereof, in order to give any notice to the perſons above, as, by agreement, by giving a certain number of pulls or ſudden twitches, which are immediately felt by the perſon that holds the line. The diver can tarry under water at leaſt half an hour at one time, without the help of pipes or any other air than what the engine contains. At E and F are two braſs ſcrews, the caps of which are to be opened as ſoon as the diver gets from the bottom to the water's ſurface, in order to give him freſh air by help of a pair of bellows, blowing at the latter, at which, when the engine leaks, the water is pumped out. In deep water, the diver is forced to make uſe of a ſaddle on his back, with a ridge touching the upper part of the engine, whereby he can keep his arms at a due diſtance out of the engine, which otherwiſe would be thruſt in, by the column of water preſſing thereon, equal to the weight thereof.

H H is a rope, to which the diver faſtens any thing which is to be drawn up.

It is well known, that the preſſure of water increaſes with its depth; and as water is a denſe body, a man cannot deſcend far in it without experiencing a very ſtrong preſſure, ſo that if a diver, whoſe head is five feet below the ſurface, attempts to breathe through a pipe, he finds himſelf incapable of inhaling the air, on account of the preſſure he ſuſtains on his breaſt. A man, therefore, to deſcend to a great depth, muſt have his body and breaſt free from the external preſſure of the fluid. In order to ſecure him from this inconvenience, C. H. Klingert of Breſlau invented a ſort of harneſs made of ſtrong tin plate, in the form of a cylinder, which goes over the diver's head, and which conſiſts of two parts, that he may conveniently thruſt his arms through it and put it on: alſo, a jacket with ſhort ſleeves, and drawers of ſtrong leather. All theſe being water tight, and cloſely jointed round the body of the diver, ſecure every part of him, but his arms and legs, from the preſſure of the water, which, at the depth of 20 feet, will occaſion no inconvenience to theſe parts.

Fig. 22, repreſents the diver covered with the harneſs, and drawers.

Figs. 23 and 25, is the cylinder, the diameter of which is equal to the breadth of a man at the top of the hipbone. It is 15 inches in height, has a globular top, and is made of the ſtrongeſt tin plate.

In the inſide of the cylinder, at *a*, is a ſtrong broad iron hoop, to enable it to withſtand better the preſſure of the water; and in the inſide of the top there are two pieces of a ſtrong hoop of the ſame kind, placed over each other in the form of a croſs at *b*; a ſtrong ring of braſs wire is ſoldered upon the outſide at *c*, that the jacket may be faſtened to it with an elaſtic bandage, to prevent it from ſlipping downwards; at *d d* are the upper halves of the apertures for the arms; and *e*, *e*, are holes to afford light, and into which the eye-glaſſes are ſcrewed: *f* is the opening into which the mouth-piece of the breathing-pipe is ſcrewed, and *g* is an aperture for looking through, as well as for the purpoſe of breathing when out of the water, and which, by means of the cover *h* ſuſpended from it, can be ſcrewed up before the diver enters the water.

The lower part of the cylinder, which is alſo 15 inches in height, is at *i*, and *k* ſtrengthened by iron hoops on the inſide, in the ſame manner as the former. To the lower hoop *k* are ſoldered four ſmall rings, to which are faſtened ſtrong leather ſtraps, three inches in breadth, that can be buckled acroſs over the ſhoulder, and ſupport the whole machine; *l*, *l*, are the under halves of the apertures for the arms; *m* is alſo a ring of braſs wire ſoldered to the cylinder, which ſerves to keep faſt the jacket when buckled on, and to ſupport the upper cylinder *d d b*, which ſlips over the under one, and on that account the under one is a little ſmaller, ſo as to fit into the upper one: there is alſo another ſuch ring at *n*, in order to prevent the drawers from falling down.

At *o* (*fig.* 26.) is a ſtrong ſemicircular piece of iron, the uſe of which is to prevent the drawers, when preſſed by the water, from touching the under part of the body, otherwiſe the preſſure, even at the depth of ſix feet, would be inſupportable. As it is not poſſible to ſew the leather ſo cloſely as to prevent water from forcing its way through the ſeams, a ſmall pump is ſuſpended at *p* for the purpoſe of pumping out the water, when it has riſen to the height of a few inches in the lower cylinder. Four hooks, *q*, *q*, *q*, *q*, ſoldered to the lower part of the cylinder, are for the purpoſe of ſuſpending weight from them.

The jacket *r*, (*fig.* 22.) with ſhort ſleeves that cover the upper part of the arms, ſerves to prevent the water from penetrating through the joining of the cylinders where the one is inſerted into the other, as alſo through the holes for the arms, as it is bound faſt round both parts of the cylinder, and likewiſe round the arms. The caſe is the ſame with the drawers which are bound cloſe round the knees.

Fig. 24. repreſents a braſs elaſtic bandage, employed for faſtening on the jacket; and which, when hooked together, is ſcrewed faſt by means of the ſcrew *s*, three inches in length; a braſs bandage is here uſed, becauſe leather is apt to ſtretch, and on that account might be dangerous.

Fig. 27. is the mouth-piece to which the pipes *x*. *y*, are faſtened, and which is ſcrewed on at *f* (*fig.* 26.); *t* is the ſcrew; *u* the part which goes into the machine, and which is taken into the mouth; *v* the exterior part of it, in which there is a partition *w*, in order to ſeparate the pipes; and *z*. is an aperture that the air in the machine may communicate with the pipe *y*.

The internal diameter of theſe tubes is three-fourths of an inch Rhinlandiſh. They conſiſt of ſtrong braſs wire, 1½ line in thickneſs, wound into a ſpiral form, and covered with ſtrong leather. In order to ſave expence, ſix yards of the pipe from the mouth-piece may be made in this manner, and the reſt of tubes of tin plate, three or four yards in length, joined together with pieces of leather-pipe about a foot in length, prepared in the firſt manner.

The reſervoir *a* (*fig.* 22.) applied in ſuch a manner that it can be ſcrewed off, is for the purpoſe of collecting the ſmall quantity of water that might force itſelf into the breathing pipe when long uſed, and which otherwiſe would be in continual motion, and render breathing diſagreeable.

To prevent the leather from becoming hard, and to cloſe up its pores, ſo that it may be rendered water-tight, the following mixture was rubbed over it, *viz.* ſix parts of wax, two of Venetian turpentine, two of pitch, and two of melted hog's lard. It is alſo to be obſerved, that the beſt and ſtrongeſt leather muſt be uſed for the tubes, and ſtrips of leather muſt be ſewed very cloſely on the ſeams of the jacket and drawers.

If the machine be intended for diving to a great depth, it muſt be conſtructed in as ſtrong a manner as poſſible, and the drawers muſt be furniſhed with iron ribs in the inſide, faſtened by means of hoops to the machine, as may be ſeen in *figs.* 23, and 25. over which a net of ſmall chain, or ſtrong cords, muſt be hooked or tied to the hoops *k*, *k*, and alſo to the hoops 2, 2, 2, 2, by means of the holes made in them for that purpoſe; but theſe chains or cords in particular which go behind muſt not be drawn too tight, that the diver may be able to bend his body.

The ribs, 1, 1, (*figs.* 23 and 25.) are ſcrewed on the inſide to the ſtrong iron hoops *k*, *k*, but in ſuch a manner as to be moveable; and as the centres reſt on the hips, the diver can move his legs backwards or forwards. To theſe ribs the two hoops, 2, 2, are made faſt by rivetting, and the two interior ribs 4, 4, are faſtened in the like manner. To the latter muſt be ſoldered, a circular piece, 6, 6, of the like radius as the part *o*, which moves, as the diver walks backwards and forwards on *o*, by means of a groove, at the ſame time that the outer ribs move; and on an account of theſe ribs, hoops, &c. the preſſure of the water upwards will preſent the leſs impediment to the diver, as it can act only according to the diameter of the ſmalleſt hoop 2.3 and 2 3.

The author gives the following inſtruction for uſing a machine of this kind. When the diver, after being made acquainted with all the parts of the machine, has put it on, and ſuſpended from it the proper weights, let him enter the water at any convenient place, and advance till it reaches to his eyes, while the end of the pipe is held by a perſon on the bank. If the diver can then breathe with eaſe, and if no water forces itſelf into the pipe, which muſt be left to float on the water, he may proceed till it covers his head, having firſt taken the precaution to tie a ſtrong rope to one of his arms; after this he may ſtop for ſome time, and then gradually go deeper and deeper, making ſignals that he finds himſelf at eaſe, by pulling the rope, or by ſpeaking through the pipe. If a man exerciſes himſelf in this manner for ſeveral days ſucceſſively, ſtill increaſing his depth, he will ſoon be able to dive boldly, and to move under water with eaſe and freedom: when he wiſhes to aſcend, he need only unhook the weights, which will drop to the bottom, and being then lighter than an equal volume of water, he will riſe to the ſurface.

To preſerve the weight from being loſt, a particular rope muſt be employed, which may be let down to the diver, upon his making a certain ſignal, and which he may faſten to the weight before he unhooks it.

By following theſe directions, a reſolute man may be taught, in the courſe of a few days, to dive to a moderate depth, though, on account of various preparations and unforeſeen difficulties, the author employed five whole weeks in teaching one who was unacquainted with ſwimming. This man, named Frederick William Joachim, a huntſman by profeſſion, dived in the above apparatus into the Oder, near Breſlau, where the water is of conſiderable depth, and the current ſtrong, on the 24th of June, 1797, before a great number of ſpectators, and ſawed through the trunk of a tree which was lying at the bottom.

He ſhewed alſo that he could have faſtened ſunk bodies to a rope, in order to be drawn up: and that, in caſe any impediments ſhould prevent the uſe of the ſaw, ſuch trunks might be hewn to pieces by an axe. It clearly appears, therefore, that two men, furniſhed with ſuch apparatus, would ſaw to pieces large beams of wood lying at the bottom of rivers, which are often a great obſtruction, and, on account of their ſize, cannot be otherwiſe removed.

One part of the conſtruction was attended with an inconvenience which it may be proper to mention: it has been already remarked, that a man, at the depth of five feet under water, cannot breathe without the machine, and, though one, ſuch as above deſcribed, will defend the preſſure of water from his breaſt and body, yet though it be furniſhed with a pipe to breathe through, it will appear from what follows, that this will be impoſſible. The air which ſurrounds the diver in this machine amounts to ſomewhat more than a cubic foot. Now, if he inhales air through the pipe ſcrewed to the machine, his body muſt diſtend a ſpace equal to the volume of air inhaled, conſequently he compreſſes ſo much of the air that ſurrounds him in the machine; but as this is impoſſible on account of its too great reſiſtance, he does not obtain air ſufficient to ſupport life, and is almoſt in the ſame ſtate as if ſurrounded by water.

To be convinced of the truth of this, let any one take a caſk, equal in content to one or two cubic feet, preſs his mouth againſt the aperture of it, and try whether he can, without difficulty, breathe back into it the air he has inhaled. A larger ſpace around the diver in the machine would make breathing eaſier, but would not afford him ſufficient eaſe to labour. The interior air in the machine, therefore, muſt be connected with the pipe deſtined for breathing, in order that it may be at freedom to dilate as his body is extended, and it is only by a conſtruction of this kind, as ſhewn at *z* in deſcribing *fig.* 24, that a man can breathe while encloſed in ſo ſmall a ſpace. The author, at firſt, had furniſhed his mouth-piece with a valve, that the air might be again exhaled through it, but this valve was ſo ill conſtructed, that it conveyed the exhaled air into the pipe deſtined for breathing. As he found that this was attended with inconvenience, on account of the moiſture which adhered to it, he afterwards omitted the valve entirely.

The diver, therefore, muſt ſuffer the air inhaled through the mouth-piece *u* to eſcape through his noſtrils into the machine; and then the air in it will remain equally elaſtic. The next time he draws breath, the air in the machine will be forced out from it at *z* by the diſtenſion of his body. By theſe means he will be able to breathe freely and eaſily for a long time, and thus the chief difficulty is overcome. This account was firſt publiſhed at Breſlau by Mr. Klingert, and was tranſlated and publiſhed in the Philoſophical Magazine, vol. iii. p. 59.

The famous Corn. Drebell had an expedient in ſome reſpects ſuperior even to the diving-bell, if what is related of it be true. He contrived not only a veſſel to be rowed under water, but alſo a liquor to be carried in the veſſel, which ſupplied the place of freſh air.

The veſſel was made for king James I. carrying twelve rowers, beſides the paſſengers. It was tried in the river Thames; and one of the paſſengers in that ſubmarine navigation, then living, told it one, from whom Mr. Boyle had the relation.

As to the liquor, Mr. Boyle aſſures us, he diſcovered by a phyſician, who married Drebell's daughter, that it was uſed from time to time, when the air in that ſubmarine boat was clogged by the breath of the company, and rendered unfit for reſpiration; at which time, by unſtopping the veſſel full of this liquor, he could ſpeedily reſtore to the troubled air ſuch a proportion of vital parts, as would make it ſerve again a good while. The ſecret of this liquor Drebell would never diſcloſe to above one perſon, who himſelf aſſured Mr. Boyle what it was. Boyle's Exp. Phyſ. Mech. of the Spring of the Air.

Mr. Martin, in his "Philoſophia Britannica," mentions a complete apparatus contrived by an Engliſhman, conſiſting of ſtrong thick leather, which contained half an hogſhead of air, ſo prepared that no air could eſcape through it, and conſtructed in ſuch a manner that it exactly fitted the arms and legs, and had glaſs placed in the fore part of it. When he put on this apparatus, he could not only walk on the ground at the bottom of the ſea, but alſo enter the cabin of a ſunk ſhip, and convey goods out of it at pleaſure. The inventor is ſaid to have carried on this buſineſs for more than 40 years, and to have acquired by it conſiderable property.

We have had many projects of diving machines, and diving ſhips, of various kinds, which have proved abortive.

Diving-*Bladder*, a term uſed by Borelli for a machine, which he contrived for diving under the water to great depths, with great facility, and preferred to the common diving-bell. The veſica, or bladder, as it is uſually called, is to be of braſs or of copper, and about two feet in diameter. This is to contain the diver's head, and is to be fixed to a goat's-ſkin habit, exactly fitting to the ſhape of the body of the perſon. Within this veſica there are pipes, by means of which a circulation of air is contrived; and the perſon carries an air-pump by his ſide, by means of which he may make himſelf heavier or lighter, as the fiſhes do, by contracting or dilating their air-bladder: by this means, the objections all other diving-machines are liable to are obviated, and particularly that of the air; the moiſture by which it is clogged in reſpiration, and by which it is rendered unfit for the ſame uſe again, being here taken from it by its circulation through the pipes, to the ſides of which it adheres, and leaves the air as free as before. Borelli Opera Poſthuma.

DIVINI, Eustachio, in *Biography*, an Italian optician, who lived at Rome about the middle of the ſeventeenth century, was diſtinguiſhed for his great ſkill in grinding and fitting up teleſcopic glaſſes. At one period, the teleſcopes of Divini were ſought after by aſtronomers in every part of Europe. Huygens, however, ſoon ſurpaſſed him in that art, and by a glaſs of his conſtruction, diſcovered the ring of Saturn. This led to a controverſy between the two philoſophers, which was carried on during the years 1660 and 1661. After this, little more is known of Divini. In 1663, he announced the invention of a new combination of glaſſes, to which he aſcribed very important advantages, but it is not at all known in what they conſiſted. Moreri.

DIVINING-Rod. See Virgula *Divinatoria*.

DIVINITY, the quality, nature, and eſſence of God.

It is falſe that the atheiſts hold the nature of a divinity to be a political invention of the ancient legiſlators, to ſecure and enforce the obſervation of their laws: on the contrary, it is certain, the legiſlators made uſe of that opinion, which they found already impreſſed on the minds of the people.

The firſt divinities among the heathens ſeem to have been the heavenly bodies, and eſpecially the ſun; which many of their learned men and philoſophers ſuppoſed to be animated and endowed with intelligence, or inhabited by intelligent beings. To this purpoſe, Diodorus Siculus ſays (l. 2.); "Men, in earlier times, ſtruck with the beauty of the univerſe, with the ſplendour and regularity which are every where conſpicuous, concluded, without doubt, that ſome divinity preſided in them; and they adored the ſun and moon under the names of Oſiris and Iſis." Plato alſo, if he be the author of the dialogue "Epinomis," obſerves, "The firſt inhabitants of Greece, as I conjecture, acknowledged no other gods but thoſe which are at this very day the gods of the barbarians, namely, the ſun, the moon, the earth, the ſtars, and the heavens." Moſes likewiſe intimates that theſe were objects of primary worſhip by cautioning the Iſraelites againſt being ſeduced by it. (Deut. iv. 19.) And as this caution was delivered after their departure from Egypt, ſome have inferred that this kind of worſhip was either firſt practiſed there, or introduced into that country at an early period. Other divinities which the heathens worſhipped were the elements of nature, probably from an imagination that they were the habitations of ſuperior intelligences, or at leaſt that they were under their direction, and ſubject to their dominion and controul. It was at a very early period that men, diſtinguiſhed as objects either of gratitude, eſteem and admiration, on account of their talents, virtues and exploits, or of apprehenſion and terror, were advanced to the rank of gods, and worſhipped by their deluded votaries. In proceſs of time divinities were feigned to exiſt appropriate to the different ages, profeſſions, and actions of human life; virtues and vices were deified; the affections and paſſions had divinities aſſigned them; and there were deities who preſided over every part of the body, and over every condition and ſtage of human life. (See Dæmons and Idolatry.)

Some have reduced the heathen divinities into three claſſes: the firſt theological, repreſenting the divine nature under divers attributes; thus Jupiter denotes the abſolute power of God, Juno his juſtice, &c.

The ſecond claſs of divinities are phyſical: thus Æolus is that power in nature, whereby vapours and exhalations are collected to form winds, &c.

The laſt are moral divinities. Thus the Furies are only the ſecret reproaches and ſtings of conſcience.

Divinity is alſo uſed in the ſame ſenſe with theology.

DIUIOHU, in *Botany*, a name given by the people of Guinea to a ſpecies of plant, with which they uſe to ripen or break boils, beating the leaves, and laying them on.

DIVIS, in *Geography*, a mountain of the county of Antrim, Ireland, the roots of which extend to the neighbourhood of the town of Belfaſt. It is about 1580 feet high, and is reckoned the higheſt land in the county.

DIVISIBILITY, a paſſive power, or property in quantity, whereby it becomes ſeparable into parts; either actually, or at leaſt mentally.

The ſchoolmen define diviſibility "capacitas coextenſionis cum pluribus;" a capacity of being co-extended with ſeveral things: thus, a ſtaff four feet long is diviſible, becauſe it may be co-extended with four feet, or forty-eight inches, &c.

This the Peripatetics and Carteſians univerſally maintain to be an affection, or property of all matter or body: the Carteſians, as holding the eſſence of matter to conſiſt in extenſion: for every part or corpuſcle of the body being extended, has parts including other parts, and conſequently is diviſible.

The Epicureans, again, hold diviſibility to agree to every phyſical continuum, as, without parts adjacent to parts, there can be no continuity; and wherever there are parts ſo adjacent, there muſt be diviſibility. But they deny that this affection agrees to all bodies; for the primary corpuſcles, or atoms, they hold perfectly inſecable and indiviſible.

The principal argument they allege is, that, from the diviſibility of all body, and of every aſſignable particle of body even after the repeated number of diviſions, it follows, that the ſmalleſt corpuſcle is infinitely diviſible, which with them is an abſurdity. For a body can only be divided into ſuch parts as it actually contains. But to ſuppoſe infinite parts for the ſmalleſt corpuſcle, ſay they, is to ſuppoſe it infinitely extended: for infinite parts placed externally to each other, as the parts of bodies doubtleſs are, muſt make an infinite extenſion.

They add, that there is a great difference between the diviſibility of phyſical and mathematical quantities. For every mathematical quantity, or dimenſion, they grant, may be increaſed and diminiſhed infinitely, but phyſical quantity, neither the one nor the other.

An artiſt, dividing a continued body, arrives at certain minute parts, beyond which he cannot go; theſe we may call minima artis. In like manner, nature which may begin where art ends, will find bounds; which we may call minima naturæ; and God, whoſe power is infinite, beginning where nature ends, may ſubdivide the minima naturæ; but he will at length come at certain parts, to which there being no other parts contiguous, they cannot be taken away. Theſe minute parts are atoms.

All we can ſay on this ſubject is, that on the one hand it is certain, every extended corpuſcle muſt have two ſides, and conſequently is diviſible; for, if it had not two ſides, it would not be extended; and if it had no extenſion, an aſſemblage of divers ſuch corpuſcles would not compoſe a body. And on the other hand, the infinite diviſibility ſuppoſes an infinity of parts in the minuteſt corpuſcle; whence it follows, that there is no body, how ſmall ſoever, but may furniſh as many ſurfaces, or parts, as the whole globe of the earth can; nay, and infinitely more; which, to ſay no worſe, is a ſtrange paradox.

The infinite diviſibility of mathematical quantity is thus proved, and illuſtrated by the mathematicians: ſuppoſe a line A D (*Plate* VI. *Geometry*, *fig.* 81.) perpendicular to B F; another at G H, at a ſmall diſtance from A, alſo perpendicular to the ſame line; with the centres C, C, C, &c. and diſtances C A, C A, &c. deſcribe circles cutting the line G H in the points *e*, *e*, &c. Now, the greater the radius A C is, the leſs is the part *e* G; but the radius may be augmented *in infinitum*; and therefore the part *e* G may be diminiſhed in the ſame manner; and yet it can never be reduced to nothing; becauſe the circle can never coincide with the right line B F. Conſequently, the parts of any magnitude may be diminiſhed *in infinitum*.

The chief objections againſt this doctrine are, that an infinite cannot be contained by a finite; and that it follows from a diviſibility *in infinitum*, either that all bodies are equal, or that one infinite is greater than another. To which it is anſwered, that to an infinite may be attributed the properties of a finite and determined quantity; and who has ever proved, that there could not be an infinite number of parts infinitely ſmall in a finite quantity; or that all infinites are equal? The contrary is demonſtrated by mathematicians in innumerable inſtances. We are not here contending for the poſſibility of an actual diviſion *in infinitum*; we only aſſert, that however ſmall a body is, it may be ſtill farther divided; which we imagine may be called a diviſion *in infinitum*, becauſe what has no limits, is called infinite.

All that is ſuppoſed, in ſtrict geometry, concerning the diviſibility of magnitude, amounts to no more than that a given magnitude may be conceived to be divided into a number of parts, equal to any given or propoſed number. It is true, that the number of parts, into which a given magnitude may be conceived to be divided, is not to be fixed or limited, becauſe no given number is ſo great but a greater may be conceived and aſſigned; but there is not, therefore, any neceſſity of ſuppoſing the number of parts actually infinite; and if ſome have drawn very abſtruſe conſequences from ſuch a ſuppoſition, yet geometry ought not to be loaded with them. Mac-Laurin's Fluxions, art. 290. See EXTENSION.

It is true that there are no ſuch things as parts infinitely ſmall; yet the ſubtility of the particles of ſeveral bodies is ſuch, that they very much ſurpaſs our conception; and there are innumerable inſtances in nature of ſuch parts actually ſeparated from one another.

Mr. Boyle gives us ſeveral inſtances of this. He ſpeaks of a ſilken thread 300 yards long, that weighed but two grains and a half. He meaſured leaf-gold, and found by weighing it, that fifty ſquare inches weighed but one grain: if the length of an inch be divided into 200 parts, the eye may diſtinguiſh them all; therefore there are in one ſquare inch 40000 viſible parts; and in one grain of it there are 2000000 of ſuch parts; which viſible parts no one will deny to be farther diviſible.

Again, a whole ounce of ſilver may be gilt with eight grains of gold, which may be afterwards drawn into a wire thirteen thouſand feet long.

In odoriferous bodies we can ſtill perceive a greater ſubtility of parts, and even ſuch as are actually ſeparated from one another; ſeveral bodies ſcarce loſe any ſenſible part of their weight in a long time, and yet continually fill a very large ſpace with odoriferous particles.

The particles of light, if light conſiſts of real particles, furniſh another ſurpriſing inſtance of the minuteneſs of ſome parts of matter. A lighted candle placed on a plane will be viſible two miles, and conſequently fill a ſphere, whoſe diameter is four miles, with luminous particles, before it has loſt any ſenſible part of its weight. And as the force of any body is directly in proportion to its quantity of matter multiplied by its velocity; and ſince the velocity of the particles of light is demonſtrated to be at leaſt a million of times greater than the velocity of a cannon ball, it is plain, that if a million of theſe particles were round, and as big as a ſmall grain of ſand, we durſt no more open our eyes to the light than to expoſe them to ſand ſhot point-blank from a cannon.

By help of microſcopes, ſuch objects as would otherwiſe eſcape our ſight, appear very large: there are ſome ſmall animals ſcarcely viſible with the beſt microſcopes; and yet theſe have all the parts neceſſary for life, as blood and other liquors. How wonderful muſt the ſubtility of the parts be, which make up ſuch fluids! (See ANIMALCULES.) Whence is deducible the following theorem:

Any particle of matter, how ſmall ſoever, and any finite ſpace, how large ſoever, being given; it is poſſible for that ſmall ſand, or particle of matter, to be diffuſed through all that great ſpace, and to fill it in ſuch manner, as that there ſhall be no pore in it, whoſe diameter ſhall exceed any given line; as is demonſtrated by Dr. Keil. Introduct. ad Ver. Phyſ.

DIVISION, the act of ſeparating a whole into the parts it contains.

If the whole be compoſed of parts really diſtinct, called integral parts, the diviſion made thereof is properly called partition; as when a houſe is divided into its apartments. If the whole be compoſed of parts, called ſubjective; that is, if the whole be only one common term, the ſubjects compriſed in the extent whereof are the parts, the diviſion thereof is what we properly call diviſion: ſuch is the diviſion of a genus into its ſpecies, &c.

Division, in *Algebra*, or *Species*, is performed by reducing the dividend and diviſor into the form of a fraction: this fraction being the quotient.

Thus, if $a\,b$ were to be divided by $c\,d$, it muſt be placed thus, $\frac{a\,b}{c\,d}$, and that fraction is the quotient; though others chooſe to write it thus, $c\,d)\;a\,b$, or $c\,d:\;a\,b$, or $a\,b \div c\,d$, which laſt mark $\div$ is the moſt common character for diviſion.

To perform the work of diviſion algebraically, theſe rules are to be obſerved: 1. When the dividend is equal to the diviſor, the quotient is unity, and muſt be placed in the quotient, becauſe every thing contains itſelf once.

2. When the quotient is expreſſed fraction-wiſe (as in ſimple diviſion) if the ſame letters are found equally repeated in each member of the numerator and denominator; caſt away thoſe letters, and the remainder is the quotient: thus, $\frac{a\,b}{a}(b$, and $\frac{a\,b\,c}{a\,b}(c$, &c.

3. When there are any co-efficients, divide them as in common arithmetic, or divide them by any common meaſure, and to the quotient annex the quantities expreſſed by letters: thus, $\frac{360\,a\,b}{24\,b}(= 15\,a$.

4. The general way of diviſion of compound quantities, after ranging them according to the dimenſions of one of their letters, is like the ordinary way in common arithmetic, reſpect being had to the rules of algebraic addition, ſubtraction, and multiplication; as alſo that the like ſigns give +, and unlike — in the quotient; taking care to divide every part of the dividend by its correſponding diviſor (that is, that whoſe letters ſhew it of the ſame kind with the other), to prevent a fraction, which would otherwiſe ariſe: thus,

$$\begin{array}{l} a+b)\;a\,a+a\,b-c\,a-c\,b\,(a-c \\ \qquad\;\; \underline{a\,a+a\,b} \\ \qquad\qquad 0 \\ \qquad\qquad\quad -c\,a-c\,b \\ \qquad\qquad\quad \underline{-c\,a-c\,b} \\ \qquad\qquad\qquad\;\; 0 \end{array}$$

That the ſame reaſon for like ſigns giving a poſitive and unlike a negative quotient, does hold in diviſion, as in multiplication, is clear from conſidering the nature of diviſion (which is only reſolving the thing into its parts); conſequently, ſince every dividend is nothing elſe but the product of the diviſor and quotient multiplied by each other, the quotient muſt conſiſt of ſuch ſigns, which could produce the dividend; therefore, if the dividend be divided by a quantity, that has a ſimilar ſign with it, the quotient muſt be poſitive; if by a quantity having a diſſimilar ſign, the quotient muſt be negative. It may be a general rule in compound diviſion in algebra, always to place ſuch a letter in the quotient, as will, when multiplied into the diviſor, produce the dividend; for that is always a rectangle under the diviſor, and the quotient: as for example,

$$\begin{array}{l} zz-16)\;z^6-8z^4-124zz-64\;(z^4+8zz+4. \\ \qquad\qquad \underline{z^6-16z^4} \\ \qquad\qquad\qquad 8z^4-124zz \\ \qquad\qquad\qquad \underline{8z^4-128zz} \\ \qquad\qquad\qquad\qquad 4zz-64 \\ \qquad\qquad\qquad\qquad \underline{4zz-64} \\ \qquad\qquad\qquad\qquad\quad 0 \end{array}$$

In ſome caſes the quotient will form an infinite ſeries, and then it is uſual to ſet down the laſt remainder with the diviſor under it.

Division, in *Arithmetic*, is the laſt of the four fundamental rules, being that whereby we find how often a leſs quantity is contained in a greater; and the overplus. Diviſion, in reality, is only a compendious method of ſubtraction; its effect being to take a leſs number from another greater as often as poſſible; that is, as oft as it is contained therein. There are, therefore, three numbers concerned in diviſion: 1. That given to be divided, called the dividend. 2. That whereby the dividend is to be divided, called the diviſor. 3. That which expreſſes how often the diviſor is contained in the dividend; or the number reſulting from the diviſion of the dividend by the diviſor; called the quotient.

There are diverſe ways of performing diviſion, one called the Engliſh, another the Flemiſh, another the Italian, another the Spaniſh, another the German, and another the Indian way, all equally juſt, as finding the quotient with the ſame certainty, and only differing in the manner of arranging, and diſpoſing the numbers.

We have likewiſe diviſion in integers; diviſion in fractions; and diviſion in ſpecies, or algebra.

Diviſion is performed by ſeeking how often the diviſor is contained in the dividend; and when the latter conſiſts of a greater number of figures than the former, the dividend muſt be taken into parts, beginning from the left, and proceeding to the right, and ſeeking how often the diviſor is found in each of thoſe parts.

For example, it is required to divide 6759 by 3. I firſt ſeek how oft 3 is contained in 6, *viz.* twice; then, how oft in 7, which is likewiſe twice, with one remaining. This 1, therefore, is joined to the next figure 5, which makes fifteen, and I ſeek how oft 3 in 15; and laſtly, how oft 3 in 9. All the numbers expreſſing how oft 3 is contained in each of thoſe parts, I write down according to the order of the parts of the dividend, that is, from left to right, and ſeparate from the dividend itſelf, by a line, thus.

Diviſor.	Dividend.	Quotient.
3)	6759	(2253

It appears, therefore, that 3 is contained 2253 times in 6759; or that 6759 being divided into 3 parts, each part will be 2253. If there be any remainder, that is, if the diviſor repeated a certain number of times is not equal to the dividend, what remains is wrote over the diviſor fraction-wiſe. Thus, if inſtead of 6759 the dividend were only 6758, the quotient will be the ſame as in the former caſe, except for the laſt figure 8: for 3 being only contained twice in 8, the laſt number in the quotient will be 2; and as twice 3 is only 6, there remains 2 of the dividend: which I write after the quotient, with the diviſor underneath it, and a line to ſeparate the two, thus:

$$3)\qquad 6758\qquad (2252\tfrac{2}{3}$$

If the diviſor is a digit, the diviſion may be eaſily performed without ſetting down any thing but the remainders. Again, if the diviſor has cyphers in the firſt places towards the right hand, theſe may be cut off, provided that an equal number of figures be cut off from the right of the dividend; and when the diviſion is finiſhed, we obtain the integral quotient; then to the remainder annex all the excluded figures of the dividend, and ſubjoin the whole diviſor. Thus,

$$8|00)\;3678|54\;(459 \text{ integral quotient.}$$

Rem. $\qquad \overline{654}$, and the fractional part of the quotient is $\frac{654}{800}$

Moreover, if the diviſor is the product of two or more digits, which may be eaſily diſcovered, divide firſt by any one of theſe, and then divide the quotient by the other, and ſo on; the laſt quotient is that required; and for the fractional part, multiply the laſt remainder by the preceding diviſor, and to the product add the preceding remainder; multiply this ſum by the next preceding diviſor, and to the product add the next preceding remainder, and ſo on till you have got through all the diviſors and remainders to the firſt. Thus, to divide 3428689 by 126, divide by 3, 6, and 7, becauſe $3 \times 6 \times 7 = 126$; the firſt quotient is 1142896, and the remainder 1; the ſecond quotient is 190482, and the remainder 4; the laſt quotient is 27211, and the remainder 5, which multiplied by the preceding diviſor 6, produces 30, to which the preceding remainder 4 being added, we have 34; this multiplied by the preceding or firſt diviſor, produces 102, and, the remainder 1 added, makes 103, the true remainder; and the fractional part of the quotient is $\frac{103}{126}$. For the diviſion of concrete, or applicate numbers, ſee REDUCTION.

Proof of DIVISION.

Diviſion is proved by multiplying the quotient by the diviſor, or the diviſor by the quotient; and adding what remains of the diviſion, if there be any thing. If the ſum be found equal to the dividend, the operation is juſt, otherwiſe there is a miſtake.

DIVISION, in *Decimal Fractions*. See DECIMAL.

DIVISION, in *Geometry*, or *geometrical* DIVISION, is alſo called application; the deſign of which, when it is employed about the conſtruction of plain problems, is this: *viz.* a rectangle being given, as alſo a right line; to find another right line, the rectangle contained under which, with the right line given, ſhall be equal to the rectangle firſt given. Such effection, or conſtruction, is called the application of a given rectangle to a right line given; and the right line ariſing by ſuch application, is called the geometrical quotient.

This is found by the rule of three, by ſaying as the line given is to one ſide of the rectangle, ſo is the other ſide to the line ſought.

Not unlike to which is Des Cartes's way of working diviſion in lines, by ſcale and compaſs: thus, ſuppoſe ac $(= 6)$, were to be divided by ad $(= 3)$ (*Plate* VI. *Geometry*, *fig.* 82) make any angle at pleaſure, and therein ſet off firſt ad $(= 3)$ the diviſor, and then on the ſame leg, au, = to unity; then on the other leg of the angle ſet ac $(= 6)$ the dividend, and join dc, and to it through u, draw ub parallel to dc, which ſhall cut off ab the quotient ſought; for as $ad : au :: ac : ab$; that is, as the diviſor: is to unity :: ſo is the dividend: to the quotient: on which proportion depends all diviſion.

DIVISION *of a word*, in *Grammar*, is a diſcourſe explaining the latitude, or comprehenſion of a word: the latitude, when the word is univerſal; as when the genus is divided into ſpecies, and differences; the comprehenſion, when the word is ambiguous, as *taurus*, bull; which ſometimes denotes a conſtellation, ſometimes a beaſt, and ſometimes a mountain.

DIVISION *by Logarithms*. See LOGARITHM.

DIVISION, in *Logic*, is the ſeparating any thing into diverſe parts or ideas. See DISTRIBUTION.

The ſchoolmen define it a diſcourſe, explaining a thing by its parts; in which it approaches nearly to the nature of a definition, whoſe character is to define a thing by its parts.

Diviſion, we have ſaid, is a diſtribution of a whole, &c. But there are two ſorts of wholes, as above expreſſed.

The firſt is what conſiſts of integral parts; as the human body, which contains diverſe members.

The ſecond is properly no other than an abſtract idea common to more things than one, as the univerſals; or a compound idea comprehending the ſubſtance and its accidents, or at leaſt moſt of its accidents.

The whole admits of a triple diviſion. 1. When the genus, or kind, is divided by its ſpecies or differences; as when ſubſtance is divided into body and ſpirit; or into extended, and thinking.

2. When any thing is divided into ſeveral claſſes, by oppoſite accidents; as when the ſtars are divided into thoſe which ſhine by their own light, and thoſe that only reflect a borrowed light.

3. When the accidents themſelves are divided according to the ſubjects in which they inhere; as when goods are divided into thoſe of the body, the mind, and fortune.

The laws of diviſion are, 1. That it be full and adequate, that is, that the members of the diviſion entirely exhauſt the whole thing divided; as when all numbers are divided into equal, and unequal.

2. That the members of the diviſion be oppoſite; as equal, and unequal: corporeal, and not corporeal; extended, and thinking.

3. That one member of the diviſion be not contained in another, ſo as the other may be affirmed of it: though, in other reſpects, it might be included without any fault in the diviſion: thus extenſion, geometrically conſidered, may be divided into a line, ſurface, and ſolid; though the line be included in the ſurface, and the ſurface in the ſolid.

4. The diviſion muſt not be made into too many, or too general parts. Laſtly, the members, unleſs the ſubject require it, are not to be too unequal; as if the univerſe were divided into heaven and earth.

DIVISION *of Mathematical Inſtruments*. See INSTRUMENT.

DIVISION, in a *Military Acceptation*, ſignifies any portion of an army under a ſeparate commander, deriving his authority from ſome immediate ſuperior. The term, when properly uſed, refers only to detachments from the main body, which is not called a diviſion, but "the army" itſelf: thus, if ſeveral bodies attack a country on ſeveral ſides, without acting under the ſame chiefs, they are not diviſions, but armies; on the other hand, when various bodies are under one chief, or have been detached from any particular army, they are then termed diviſions. In regard to the extent of ſuch diviſions, in point of number, we have no diſtinguiſhing term; that point being arbitrary, according to circumſtances.

When an army is brigaded, and that the entire of a brigade is detached, it is uſual to retain that deſignation; becauſe it exhibits more pointedly to all within the range of operations the extent of the force, which might elſe be often miſunderſtood; whereas few perſons in a camp are ignorant of the manner in which the various brigades are compoſed. But we often find in the ſame camp, that two, or more brigades, are formed into ſeparate commands for ſubordinate general officers, and are termed diviſions: in ſuch caſe the whole are uſually portioned in that manner, and the commander in chief retains no ſeparate command over either of them; but occupies himſelf ſolely in the general concerns, and management of the whole force under his command. The French have a diſtinguiſhing rank in their ſervice, *viz.* "general of diviſion;" which, in every reſpect, correſponds with the commands of large bodies, under a commander in chief, in our ſervice; though it often includes no more than two or three regiments: in the latter inſtance they muſt be conſidered merely as brigadier generals.

When entire regiments are detached from brigades, with their uſual proportions of artillery, &c. it is uſual, and much the moſt convenient, to retain their deſignations, according to the numbers of the regiments reſpectively: it has even been remarked, that ſingle corps thus detached have behaved with great gallantry; towards which, in all probability, the circumſtance of being noticed as a ſingle corps greatly, though unconſciouſly, contributes; whereas, under the term diviſion, the reputation a regiment might acquire would be leſs ſubject to general diſtinction.

When companies are detached from a regiment, they are included under the term diviſion of the regiment; or three, or four, or five, companies of the regiment: obſerving, that wherever the colours fly, that portion is called "the regiment;" though poſſibly the force remaining therewith may be comparatively ſmall. But the colours are always under the commandant's own charge: they conſtitute the head-quarters.

The term diviſion, in the formation of a regiment, always relates to one of the portions, ordinarily eight or ten, into which the corps is "told off," or divided, for firing in equal portions; or for marching in column. In the firſt intention, it is uſual to "tell off" the battalion companies into diviſions of equal ſtrength; the grenadiers and light infantry being leſs attended to, both on account of their being ſo frequently detached; and becauſe, from being on the flanks, they are not ſo much under the ſtrict neceſſity of preſerving that exact locality incumbent on the battalion companies. In marching in column of diviſions; which is by far the moſt pleaſant to the ſoldier, and moſt prompt for defence, the companies are not ſubject to occupy each others places in the line, as they are in manœuvring on a parade, and require leſs preciſion in reſpect to their extent of front. It is not, however, always practicable to proceed by diviſions, or, in other words, by companies, on account of various roads: on ſuch occaſions the company divides into halves, which are called ſub-diviſions, or into four, which are called platoons, or into eight, which are called ſections. Many term a company a platoon, and ſome call the fourth part of the company a ſection. When two companies, or two diviſions, act within the regiment under one commander, they unite under the deſignation of "grand diviſions." Therefore a battalion of eight companies contains four grand diviſions, eight diviſions, and ſixteen ſub-diviſions. A column of diviſions is the drawing up of a battalion with all the diviſions ſeparate from each other, at diſtances equal to their reſpective fronts; the one diviſion behind the other, in regular ſucceſſion. Thus, when a corps has wheeled to the right, or to the left, by diviſions, it preſents a column of diviſions, of which the front will be ſeen on that ſide to which it wheeled.

From the foregoing it will be ſeen, that the term diviſion is, in many reſpects, arbitrary, or circumſtantially appropriate; the only inſtance in which it appears ſpecifically applicable being that we have deſcribed, regarding the "telling off" of a corps for firing or for marching. Thus, when we ſay "a firing by diviſions," we mean that a regular fire was kept, either from right to left, or *vice verſâ;* or from flanks to centre, or from centre to flanks; the ſeveral diviſions firing in ſucceſſion according to their ſituation, and to the order of firing. Under theſe terms military perſons always underſtand, that the firing is ſupported by the vollies of diviſions, in contradiſtinction to the firing in leſſer portions, ſuch as by platoons, or ſections; in which caſe each diviſion may be conſidered as a ſmall battalion, having an order of fire within itſelf, and acting quite independently, in that reſpect, from the reſt of the corps.

Division, in *Muſic*, imports the dividing of the interval of an octave into a number of leſſer intervals.

The 4th and 5th, each of them, divide or meaſure the octave perfectly, though differently. When the fifth is below, and ſerves as a baſs to the 4th, the diviſion is called harmonical; when the 4th is below, the diviſion is called authentic.

Beſides the harmonical, and arithmetical diviſion of the octave, the word frequently occurs in muſic: as the diviſion of the monochord, or diviſion of a ſingle ſtring, into ratios by numbers, or reducing by moveable bridges, a ſingle ſtring to every kind of proportion allowable in muſic. See Monochord.

Point of Division in the time-table. See Point, and Time-table.

Division, in *Melody*, a rapid paſſage of execution in a ſong. (See Neuma.) In ſinging, many ſounds applied to one ſyllable conſtitute a diviſion, volée, roulade, volata, paſſaggio; and in playing upon an inſtrument, a rapid ſucceſſion of ſounds without a reſt, or ſlow note, has generally the ſame appellation. Such as are chiefly pleaſed with grave and ſober muſic cenſure thoſe flights as capricious, unmeaning, and trivial. Others are however captivated by them, when executed with preciſion, and regard them as proofs of the compoſer's invention, and the performer's abilities. And it is perhaps a popular prejudice to imagine that all ſuch inflexions are abſurd, and ill placed, even in a ſlow and plaintive melody. On the contrary, when the heart is much moved and affected, the voice can more eaſily find ſounds to expreſs paſſion than the mind can furniſh words; and hence came the uſe of interjections and exclamations in all languages. It is no leſs a prejudice to aſſert that a diviſion is always proper on a favourable word or ſyllable, without conſidering the ſituation of the ſinger, or the ſentiment he has to expreſs.

Division *by Neper's Bones.* See Neper's *Bones.*

Division, in *Phyſics*, or Divisio *continui*, is the ſeparation of the parts of a quantity; whereby, what before was one, is now reduced into ſeveral. See Continuity, and Dissolution.

This diviſion is effected by means of motion, without which there can be no ſeparation of any continuum, or even contiguum.

This motion is performed diverſe ways, by fraction, ſciſſion, ſection, fiſſion, reſolution, dilution, maceration, diſperſion, effuſion, diſtraction, &c.

Division *of Powers.* See Powers.

Division *of Proportion.* See Proportion.

Division *of Ratios.* See Ratio.

Division, in *Rhetoric*, the arrangement of a diſcourſe under ſeveral heads, to be ſpoken to ſeparately. See Disposition.

Division *of Surds.* See Surd.

Division *of Vulgar Fractions.* See Fraction.

Division, in the *Sea Language*, the third part of a naval army, or fleet; or one of the ſquadrons thereof, diſtinguiſhed by a particular flag or pendant, under the command of ſome flag-officer. Or, in large fleets, the ſquadrons are ſubdivided into three diviſions, which, like the ſquadrons, are denominated the van, the centre, and the rear. See Squadron.

The white flag denotes the firſt ſquadron of France, the white and blue the ſecond, and the third is characterized by the blue. In England, the firſt admiral, or the admiral of the fleet, diſplays the union flag at the main-top-maſt-head; next follows the white flag with St. George's croſs; and afterwards the blue. The private ſhips carry pendants of the ſame colour with their reſpective ſquadrons at the maſts of their particular diviſions; ſo that the laſt ſhip in the diviſion of the blue ſquadron carries a blue pendant at her mizen-top-maſt-head. Naval battles are uſually ranged in three lines, according to their three diviſions.

DIVISIONES, in *Antiquity*, certain perſents of money, oil, bread, wine, or the like, appointed by will to be diſtributed annually among certain perſons or companies, and ſometimes to the people in general.

DIVISOR, the dividing number; or that which ſhews how many parts the dividend is to be divided into.

DIVISOR, *common.* See COMMON *meaſure.*

DIVISORS, *Invention of*, denotes the inveſtigation of all thoſe quantities by which any given quantity, ſimple or compound, may be divided without a remainder. If the quantity whoſe diviſors are ſought be a ſimple quantity, divide it by its leaſt diviſor, and then the quotient by its leaſt diviſor, and ſo on till you come to a quotient that is not farther diviſible: you will thus have all the prime numbers or diviſors by which the quantity propoſed can be divided: then multiplying theſe prime diviſors two and two together, find as many different products as you can this way; then find as many more products as you can by multiplying them three and three together, and ſo on; and theſe products, ſo found, will be all the compoſite diviſors, of which the given quantity will admit. *E. G.* Let it be required to aſſign all the diviſors of the number 60. Firſt divide 60 by its leaſt diviſor 2, and then the quotient 30 by its leaſt diviſor 2, and the quotient 15 by 3, whence will reſult the quotient 5, incapable of any farther diviſion. Having obtained all the prime diviſors of the number 60, *viz.* 1, 2, 2, 3, 5, or leaving out 1, becauſe it is a common diviſor of all numbers, 2, 2, 3, 5; multiply theſe together, as, 2×2, 2×3, 2×5, 3×5, and you obtain other diviſors, 4, 6, 10, 15; then multiply them three and three together, and you will have other diviſors, as $2 \times 2 \times 3$, $2 \times 2 \times 5$, $2 \times 3 \times 5$, that is, 12, 20, 30; and laſtly multiply them all four together, and you will have the diviſor $2 \times 2 \times 3 \times 5$, or 60. Again, let it be required to find all the diviſors which will divide the quantity $21abb$ without a remainder. Divide $21abb$ by 3, and the quotient $7abb$ by 7, and the quotient abb by a, and the quotient bb by b, and you will at laſt obtain the prime quotient b; conſequently the prime diviſors of the quantity $21abb$ are 3, 7, a, b, b: theſe multiplied two and two together will give 21, $3a$, $3b$, $7a$, $7b$, ab, and bb; multiply them three and three together, and you will have $21a$, $21b$, $3ab$, $3bb$, $7ab$, $7bb$, abb; multiply them four and four together, and you will have $21ab$, $21bb$, $3abb$, $7abb$; multiply all five together, and you will have the quantity itſelf that was at firſt propoſed, *viz.* $21abb$.

If a quantity, after having been divided by all its ſimple diviſors, remains ſtill a compound quantity, and there be any ſuſpicion that it will admit of ſome compound diviſor, range its ſeveral members according to the dimenſions of ſome letter in it; then ſubſtitute for that letter three or more terms of this arithmetical progreſſion 3, 2, 1, 0, −1, −2; then place the numbers reſulting hence over-againſt them, together with all their diviſors both affirmative and negative; or if the negative diviſors be not actually put down, they are at leaſt to be underſtood; laſtly over-againſt theſe diviſors put down all the decreaſing arithmetical progreſſions that can be made out of them, proceeding from the higheſt to the loweſt rank, as is the caſe with the terms of the progreſſion 3, 2, 1, 0, −1, −2; but the difference of the terms of the progreſſion made out of the diviſors muſt be either unity, or ſome other number that will divide the higheſt power of the dividend propoſed: if any ſuch progreſſion can be found, take that term which ſtands againſt 0 in the firſt progreſſion, 1, 0, −1, &c. and dividing it by the common difference of the progreſſion, join the quotient with its proper ſign to the letter according to the dimenſions whereof the dividend was diſpoſed, and you will have a quantity with which a diviſion is to be tried. *E. G.* Let the quantity whoſe compound diviſor is ſought be $x^3 - xx - 10x + 6$. Here ſubſtituting the terms 1, 0, −1 for x ſucceſſively, we find the reſulting numbers to be −4, 6, 14; placing theſe together with their diviſors, over-againſt the reſpective terms of the progreſſions whence they ariſe, they will ſtand in the following order:

1	4	1, 2, 4.	+4
0	6	1, 2, 3, 6.	+3
−1	14	1, 2, 7, 14.	+2

Then becauſe the higheſt power of the dividend, *viz.* x^3, admits of no numeral diviſor but unity, we find among the diviſors an arithmetical progreſſion, whoſe common difference is unity, and whoſe terms decreaſe after the ſame manner as the terms of the firſt progreſſion 1, 0, −1; and of this ſort of progreſſion we find among the diviſors only one, *viz.* 4, 3, 2; the number 4 being one of the diviſors that ſtand over againſt 1, the number 3 one of thoſe over-againſt 0, and 2 over-againſt −1: of this progreſſion 4, 3, 2, we take the number 3 that ſtands over-againſt 0, and joining it with the letter x, we try a diviſion with the quantity $x + 3$, and find that it ſucceeds; for $x^3 - xx - 10x + 6$, being divided by $x + 3$, gives $xx - 4x + 2$ for a quotient, without any remainder.

If no diviſor can be found this way, we may conclude that the quantity propoſed admits of no compound diviſor of one dimenſion: nevertheleſs, it may ſtill have a diviſor where the indeterminate quantity ariſes to two or more dimenſions.

If the quantity propoſed does not riſe to above three dimenſions, and admits of a compound diviſor of two, it muſt neceſſarily have another diviſor of one dimenſion, which being found (as above) and dividing the quantity propoſed, the quotient will be the other diviſor; but if it riſes to above three dimenſions, and hath no diviſor of leſs than two, ſuch a diviſor muſt be found by the following method. Let x be the indeterminate quantity of whoſe powers the quantity propoſed conſiſts, then ſubſtituting the terms of this progreſſion 3, 2, 1, 0, −1, −2, ſucceſſively for x, and putting down over-againſt them the numbers reſulting, together with all their affirmative diviſors, as before, the negative ones being underſtood: multiply the ſquares of the terms of the progreſſion by ſome numeral diviſor of the higheſt term of the quantity propoſed, which we will call e, and put down the products $9e$, $4e$, $1e$, 0, $1e$, $4e$ over-againſt the terms of the progreſſion. This done, ſubtract theſe products from all the diviſors of their reſpective ranks, both affirmative and negative, and put down the remainders in the ſame ranks under their proper ſigns; then try if, in paſſing from the higheſt to the loweſt rank of remainders, you can find an arithmetical progreſſion of any ſort, whether increaſing or decreaſing: if one or more ſuch progreſſions can be found, put them down over-againſt the terms of the firſt progreſſion, and then examine them one after another thus: let (in any of thoſe progreſſions) $\pm g$ be the term that ſtands over-againſt 0 in the firſt progreſſion; then ſubtracting this term, $\pm g$, from the next above it in the ſame progreſſion, let the remainder be $\pm f$; then the compound quantity, with which the diviſion is to be tried, will be $exx \pm fx \pm g$. But if no diviſor can be found this way, try another diviſor of the co-efficient of the higheſt term of the quantity propoſed for e, and ſo proceed till you have paſſed over all the affirmative numeral diviſors of the higheſt term; and then if no compound diviſor can be found, it will infallibly prove that the quantity propoſed admits of none. *E. G.* Let the quantity propoſed be $x^4 - x^3 - 5xx + 12x + 6$. Here ſubſtituting the numbers 3, 2, 1, 0, − 1, − 2 ſucceſſively for *x*, we find the numbers reſulting to be 39, 6, 1, − 6, − 21, − 26; theſe, without any regard to their ſigns, together with their diviſors, are to be put down as uſual; then multiplying the ſquares of the terms of the progreſſion by 1, which is the only affirmative numeral diviſor of x^4, the higheſt term of the quantity propoſed, and putting down the products 9, 4, 1, 0, 1, 4, over-againſt the terms of the progreſſion, we ſubtract 9 from all the diviſors of its rank, both affirmative and negative, that is, from 39, 13, 3, 1, − 1, − 3, − 13, − 39, and the remainders, *viz.* 30, 4, − 6, − 8, − 10, − 12, − 22, − 48, are placed over-againſt 9 in the higheſt rank; the ſame is done with the next number 4, with reſpect to the diviſors of its rank; and ſo of all the reſt. Then, the remainders being examined, we find among them two arithmetical progreſſions paſſing from the higheſt to the loweſt rank, *viz.* 4, 2, 0, − 2, − 4, − 6, and − 6, − 3, 0, + 3, + 6, + 9, both which are put down over-againſt the terms of the firſt progreſſion 3, 2, 1, 0, − 1, − 2. In the former of theſe two progreſſions we find the term − 2 ſtanding over-againſt 0 in the firſt progreſſion; therefore $g = -2$; this ſubtracted from 0, the next term above it in the ſame progreſſion, gives + 2 for *f*; hence, ſince $e = 1$, the diviſor to be tried, drawn from this progreſſion, will be $xx + 2x - 2$. In the other progreſſion we find the term over-againſt 0 to be 3, therefore $g = 3$; and this, ſubtracted from 0 above, leaves − 3 for *f*; therefore the diviſor from this progreſſion, by which the diviſion is to be tried, is $xx - 3x + 3$. Both, being tried, ſucceed; that is, if the quantity propoſed be divided by either of theſe diviſors, the quotient will be the other.

3	39	39, 13, 3, 1.	9	30, 4, − 6, − 8, − 10, − 12, − 22, − 48.	4, − 6.
2	6	6, 3, 2, 1.	4	2, − 1, − 2, − 3, − 5, − 6, − 7, − 10.	2, − 3.
1	1	1	1	0, − 2	0, 0.
0	6	6, 3, 2, 1.	0	6, 3, 2, 1, − 1, − 2, − 3, − 6.	− 2, 3.
− 1	21	21, 7, 3, 1.	1	20, 6, 2, 0, − 2, − 4, − 8, − 22.	− 4, 6.
− 2	26	26, 13, 2, 1.	4	22, 9, − 2, − 3, − 5, − 6, − 17, − 30.	− 6, 9.

Theſe operations may (when neceſſary) be contracted a little thus: let *p*, *q*, *r*, *s*, *t*, *v*, be the numbers reſulting from the poſitions 3, 2, 1, 0, − 1, − 2, and as ſuch let them be put down over-againſt them; then if the extreme numbers *p* and *v* be pretty large, or contain many diviſors, let theſe diviſors, as well as the remainders ariſing from them, be omitted, and try if you can find an arithmetical progreſſion, paſſing through the remainders belonging to the intermediate numbers *q*, *r*, *s*, *t*; if ſuch a one can be found, let the terms be $2f + g, f + g, g, -f + g$; then it is plain that in this progreſſion, the next term above $2f + g$ will be $3f + g$, and the next below $-f + g$ will be $-2f + g$; add the number, $9e$, to the term $3f + g$, and try whether the number $9e, + 3f + g$ will divide the number *p*; if it does, then add alſo $4e$ to $-2f + g$, and try whether the number $4e - 2f + g$ will divide the number *v*: if this diviſion alſo ſucceeds, you will then have as full a progreſſion to try with, as if the diviſors and remainders of the extreme numbers *p* and *v* had been put down; but if neither, or but one of theſe diviſions ſucceeds, it ſhews that the progreſſion thus found was accidental, and did not ſpring from any compound diviſor.

If the quantity propoſed be made out of the powers of two different letters, ſo as to have all its terms of the ſame number of dimenſions, inſtead of one of the letters put unity; then finding (by the foregoing rules) a compound diviſor, if any ſuch there be, fill up the deficient dimenſions of the diviſor by thoſe of the letter that was before ſuppreſſed, and you will have the diviſor compleated. *E. g.* Let the quantity propoſed be $6y^4 - ay^3 - 21a^2y^2 + 3a^3y + 20a^4$, every term of which conſiſts of four dimenſions, either of the letter *y*, or of the letter *a*, or of both together. Here then ſubſtituting 1 for *a*, the former quantity will be changed into $6y^4 - y^3 - 21y^2 + 3y + 20$, of which $3y + 4$ is a compound diviſor, found above. Now as $3y$, the firſt term of this diviſor, hath one dimenſion of the letter *y*, and as the other term 4 hath no dimenſion of any letter, one dimenſion may be ſupplied from the letter *a*, and the diviſor will become $3y + 4a$.

Again, let the quantity propoſed be $x^4 - ax^3 - 5a^2x^2 + 12a^3x - 6a^4$; this quantity, ſubſtituting 1 for *a*, becomes $x^4 - x^3 - 5x^2 + 12x - 6$; of which $xx + 2x - 2$ is a compound diviſor, found above; ſupply the deficient dimenſions of this diviſor from thoſe of the letter *a*, ſo that every term may have two dimenſions as well as the firſt, and it will be $xx + 2ax - 2aa$. Newton's Arithmetica Univerſalis, c. 7. § 2. Apud Opera ed. Horſl. tom. 1. p. 40, &c. Saunderſon's Algebra, book ix. pt. 3. vol. ii. p. 647, &c.

DIUM, in *Ancient Geography*, a town of Macedonia, ſituated at the foot of mount Olympus, about 7 ſtadia from the gulf of Theſſalonica, according to Strabo: now called *Standia*. —Alſo, a town of the peninſula of mount Athos, upon the Strymonian gulf.—Alſo, a town of the iſland of Crete. (See DIA.)—Alſo, a town of the iſland of Eubœa; the ſame which Strabo calls "Athenæ Diades," placed by M. D'Anville upon the northern coaſt of Eubœa, S.W. of Oreus, and oppoſite, on the other ſide of the ſea, the Pelaſgic gulf and the paſs of Thermopylæ.—Alſo, a town of Aſia, in Cœleſyria; placed by Ptolemy between Pella and Gadera.

DIVO, a town of Spain, on the coaſt of the country of the Cariſti, near *Tritium*, and E. of it.

DIVODURUM, afterwards called *Medimatrici*, and now *Metz*, which ſee.

DIVONA, now *Cahors*, a town of Aquitania Prima, called Carduci, and belonging to a people of that name.

DIVORCE, from *diverto*, I turn away, a breach or diſſolution of the bond of marriage.

In our law divorce is of two kinds; the one total, *a vinculo matrimonii*; which alone is properly divorce; the other partial, *a menſa & thoro*; a ſeparation from bed and board.

The woman divorced *a vinculo matrimonii* receives all again that ſhe brought with her; the other has a ſuitable ſeparate maintenance allowed her out of her huſband's effects. See ALIMONY.

The firſt only happens through ſome eſſential impediment, as conſanguinity or affinity within the degrees forbidden, precontract, impotency, &c. of which impediments the canon law allows fourteen, comprehended in theſe verſes.

"Error, conditio, votum, cognatio, crimen,
Cultus, diſparitas, vis, ordo, ligamen, honeſtas,
Si ſis affinis, ſi forte coire nequibus,

Si parochi & duplicis deſit præſentia teſtis,
Raptave ſit mulier, nec parti reddita tutæ."

In this kind of divorce, the marriage is declared null, as having been abſolutely unlawful, *ab initio*, and the parties are ſeparated *pro ſalute animarum*, and allowed to marry again; the iſſue of ſuch marriage as is thus entirely diſſolved, are baſtards. (Co. Litt. 235.)

Divorce *a menſa & thoro* diſſolveth not the marriage, becauſe it was juſt and lawful *ab initio;* but for ſome ſupervenient cauſe, it becomes improper or impoſſible for the parties to live together; as in the caſe of intolerable ill temper, or adultery in either of the parties. For the canon law, which is followed by the common law in this caſe, has ſuch reſpect for the nuptial tie, that it will not allow it to be unlooſed for any cauſe whatſoever, that ariſes after the union is made. And this is ſaid to be built on the divine revealed law; though that expreſly aſſigns incontinence as a cauſe, and indeed the only cauſe, why a man may put away his wife and marry another. (Matt. xix. 9.) The civil law, which is partly of pagan original, allows many cauſes of abſolute divorce; and ſome of them pretty ſevere ones: (as if a wife goes to the theatre or the public games, without the knowledge and conſent of the huſband, Nov. 117.) but among them adultery is the principal, and with reaſon named the firſt. (Cod. 5. 17. 8.) But with us in England adultery is only a cauſe of ſeparation from bed and board; (Moor 683.) for which the beſt reaſon that can be given is, that if divorces were allowed to depend upon a matter within the power of either of the parties, they would probably be extremely frequent; as was the caſe when divorces were allowed for canonical diſabilities, on the mere confeſſion of the parties (2 Mod. 314), which is now prohibited by the canons (Can. 1603. c. 100.) However, divorces *a vinculo matrimonii*, for adultery, have of late years been frequently granted in England, by act of parliament.

Divorce is a ſpiritual judgment, and therefore is paſſed in the ſpiritual court. Under the old law, the woman divorced was to have of her huſband a writing, as St. Jerom and Joſephus teſtify, to this effect: "I promiſe that hereafter I will lay no claim to thee;" which was called a bill of divorce.

Divorce was allowed with great latitude both among the Pagans and Jews. The Roman lawyers diſtinguiſh between repudium and divortium, or repudiation and divorce; making the former to be the breaking of a contract or eſpouſal, and the latter ſeparation after matrimony. Monteſquieu (Sp. of Laws, vol. i., p. 370.) thus diſtinguiſhes between a divorce and a repudiation: the former, he ſays, is made by a mutual conſent occaſioned by a mutual antipathy; while a repudiation is made by the will and for the advantage of one of the two parties independently of the will and advantage of the other. This writer eſtabliſhes it as a general rule, that in all countries where the laws have given to men the power of repudiating, they ought alſo to give it to women. Repudiation, he adds, ſeems chiefly to proceed from a haſtineſs of temper, and from the dictates of ſome of the paſſions; whereas divorce appears to be an affair of deliberation. Romulus enacted a ſevere law, which ſuffered not the wife to repudiate her huſband, but gave the man the liberty of repudiating his wife, either upon poiſoning her children, counterfeiting his private keys, or for the crime of adultery; but if the huſband on any other occaſion put her away, he ordered one moiety of his eſtate for the wife, and the other to the goddeſs Ceres; beſides an atonement to the gods of the earth. They might then repudiate in all caſes, if they were willing to ſubmit to the penalty. (Plut. in Rom.)

The firſt inſtance of a divorce that occurred at Rome was that of Spurius Carvilius Ruga, A. U. C. 523. B. C. 231, who repudiated his wife, whom he much loved, ſolely on account of her barrenneſs; to which he was determined by an oath which the cenſors obliged him to take, to the end that he might give children to the republic. It has been ſaid, that though he thus acted through neceſſity, and with the advice of his friends, his conduct was univerſally condemned, and rendered him extremely odious. Monteſquieu, however, ſuggeſts, that he did not incur diſgrace with the people for repudiating his wife; but they were offended by his oath to the cenſors, that he would repudiate her on account of her ſterility, that he might give children to the republic. This, it is alleged, was a yoke which the people perceived that the cenſors were going to put upon them. Plutarch, in his "Roman Queſtions," maintains, that Domitian was the firſt who permitted divorces. The law of Romulus is conſidered by others as temporary and tranſient; and it has been thought improbable that ſuch a law, which gave to the people a right of repudiation for certain cauſes, ſhould have ſubſiſted for above 500 years, and yet that no one ſhould avail himſelf of it in that long interval of time. The teſtimony of Dionyſius Halicarnaſſenſis, Valerius Maximus, and Aulus Gellius, to the contrary, is thought to be very improbable; more eſpecially as the law of the Twelve Tables ratified in the year 451. B. C., and the manners of the Romans, greatly extended the law of Romulus. To what end, it may be ſaid, were theſe extenſions, if the people never made uſe of a power to repudiate? Beſides, if the citizens had ſuch a reſpect for the auſpices, as the authors above-named pretend they had, ſo that they would never repudiate, how came the legiſlature of Rome to have leſs than they? and how came the laws inceſſantly to corrupt their manners? Moreover, it is mentioned as a fact, that Coriolanus, when he ſet out on his exile B. C. 491, adviſed his wife to marry a man more happy than himſelf. The right of the women to repudiate their huſbands ſubſiſted among the firſt Romans, notwithſtanding the law of Romulus; and it is well known that this inſtitution was one of thoſe which the deputies of Rome brought from Athens, and which were inſerted in the laws of the Twelve Tables. (See Juvenal, ſat. ix. Martial. lib. 1. Ep. 41.) Cicero ſays, that the reaſons of repudiation ſprung from the laws of the Twelve Tables; and we may, therefore, conclude, that this law increaſed the number of the reaſons for repudiation eſtabliſhed by Romulus. The power of divorce was alſo an appointment, or at leaſt a conſequence of the law of the Twelve Tables: for from the moment that the wife or the huſband had ſeparately the right of repudiation, there was a much ſtronger reaſon for their having the power of parting in concert, and quitting each other by mutual conſent. The law at firſt did not require that they ſhould diſcloſe the cauſes of divorce; though Juſtinian afterwards altered the law in this reſpect (Nov. 117. c. 10.)

At Rome, barrenneſs, age, diſeaſe, madneſs, and baniſhment, were the ordinary cauſes of divorce. Juſtinian afterwards added impotence, a vow of chaſtity, and the profeſſion of a monaſtic life, as valid reaſons of divorce. The cauſes of the diſſolution of matrimony have much varied among the Romans; but the moſt ſolemn ſacrament, the confarreation itſelf, might always be done away by rites of a contrary tendency. In the firſt ages, the father of a family might ſell his children, and his wife was reckoned in their number; the domeſtic judge might pronounce the death of the offender, or his mercy might expel her from his bed and houſe; but the ſlavery of the wretched female was, for a long period, hopeleſs and perpetual, unleſs he aſſerted for his own convenience the manly prerogative of divorce.

At length, when the Roman matrons became the equal and voluntary companions of their lords, a new juriſprudence was introduced, that marriage, like other partnerſhips, might be diſſolved by the abdication of one of the aſſociates. During an interval of proſperity and corruption, this principle was enlarged to frequent practice and pernicious abuſe. Paſſion, intereſt, or caprice, ſuggeſted daily motives for the diſſolution of marriage; a word, a ſign, a meſſage, a letter, the mandate of a freedman, declared the ſeparation: the moſt tender of human connections was degraded to a tranſient ſociety of profit or pleaſure. According to the various conditions of life, both ſexes alternately felt the diſgrace and injury: an inconſtant ſpouſe transferred her wealth to a new family, abandoning a numerous, perhaps a ſpurious, progeny to the paternal authority and care of her late huſband; a beautiful virgin might be diſmiſſed to the world, old, indigent, and friendleſs: but the reluctance of the Romans, when they were preſſed to marriage by Auguſtus, ſufficiently marks, that the prevailing inſtitutions were leaſt favourable to the males. A ſpecious theory, ſays Mr. Gibbon, (Hiſt. Decl. and Fall of Rom. Emp. vol. viii.) is confuted by this free and perfect experiment, which demonſtrates, that the liberty of divorce does not contribute to happineſs and virtue. The facility of ſeparation would deſtroy all mutual confidence, and inflame every trifling diſpute; the minute difference between an huſband and a ſtranger, which might ſo eaſily be removed, might ſtill more eaſily be forgotten; and the matron, who in five years can ſubmit to the embraces of five huſbands, muſt ceaſe to reverence the chaſtity of her own perſon. Inſufficient remedies followed with diſtant and tardy ſteps the rapid progreſs of the evil. Auguſtus adopted different modes of repreſſing or chaſtiſing the licence of divorce. The preſence of ſeven Roman witneſſes was required for the validity of this ſolemn and deliberate act; if any adequate provocation had been given by the huſband, inſtead of the delay of two years, he was compelled to refund immediately, or in the ſpace of ſix months; but if he could arraign the manners of his wife, her guilt or levity was expiated by the loſs of the ſixth or eighth part of her marriage portion. The Chriſtian princes were the firſt who ſpecified the juſt cauſes of a private divorce. Conſtantine attempted to remedy the evil, which was very prevalent, by diminiſhing the number of caſes in which a divorce ſhould be allowed, and increaſing the penalty annexed to unjuſt and needleſs ſeparation. Juſtinian alſo introduced ſome uſeful regulations and reſtrictions. In the moſt rigorous laws, a wife was condemned to ſupport a gameſter, a drunkard, or a libertine, unleſs he were guilty of homicide, poiſon, or ſacrilege, in which caſes the marriage, as it ſhould ſeem, might have been diſſolved by the hand of the executioner. But the ſacred right of the huſband was invariably maintained, to deliver his name and family from the diſgrace of adultery; the liſt of *mortal ſins*, either male or female, was curtailed and enlarged by ſucceſſive regulations, and the obſtacles of incurable impotence, long abſence, and monaſtic profeſſion were allowed to reſcind the matrimonial obligation. Whoſo tranſgreſſed the permiſſion of the law, was ſubject to various and heavy penalties. The woman was ſtripped of her wealth and ornaments, without excepting the bodkin of her hair; if a man introduced a new bride into his bed, *her* fortune might be lawfully ſeized by the vengeance of his exiled wife. Forfeiture was ſometimes commuted to a fine; the fine was ſometimes aggravated by tranſportation to an iſland, or impriſonment in a monaſtery; the injured party was releaſed from the bonds of marriage; but the offender during life or a term of years, was diſabled from the repetition of nuptials. The ſucceſſor of Juſtinian yielded to the prayers of his unhappy ſubjects, and reſtored the liberty of divorce by mutual conſent.

The common way of divorcing, was by ſending a bill to the woman, containing the reaſons of ſeparation, and the tender of all her goods which ſhe brought with her; and this was called repudium mittere; or elſe it was performed in her preſence, and before ſeven witneſſes, and accompanied with the formalities of tearing the writings, refunding the portion, taking away the keys, and turning the woman out of doors.

The Grecian laws concerning divorces were different: the Cretans allowed divorce to any man that was afraid of having too many children. The Spartans ſeldom divorced their wives; and it was extremely ſcandalous for a woman to depart from her huſband. The Athenians allowed divorce on very ſmall grounds, by a bill, containing the reaſon of the divorce, and approved, if the party appealed, by the chief magiſtrate; and women alſo were allowed to leave their huſbands on juſt occaſions. Perſons divorcing their wives were obliged to return their portions; otherwiſe, the Athenian laws obliged them to pay nine oboli a month for alimony. The terms expreſſing the ſeparation of men and women from each other were different; the men were ſaid αποπεμπειν or απολευειν, *to diſmiſs their wives*, but wives απολειπειν, *to leave their huſbands*. Port. Arch. Græc. vol. ii. book iv. chap. 12.

Among the Jews, beſides incontinence and adultery, uglineſs, old age, or ill humour in a wife, were ſufficient reaſons for giving her a bill of divorce. Nay, even the man's own pleaſure, or the repenting of his match, were admitted as good reaſons. Selden de Uxore Heb. lib. iii. cap. 17.

Although divorce was permitted to the Jews, it had never been practiſed by any of the patriarchs, whatever might have been the caſe among other nations. The law relating to it, is expreſſed to this effect: (Deut. xxiv. 1, &c.) "When a man hath taken a wife, and married her, and it come to paſs that ſhe finds no favour in his eyes, becauſe he has found in her ſome uncleanneſs; then let him write her a bill of divorcement, and give it into her hand, and ſend her out of his houſe. And when ſhe is departed, ſhe may go, and be another man's wife; and if her ſecond huſband hate her, and write her a bill of divorce, or if he chance to die, her former huſband ſhall not take her again to be his wife, after ſhe is defiled, for that is an abomination to the Lord." Upon the interpretation of this law a queſtion has occurred, what is meant by the words, "if he find any uncleanneſs, turpitude, or nakedneſs in her?" The Jews are divided in their opinion about it. The Hebrew words, which Dr. Geddes, in his tranſlation, hath rendered "ſome defect," פרות רבר, are by Montanus rendered *nuditatem verbi*—by our tranſlators, *ſomething unclean*. Sept. ασχημον πραγμα. Vulg. *aliquam fæditatem*, and ſo equivalently Onk. Syr. and both Arabs. But Tharg. פתגם עבירת, *ſome tranſgreſſion;* and this *tranſgreſſion* is ſuppoſed by Rabbi Sammai and his followers to be adultery. But R. Hillel and his party extend the ערות דבר to whatever may diſpleaſe the huſband. The opinion of the Sammaites is untenable; for adultery was puniſhed with death; but the opinion of the Hillelites appears to be too lax. It was probably either ſome very great bodily blemiſh, or ſome baſe immoral habit, that was meant by the legiſlator. The form of the bill of divorce was to this effect: "Such a day, month, or year, I, ſuch an one, of ſuch a place, upon, or near ſuch a river, do, of my own free conſent and choice, repudiate thee, ſuch an one, my late wife, baniſh thee from me, and reſtore thee to thy own liberty; and thou mayeſt henceforth go whither, and marry whom thou wilt: and this is thy bill of divorcement, and writing of expulſion, according to the law of Moſes and Iſrael." This writing was ſigned by two witneſſes, and delivered in the preſence of as many, at leaſt. From this time, the wife was as much at her liberty, as if ſhe had been a widow; only, in both caſes, ſhe was obliged to ſtay, at leaſt 90 days, before ſhe was married to another, leſt ſhe ſhould prove pregnant by the laſt. It does not appear that women were indulged by the law of Moſes with the privilege of divorcing their huſbands upon the ſame ground; unleſs in the caſe of a virgin betrothed by her parents before ſhe was twelve years of age, who might then refuſe to ratify the contract which her parents had made, without giving any other reaſon than that ſhe did not like the perſon deſigned for her; but this cannot be called a divorcement, becauſe there is no marriage in the caſe. Joſephus, therefore, thinks (Ant. lib. xv. c. 11. xviii. 7. xx. 15.) that a divorce was ſo far from being permitted to women, that if the huſband forſook his wife, it was not lawful for her to marry another, till ſhe had firſt obtained a divorce from him. He adds, that Salome, ſiſter of Herod the Great, was the firſt who took upon her to repudiate her huſband, whoſe example was ſoon followed by others, mentioned by the ſame author.

Divorce is allowed by the Mahometan law, as it was by the Moſaic, with this difference only, that according to the latter a man could not take again a woman whom he had divorced, and who had been married or betrothed to another (Deut. xxiv. 3, 4. Jerem. iii. 1. Selden, ubi ſup. l. i. c. 11.); whereas Mahomet, to prevent his followers from divorcing their wives on every light occaſion, or from an inconſtant humour, ordained, that if a man divorced his wife the third time (for he might divorce her twice without being obliged to part with her, if he repented of what he had done), it ſhould not be lawful for him to take her again, until ſhe had been firſt married and bedded by another, and divorced by ſuch ſecond huſband. (Koran. ch. ii. p. 27.) This precaution has had ſo good an effect, that the Mahometans are ſeldom known to proceed to the extremity of divorce, notwithſtanding the liberty given them; it being reckoned a great diſgrace ſo to do: and there are few beſides thoſe who have little or no ſenſe of honour, that will take a wife again, on the condition enjoined. (Seld. ubi. ſup. l. iii. c. 21. Ricaut's Ottom. Emp. b. ii. c. 21.) It muſt be obſerved, that though a man is allowed by the Mahometan, as well as by the Jewiſh law, to repudiate his wife even on the ſlighteſt diſguſt, yet the women are not allowed to ſeparate themſelves from their huſbands, unleſs it be for ill uſage, want of proper maintenance, neglect of conjugal duty, impotency, or ſome cauſe of equal import; but then ſhe generally loſes her dowry; which ſhe does not loſe if divorced by her huſband, unleſs ſhe has been guilty of impudicity, or notorious diſobedience. (Koran, ch. iv. p. 62.) When a woman is divorced, ſhe is obliged, by the direction of the Koran, to wait three months before ſhe marry another; after which time, in caſe ſhe be not found with child, ſhe is at full liberty to diſpoſe of herſelf as ſhe pleaſes; but if ſhe prove with child, ſhe muſt wait till ſhe be delivered: and during her whole term of waiting, ſhe may continue in her huſband's houſe, and is to be maintained at his expence; it being forbidden to turn a woman out before the expiration of the term, unleſs ſhe be guilty of diſhoneſty. (Koran, ch. ii. p. 26, 27. ch. 65. p. 454.) Where a man divorces a woman before conſummation, ſhe is not obliged to wait any particular time (Koran, ch. xxxiii. p. 348.); nor is he obliged to give her more than one half of her dower. (Koran, ch. ii. p. 28.) If the divorced woman have a young child, ſhe is to ſuckle it till it be two years old; the father, in the mean time, maintaining her in all reſpects: a widow is alſo obliged to do the ſame, and to wait four months and ten days before ſhe marry again. (Koran, ch. ii. p. 27. ch. 65.) Theſe rules are copied from thoſe of the Jews, according to whom a divorced woman, or a widow, cannot marry another man, till 90 days be paſt, after the divorce or death of the huſband: and ſhe who gives ſuck is to be maintained for two years from the birth of the child; within which time ſhe muſt not marry, unleſs the child die, or her milk be dried up. (Miſhna. Gemara. Maimonides. Selden ubi. ſup. l. ii. c. 11. l. iii. c. 10) See the Preliminary Diſc. to Sale's Koran, p. 134.

According to Rycaut (State, Ottom. Emp. ch. xxi.) there are among the Turks three degrees of divorce. The firſt only ſeparates the man and wife from the ſame houſe and bed, the maintenance of the wife being ſtill continued: the ſecond not only divides them in that manner, but the huſband is compelled to make good her "Kabin," which is a jointure, or dowry promiſed at her marriage, ſo as to have no intereſt in him or his eſtate, and to remain in a free condition to marry another. The third ſort of divorce (which is called "Ouch Talae") is made in a ſolemn and more ſerious manner, with more rigorous terms of ſeparation; and in this caſe, the huſband, repenting of his divorce, and deſirous of retaking his wife, cannot by the law be admitted to her without firſt conſenting and contenting himſelf to ſee another man enjoy her before his face, which condition the law requires as a puniſhment of the huſband's lightneſs and inconſtancy.

It appears from the preceding part of this article, that the power of divorce, or of diſſolving the marriage contract, was allowed to the huſband among the Jews, the Greeks, and later Romans; and that it is at this day exerciſed by the Turks, as it is alſo by the Perſians. The late archdeacon Paley has inquired in his "Principles of moral and political Philoſophy" (vol. i. p. 326, &c.) how far ſuch a right is congruous with the law of nature: and he obſerves, that it is manifeſtly inconſiſtent with the duty which parents owe to their children; which duty can never be ſo well fulfilled as by their cohabitation and united care. It is alſo incompatible with the right which the mother poſſeſſes, as well as the father, to the gratitude of her children and the comfort of their ſociety; of both which ſhe is almoſt neceſſarily deprived by her diſmiſſion from her huſband's family. Where this objection does not interfere, the ingenious writer is of opinion, that no principle of the law of nature is applicable to the queſtion, beſide that of general expediency. Reaſons of expediency, he ſays, amply juſtify the policy of thoſe laws, which refuſe to the huſband the power of divorce, or reſtrain it to be for extreme and ſpecific provocations; and upon the principles of our author, that is contrary to the law of nature, which can be proved to be detrimental to the common happineſs of the human ſpecies. A lawgiver, whoſe counſels were directed by views of general utility, and obſtructed by no local impediment, would make the marriage contract indiſſoluble during the joint lives of the parties, for the ſake of the following advantages.

Becauſe, in the firſt place, this tends to preſerve peace and concord between married perſons, by perpetuating their common intereſt, and by inducing a neceſſity of mutual compliance; and, ſecondly, becauſe new objects of deſire would be continually ſought after, if men could, at will, be releaſed from their ſubſiſting engagements. Conſtituted as mankind are, and injured as the repudiated wife muſt generally be, it is neceſſary to add a ſtability to the condition of married women, more ſecure than the continuance of their huſband's affection; and to ſupply to both ſides, by a ſenſe of duty and of obligation, what ſatiety has impaired of paſſion and of perſonal attachment. Upon the whole, the power of divorce, poſſeſſed and exerciſed by the huſband, is evidently and greatly to the diſadvantage of the woman; and the only queſtion appears to be, whether the real and permanent happineſs of one half of the ſpecies ſhould be ſurrendered to the caprice and voluptuouſneſs of the other? The ſame objections, which may be urged againſt divorces, as depending upon the will of the huſband, apply, in a great degree, to divorces by mutual conſent; eſpecially when we conſider the indelicate ſituation and ſmall proſpect of happineſs which remain to the party, who oppoſed his or her diſſent to the liberty and deſires of the other. The law of nature admits of an exception in favour of the injured party, in caſes of adultery, of obſtinate deſertion, of attempts upon life, of outrageous cruelty, of incurable madneſs, and, perhaps, of perſonal imbecility; but by no means indulges the ſame privilege to mere diſlike, to oppoſition of humours and inclinations, to contrariety of taſte and temper, to complaints of coldneſs, neglect, ſeverity, peeviſhneſs, and jealouſy; which are difficult to be aſcertained; and if marriages were diſſolved in conſequence of ſuch pleas, real or pretended, the effect would be the licentiouſneſs of arbitrary divorces. Milton's ſtory is well known. Upon a quarrel with his wife, he paid his addreſſes to another woman, and ſet forth a public vindication of his conduct, by attempting to prove, that confirmed diſlike was as juſt a foundation for diſſolving the marriage contract as adultery. But it may be argued, in addition to the obſervations already made, that if a married pair, in actual and irreconcileable diſcord, complain that their happineſs would be better conſulted, by permitting them to terminate a connection, which is become odious to both, the ſame permiſſion, as a general rule, would produce libertiniſm, diſſenſion, and miſery, among thouſands who are now virtuous, and quiet, and happy, in their condition; and it ought to ſatisfy them to reflect, that when their happineſs is ſacrificed to the operation of an unrelenting rule, it is ſacrificed to the happineſs of the community.

The law of Moſes, as we have already ſeen, for reaſons of local expediency, permitted the Jewiſh huſband to put away his wife; but Chriſt, the precepts of whoſe religion were calculated for more general uſe and obſervance, revokes this permiſſion, and promulges a law, which was thenceforward to confine divorces to the ſingle cauſe of adultery in the wife. (Matt. xix. 9.) Nor is there any reaſon to depart from the plain and ſtrict meaning of the words; though ſome maintain, that divorce is no where permitted in the New Teſtament for adultery, but only a ſeparation. (See Matt. xix. 9. Mark, x. 11. 1 Cor. vii. 27. See alſo the council of Florence, at the end, after the queſtions propoſed to the Greeks. Tertull. de Monogam. cap. 9 & 10. Auguſtin. de bono conjugio, et de Adult. conjug. See alſo ADULTERY.) The rule laid down by our bleſſed Lord was new. It both ſurpriſed and offended his diſciples; yet Chriſt added nothing to relax or explain it.

Inferior cauſes may juſtify the ſeparation of huſband and wife, although they will not allow ſuch a diſſolution of the marriage contract, as would leave either party at liberty to marry again; for it is that liberty in which the danger and miſchief of divorces conſiſt. The law provides for ſeparation in extraordinary caſes, and has conſtituted a judicial relief from the tyranny of a huſband, by the divorce *à menſa et thoro*, and by the proviſion which it makes for the ſeparate maintenance of the injured wife. St. Paul likewiſe diſtinguiſhes between a wife's merely ſeparating herſelf from the family of her huſband, and her marrying again. "Let not the wife depart from her huſband; but, and if ſhe do depart, let her remain unmarried." The law of our country, as we have already ſtated it, conforms to our Saviour's injunctions, by confining the diſſolution of the marriage contract to the ſingle caſe of adultery in the wife; and a divorce, even in that caſe, can only be brought about by the operation of an act of parliament, founded upon a previous ſentence in the eccleſiaſtical court, and a verdict againſt the adulterer at common law; which proceedings taken together compoſe as complete an inveſtigation of the complaint as a cauſe can receive. The rite of marriage itſelf comprehends an exception of thoſe impediments which juſtify thoſe ſentences of the eccleſiaſtical courts that releaſe the parties *a vinculo matrimonii.*

Pope Innocent I. in his decretal to Exuperius, declares ſuch as contract a new marriage after divorce, adulterers; as well as the perſons with whom they marry. The occaſion of this decree was, that ſuch marriages were then allowed of by the Roman laws. There is an exception, however, in caſe of marriage between two heathens, which the decrees allow to be diſſolved after the converſion of one of the parties. And St. Paul ſays the ſame, 1 Cor. vii. 15. Yet even in this caſe, 1. The marriage is not immediately diſſolved by the converſion of one of the parties, but they may ſtill live together, and even on ſome occaſions they ought to do ſo. Nor is it even diſſolved by the ſeparation of the infidel party; for if ſhe be afterwards converted, he is obliged to take back his wife. But the marriage is totally diſſolved by a ſecond marriage of the converted party with another perſon.

2. Though the party converted to the faith may, the minute of his converſion, legally ſeparate himſelf, and contract with another, a liberty the Chriſtian law allows him, as in juſtice he is not deemed to owe any thing to an infidel; yet charity frequently forbids ſuch divorce, and ſeparation: as, *e. g.* if the infidel conſent to live with him, and do not moleſt him in his religion; if his faith be not at all in danger; if there be any hopes of converting her, or of gaining the children; if the ſeparation would prove a ſcandal to the heathens, and render Chriſtianity odious, &c. See St. Paul, 1 Cor. vii. 13, 14.

The fourth council of Toledo decrees, that in a country where Chriſtianity is the prevailing religion, the infidel party muſt be advertiſed to become Chriſtian; which if ſhe refuſe, the marriage muſt be diſſolved.

The council of Trent prohibits divorce on any occaſion whatever. The papal diſpenſations, however, are a ſalvo for this inſtance of rigour.

DIUR, in *Ancient Geography*, a river of Africa, in Mauritania Tingitania, according to Ptolemy; it is called *Viar* by Pliny.

DIURESIS, in *Medicine*, a free excretion of urine, whether produced ſpontaneouſly by an effort of the conſtitution, or artificially by the action of medicines. Vogel has conſtituted a genus of diſeaſe under this term, including the caſual, or periodical diſcharge of urine, ſymptomatic of hyſteria, &c. and diſtinct from diabetes. Gen. Morbor. Cl. ii.

DIURETICS, in the *Materia Medica*, from διὰ and ȣ̃ρον, *the*

the urine, thoſe medicines which promote the ſecretion of urine.

The ſecretion of the urine may be promoted, either by increaſing the quantity of water in the maſs of the blood, (ſee Diluent); or, that remaining the ſame, by introducing a matter which may be a ſtimulus to the ſecerning veſſels of the kidnies, and excite them to increaſed action.

If much liquid is taken into the ſtomach, and thence into the maſs of blood, it muſt neceſſarily paſs off by one of the excretions, perſpiration, or urine; and we commonly find, indeed, that an increaſe of the quantity of drink is attended with a proportional increaſe in the quantity of urine ſecreted. Accordingly this increaſe of drink has always been conſidered as the chief of diuretics. There are, however, certain ſtates of the body, in which it may be doubtful, whether this means of increaſing the ſecretion of urine may be ſafely employed. It ſometimes happens that the water of the blood, inſtead of paſſing off by the excretions, is effuſed into ſome of the cavities of the body, giving riſe to the well-known diſeaſe of dropſy: and in ſuch a caſe it may be ſuſpected, that an increaſe of the water in the blood, occaſioned by an increaſe of drinking, may augment the effuſion juſt mentioned, and aggravate the diſeaſe. This ſuſpicion has prevailed ſo much with phyſicians, as to lead them in ſuch caſes to enjoin, as much as poſſible, an abſtinence from drinking; and it is alleged that ſuch an abſtinence has, in ſome caſes, entirely cured the diſeaſe.

But the truth of this ſtatement will perhaps not bear a very rigorous inquiry; and it may be confidently aſſerted, that ſuch facts are, at leaſt, of extremely rare occurrence; and the numerous inſtances in which ſuch abſtinence has been attempted with little or no benefit, have led many phyſicians to recommend that it ſhould not be attempted at all. It is, in fact, an extremely painful meaſure, to reſiſt the urgent deſire of drink, which commonly attends this diſorder: and as far as careful obſervation has gone, we believe it to have been decided that the uſe of drink is ſafe in dropſy; and that the quantity of urine voided, where it is permitted, is uſually equal to the quantity of drink taken in. Sometimes it is even greater; eſpecially when the drink is taken tepid, or is mixed with materials, that are ſlightly ſtimulant to the kidnies, ſuch as weak gin punch, &c.; for in whatever way the kidnies are incited to action, that action ſometimes goes on, after the immediate ſtimulus has paſſed off; while, on the contrary, the want of action, whether from abſence of the watery part of the blood, or other cauſes, itſelf conduces to a farther inactivity. Thus Dr. Cullen affirms, "I have frequently found that a very entire abſtinence from drinking, by diminiſhing the quantity of urine voided, allowed the ſecretories of the kidnies to fall into a contracted ſtate, ſo that the quantity of urine voided was ſtill farther diminiſhed, and, as I judged, tended to increaſe the effuſion, and thereby to aggravate the diſeaſe. In other caſes I found, that when a quantity of drink was taken in, a conſiderable portion of it paſſed by the kidnies; and when, as ſometimes happened, the quantity of urine voided was equal to the drink taken in, I concluded that the giving ſo much drink was a perfectly ſafe meaſure." Materia Medica, vol. ii. p. 547.

To illuſtrate the matter ſtill farther, the ſame intelligent phyſician has remarked, that the water of the blood, carrying the ſaline matters of it, is, by the nature of the animal economy, determined to the excretions, and particularly to the kidnies; and therefore, that drinks impregnated with ſaline matters are naturally determined this way, rather than by the preternatural effuſions of dropſy. The fluid poured out in theſe effuſions is nearly inſipid; whilſt, though the watery part of the blood is by theſe withdrawn from the ſecretories of the kidnies, yet a great quantity of the ſaline matter of the blood continues to paſs this way; and therefore he had been led to give for drinks, not ſimple water, but always water impregnated with ſaline matters; and he aſſerts, that water, ſo impregnated, paſſes more certainly to the kidnies, than perfectly inſipid liquors. Thus water impregnated with vegetable acids is not only more grateful to the patient than ſimple barley-water, or watergruel, but paſſes always in greater quantity, in proportion to the liquid taken in. In the ſame way ſome other liquors are particularly well ſuited for drinks in the dropſical ſtate; ſuch as fermented liquors of all kinds, when theſe are either weak in their quality, or taken pretty well diluted with water. Even ardent ſpirits, if largely diluted, and joined with a portion of vegetable acid, have been found to ſtimulate the kidnies, and hence to make a proper part of the ordinary drink. The milk of the non-ruminant animals, and the products of whey and butter-milk from the other ſorts of milk, eſpecially when theſe products are in their moſt acid ſtates, are uſeful as drinks in the diſorders in queſtion.

In a word, with reſpect to the propriety of taking drink in dropſy it may be obſerved, that whenever we perceive that the quantity of urine voided is equal to the quantity of drink for the ſame time taken in, it is obviouſly ſafe to allow as much drink as the patient may deſire; and there is no doubt, that, by ſuch indulgence, the diſeaſe may be often entirely cured. There are in fact many inſtances of the cure of dropſy, in this manner, on record; as the caſes publiſhed by ſir George Baker, in the Medical Tranſactions, and thoſe quoted by ſir Francis Milman from ſeveral authors, and eſpecially the inſtances given by that ingenious author from his own experience; ſee his Treatiſe on Dropſy. "From my own practice," Dr. Cullen juſtly obſerves, "I always thought it abſurd in phyſicians to employ diuretics, while they enjoined an abſtinence from drink, which is almoſt the only means of conveying theſe diuretics to the kidnies: ſo, whenever I employ diuretics, I at the ſame time adviſe drinking freely; and I am perſuaded that drinking largely has often contributed to the cures I have made." Loc. cit.

The number of ſubſtances, which have been praiſed by different writers, as poſſeſſed of diuretic powers, or capable of ſtimulating the action of the kidnies, is very great, eſpecially from the vegetable world. Many of them, however, are very inefficacious; and it is the common imperfection of the whole of this claſs to be very uncertain in their operation: ſometimes the more feeble diuretics will ſucceed, when the ſtronger have failed; and often after every variety of kind and combination has been tried, the ſecretion of urine remains unaltered. Digitalis, ſquill, mercury, and cryſtals of tartar ſeparately or combined, are the moſt efficacious of the claſs; but the alkalies both fixed and volatile, ſome of the neutral ſalts, the nitrous ether, the terebinthates, &c. are by no means uſeleſs as auxiliaries. There is, perhaps, no claſs of medicines, in which a combination of two or more ſubſtances, poſſeſſing ſimilar powers, is ſo frequently important, as in that of the diuretics. Thus the uſe of potaſs, joined with bitter vegetables, is recommended by ſir John Pringle, as an efficacious medicine: and as the alkaline ſubſtances may be often prevented, by purging, from reaching the kidnies, ſo their diuretic effect may be often more certainly ſecured by giving an opiate at the ſame time, according to the practice of Dr. Mead. A combination of the ſquill, with digitalis, and ſome of the leſs purgative preparations of mercury, as the common blue pill, is occaſionally very active in its diuretic operation; and, in children, or in old and feeble people, the union of the ſpirit of nitrous ether, or of other diuretic ſubſtances, with the bark, or other vegetable tonics, appears to be often very ſerviceable.

The mode in which diuretic medicines effect the removal of dropſies is not ſatisfactorily underſtood. The diſcharge of the water by the kidnies implies the previous abſorption of it, from the cavities into which it was effuſed. Whether, therefore the primary action of diuretics is on the abſorbent ſyſtem, which takes up the ſerum, and excites diureſis by increaſing the water of the blood, as ſtated with reſpect to diluent drinks; or whether the diminution of the water of the blood, in conſequence of increaſed action in the kidnies, may occaſion an extraordinary action of the abſorbents, to ſupply the deficiency, it is not eaſy to determine. It is ſufficient, however, that we know the practical fact, that diuretics do, at the ſame time, increaſe the diſcharge of urine, and diminiſh the watery effuſions which conſtitute dropſy.

In aſthma, dyſpnœa, chronic catarrh, and other chronic diſeaſes of the lungs, diuretics afford relief; perhaps in conſequence of the balance between the halitus of the lungs, (as well as of the ſkin) and the urinary ſecretion. "In omnibus morbis pectoris," ſays Baglivi, "ad urinam ſpectandum."

It may be added that a ſuppreſſion of urine ſometimes takes place, particularly in children, from a ſlight weakneſs, or temporary paralyſis of the fibres of the bladder, which is readily removed by the application of cold to the lower extremities, ſo that the urine will ſpeedily begin to flow, when the patient is placed with his naked feet on a cold hearth, or cold water is daſhed over his legs.

Diuretic *Salt* is the old name for *acetite of potaſh*, which ſee.

DIURIS, in *Botany*, (from δις, *double*, and ουρα, *a tail*, expreſſive of the long lower leaves of the calyx hanging down like two tails,) Sm. Tranſ. of Linn. Soc. v. 4. 222. Swartz. Orchid. 58. t. 1. f. M. Willd. Sp. Pl. v. 4. 79. Claſs and order, *Gynandria Monandria*. Nat. Ord. *Orchideæ*.

Gen. Ch. *Cal.* Perianth ſpreading, of five leaves; the three uppermoſt coloured, of which the central one is ſeſſile, ſomewhat vaulted, the two lateral ones with claws, ovate; two lowermoſt elongated, channelled, linear-lanceolate, pointing downwards, under the lip. *Cor.* Petals four, much ſmaller than the calyx, lateral; the two outermoſt obovate, rather ſpreading; two inner erect, acute, ſometimes lobed. Nectary an ovate convex pendulous lip, ſhorter than the calyx, without a ſpur, with two erect teeth reaching from the baſe to the middle of its upper ſurface. *Stam.* and *Piſt.* Germen inferior, oblong, ſomewhat cylindrical, furrowed; ſtyle ſhort, reverſed, pointed; ſtigma near the extremity, oblique. Anther parallel to the ſtyle, on the ſide oppoſite to the lip; its lid elliptical, with two parallel oblong cells. *Peric.* Capſule of one cell, with many ſeeds.

Eſſ. Ch. Nectary a pendulous lip without a ſpur. Calyx of five leaves; the three uppermoſt coloured. Petals four, lateral. Style reverſed.

1. D *punctata*. Sm. Exot. Bot. v. 1. 13. t. 8. Blue dotted Diuris. "Two lower calyx-leaves linear, thrice as long as the lip; two lateral ones rounded, entire."—Native of New South Wales, near Port Jackſon, in a good ſoil, flowering from July to October. *Stem* about two feet high, clothed with a few ſheathing ſcale-like leaves. *Flowers* large and handſome, about four in a looſe, upright, terminal ſpike, with linear channelled bracteas ſhorter than the flowers. The two lower calyx-leaves are green, an inch and half long; the reſt, as well as the lip and petals, are of a delicate lilac hue, dotted, repreſented much too deep and too blue in the figure of Exot. Bot. and the two lateral upper calyx-leaves there alſo ſeem too pointed. 2. D. *aurea*. Sm. Exot. Bot. v. 1. 15. t. 9. (D. ſpatulata; Sw. Orchid. 107.) Golden Diuris.—"Two lower calyx-leaves lanceolate, not twice as long as the lip; two lateral ones elliptical, acute, with ſhort claws."—From the ſame country, where it bloſſoms in October. *Root* a double bulb, as in moſt Orchiſes. *Stem* twelve or fourteen inches high, bearing one or two concave ſheathing ſcales. *Leaves* one or two, radical, erect, linear-lanceolate. *Flowers* from three to five in the ſpike, but half the ſize of the laſt, of a bright golden yellow, their claws ſtained, and the lip ſpotted, with red. Two inner petals lanceolate, entire, which in the former have a notch on one ſide. 3. D. *maculata*. Sm. Exot. Bot. v. 1. 57. t. 30. Willd. Sp. Pl. v. 4. 79. Yellow Spotted Diuris.—"Two lower calyx-leaves lanceolate, twice as long as the lip; two lateral ones rounded, obtuſe, with long claws."—Native alſo of New South Wales. It differs from the laſt in having a more zig-zag flower-ſtalk, and eſpecially in the three upper leaves of the calyx being rounded, all ſpotted like the lip and outermoſt petals with blotches of red. The two lower green calyx leaves often croſs each other.

Theſe plants would be a very deſirable acquiſition to our gardens, and perhaps might be brought over alive if their roots were taken up while in flower, and replanted in pots of dry ſifted earth, being afterwards duly watered occaſionally, according to the method recommended by Mr. Crowe for European *Orchideæ*; ſee Sm. Introd. to Botany, 110.

DIURNAL, from *dies*, day, in *Aſtronomy*, ſomething relating to the day; in oppoſition to nocturnal, which regards the night.

Diurnal *arch*. See Arch.

Diurnal *circle*. See Circle *Diurnal*.

Diurnal *motion of a Planet*, is ſo many degrees and minutes, &c. as any planet moves in twenty-four hours.

The Diurnal *motion of the earth*, is its rotation round its axis, the ſpace whereof conſtitutes the natural day. See *Motion of the* Earth.

Diurnal is alſo uſed in ſpeaking of what belongs to the nycthemeron, or natural day of twenty-four hours. In which ſenſe it ſtands oppoſed to annual, menſtrual, &c.

Diurnal, *Diurnale*, low Latin, a book containing thoſe canonical hours of the Roman breviary, which are to be ſaid in the day time, namely, lauds, prime, terce, &c. in oppoſition to the nocturns which were appointed to be ſaid in the night.

DIURNARY, Diurnarius, an officer in the Greek empire, who wrote down, in a book for that purpoſe, whatever the prince did, ordered, regulated, &c. every day.

DIUTURNITY, the long continuance or duration of any being.

DIVUS, Diva, in *Antiquity*, appellations given to men and women who had been deified, or placed in the number of the gods.

Hence it is, that on medals ſtruck for the conſecration of an emperor or empreſs, they gave them the title of Divus, or Diva. For example: divus julius. divo antonino pio. divo pio. divo claudio. diva faustina aug. &c.

DIVY, in *Geography*, an iſland of the Eaſt Indies, on the coaſt of Orixa, ſouth-weſt of Mazulipatam, which formerly belonged to the French. It is formed partly by the ſea and partly by the river Crichena, which being divided into two arms, ſurrounds a country of about 75 miles in circumference, and from 15 to 18 miles in diameter, and diſcharges itſelf into the ocean by means of two unequal æſtuaries, one of which, to the north-eaſt of the iſland, is called Ampſaldivy, and the other to the ſouth-weſt, which is the real Crichena, but commonly called Chipler mouth. (Herbin Statiſtique de la France.) The benefit which France derived from this iſland is computed at 240,000 livres *per annum*.

Divy *point*, a cape of Hindooſtan, on the eaſt-coaſt of the circar of Condapilly, in the bay of Bengal. N. lat. 15° 55′. E. long. 81° 20′.

DIXAN, a town of Abyſſinia, ſeated on the top of a hill in the form of a ſugar-loaf; ſurrounded by a deep valley like a trench, and having a road that winds ſpirally up the hill till it terminates among the houſes. It is inhabited partly by Moors, and partly by Chriſtians, and is very well peopled; and the only trade of the place is that of ſelling children. The Chriſtians bring ſuch as they have ſtolen in Abyſſinia to this frontier town as to a ſure depoſit; and the Moors receive them there, and carry them to a certain market at Maſuah, whence they are ſent over to Arabia or India. The prieſts of the province of Tigré, eſpecially thoſe near the rock Damo, are concerned in this infamous traffick, and ſome of them are licenſed to carry it on as a fair trade, upon paying ſo many firelocks for each dozen or ſcore of ſlaves. The Naybe of Dixan receives ſix patakas of duty for each one exported. N. lat. 14° 57′ 55″. E. long. 40° 7′ 30″.

DIXAIN, a topical diviſion of the Vallais; which ſee.

DIXBILLS, a poſt town of America, in the county of Suffolk and ſtate of New York; 290 miles N. E. of Waſhington.

DIXFIELD, a town of America, in the ſtate of Maine and county of Cumberland, on the north bank of Ardroſcoggin river, having Jay on the E. and Wilton N.; about 70 miles N. of Portland.

DIXIEME, *Fr.* the 10th in *Muſic*, that is to ſay, the octave of the 3d, or 3d of an octave.

DIXMONT, in *Geography*, a ſmall town of France, in the department of the Yonne; ſix miles north of Joigny.

DIXMUDE, a ſmall town of France, in the department of the Lys, chief place of a canton in the diſtrict of Furnes, with a population of 2521 individuals. It is ſituated in a fertile plain on the river Yperlée; nine miles north of Furnes and Nieuport, and 24 eaſt of Dunkirk, lat. 51° 2′ 6″, and remarkable for its excellent butter, which is really of the very firſt quality. The canton has 10 communes and 15,256 inhabitants, upon a territorial extent of 147½ kiliometres.

DIXNEUVIEME, 19th double octave of the 5th in *Muſic.*

DIXON, in *Geography*, a town of America, in South Carolina; 27 miles eaſt of Camden.

Dixon's *Entrance*, lies on the N. W. coaſt of North America, and is the paſſage into the ſound between the Main land and Waſhington's or Queen Charlotte's iſlands, from the north-weſt. It ſeems to be what is called in America *Barrell's Sound.*

Dixon's *Springs*, in Smith's county, Teneſſee. Here is a poſt-office; 691 miles W. by S. from Waſhington.

DIXSEPTIEME, *Fr.* 17th double octave of the 3d in *Muſic.* Every ſounding body gives with its principal ſound, its major 17th preferably to its immediate 3d, or 10th, becauſe the 17th is produced by an aliquot part of the whole ſtring, *i. e.* a 5th part; whereas, neither $\frac{4}{5}$, which would give the 3d, nor $\frac{2}{3}$, which would give the 10th, are aliquot parts of a ſtring. See Sound, Interval, Harmony.

DIZABAD, in *Geography*, a town of Perſia, in the province of Irak; 60 miles S.S.E. of Amaden.

DIZIER, Saint, in Latin *Sancti Deſiderii Fanum*, a town of France, in the department of the Upper Marne, chief place of a canton in the diſtrict of Waſſy, with a population of 5824 individuals. It is ſituated on the river Marne, at the ſpot where this river becomes navigable, 18 miles E. of Vitry, 15 S. W. of Bar le Duc, 168 E. of Paris, lat. 48° 35′; and chiefly remarkable for ſeveral iron mines and forges, and manufactures of caſt-iron, linen-cloth, leather, hoſiery, and hats. The canton has 14 communes, a territorial extent of 172 kiliometres and a half, and 11,449 inhabitants.

DIZOSTOS, in *Botany*, a name given by ſome of the old Greek writers to the apios, or knobby-rooted ſpurge: it is ſo called, becauſe of its having uſually two or three ſlender and ruſh-like ſtalks, growing up from the roots, which ſeem as if they were fit to be uſed as cords or bandages. See Apios.

DIZUM, or Ditsum, in *Geography*, a town of Germany, in the circle of Weſtphalia, and county of Eaſt Frieſland; four miles S.S.E. of Emden.

DIZZINESS, in *Medicine.* See Vertigo.

DMITREVSKOI, in *Geography*, a town of Ruſſia, in the government of Jaroſlavi, or Yaroſlaf; 68 miles N.N.W. of Jaroſlavi or Yaroſlaf.

DMITRIEV Svopa, a town of Ruſſia, in the government of Kurſk, on the Svopa; 20 miles N.N.W. of Kurſk, and 432 S.S.E. of Peterſburg. N. lat. 52° 5′. E. long. 71° 16′.

DMITRIJA Rostovskoi, a town of Ruſſia, in the province of Uſting, on the Sula; 140 miles E.S.E. of Uſting.

DMITROFSK, a town of Ruſſia, in the government of Orel, ſeated on the rivulet Neruſer, falling into the Siof.

DMITROV, a town of Ruſſia, in the government of Moſcow, ſeated on the ſmall river Vakhroma, which, uniting with the Seſtra, forms the river Dubnia. The environs are celebrated for yellow and white apples, which are ſo tranſparent, that the pips may be ſeen through the rind; 32 miles north of Moſcow.

DNEPROVSK, a town of Ruſſia, in the government of Tauris, or Crim Tartary, on the Dnieper; 80 miles S.S.W. of Ekaterinoſlav.

DNIEPER, Dniepr, Nieper, Danapris, the Boryſthenes of ancient geographers, one of the largeſt rivers in Europe, has its ſource in Ruſſia, in the government of Smolenſk, not far from the mountains whence iſſue the Duna and the Wolga, and runs ſouthwards through Lithuania, the country of the Zaporog Coſſacks, and that of the Nogaï Tartars into the Euxine or the Black ſea, at Kinburn, near Oczakow. It purſues a courſe of about 1500 verſts through the fertile provinces of Smolenſko, Mohilef, Tſchernigof, Kief, and Ekaterinoſlav.. At Smolenſk it generally freezes in November, at Krementſchuk in December, and at Kief in January. Its bed is partly ſandy and ſtony, and partly of marle. The water, though calcareous, is not reckoned unwholeſome. The iſlands which the Dnieper forms in its windings are extremely numerous. In many places it has commodious ferries. At Kief there is a bridge of boats 1638 feet, or 546 fathoms in length; this bridge is opened at the breaking of the ice.

The Dnieper abounds with fiſh, particularly ſturgeon, carp, and pike. It is navigable from Smolenſko to Kief: but below this town, at the diſtance of 60 verſts from the influx of the Siera, down to Alexandroffkaia, thirteen cataracts, cauſed by a multitude of blocks of granite projecting into the river, impede its navigation. Empty barks only can get over the cataracts at high water. The cargoes are re-ſhipped in other veſſels, 70 verſts lower down.

From the waterfalls, to the mouth of the Dnieper, the diſtance of about 400 verſts, this river is navigable with perfect ſafety. But at Cherſon there are only five to ſix feet water in the deepeſt channel of the Dnieper, near the diſgorging of all its branches into the Liman, which is a marſhy lake about 60 verſts in length and 10 in breadth. Mr. W. Elton, aſſerts, however, that this bar is not very broad, and that to deepen it would not require more than 40,000*l.* ſterling, according to the calculation of a Dutch engineer.

The banks of the Dnieper, as far as Kief, are covered with thick foreſts, which yield thoſe fine maſts that are exported from Riga. Below Kief the ſhores are moſtly bare; but the contiguous provinces yield ſuch an abundance of corn, that as much might be exported from the Dnieper and Caffa as would ſupply almoſt all Europe.

The foreſts which contain the beſt maſts are ſituated on the Branſk river, which, together with ſeveral other ſtreamlets, as the Soſh, the Deſna, the Soola, the Pſiol, the Vorſkla, the Sammara, the Ingulatz, falls into the Dnieper. Tooke's View of the Ruſſian Empire.

Dnieper, *the Steppe of the*, is one of the numerous vaſt plains of Ruſſia, in the government of Ekaterinoſlav, between the Dnieper and the Bogue. It includes the Crimæan Steppe on the left ſide of the Dnieper, and the whole ſpace which extends over the Donetz to the Don, the ſea of Azof, and the Black ſea; conſequently the greateſt part of the governments of Ekaterinoſlav, Taurida, and a part of Voronetz, Karkhof, and Kief. It is in general very dry and ſandy, has many ſalt lakes, and is as yet but little inhabited, although ſome of its diſtricts ſeem fit to be adapted to paſturage and agriculture. Tooke's View of the Ruſſian Empire.

DNIESTR, or Niester, a river of Poland, which paſſes by Halics, Choczim, Saroka, Raſzcow, Egerlik, Bender, &c. and diſcharges itſelf into the Black ſea, at Akerman. See Niester.

DO, in *Muſic*, a ſyllable ſubſtituted by the Italians to *ut* in ſolemnization, as more vocal and fit for the exerciſe of the voice, for which *u* is the moſt unfavourable of all the vowels, and *t* totally ſtops all emiſſion of ſound.

Do *Law*.—To *do law*. *facere legem*, is the ſame as to *make law*, anno 23 Hen. VI. cap. 14. See Make.

Do, *ut des* and *ut facias*. See Consideration.

DOABEH, in *Geography*, a river of Aſia, which changes its name to Kameh, near Cabul.

DOAN, a town of Arabia, in the province of Hadramaut, the reſidence of a ſchiech; 25 days' journey eaſt from Sana, and 11 from Keſchim; ſaid to be a larger and more elegant city than Sana.

DOANÆ, in *Ancient Geography*, a people of India, on the other ſide of the Ganges, placed by Ptolemy on the river *Doanas*. The mouth of this river is referred by M. D'Anville to the bay, in which was ſituated the town of Berobe. *Doanas* is alſo the name of a town of India, on the other ſide of the Ganges; called *Tana-Serim*.

DOARA, an epiſcopal ſee of Aſia, in Cappadocia.

DOARÇON, or Doiarçon, or *Oiarçon*, in *Geography*, a river of Spain, which runs into the bay of Biſcay, near port Paſſage.

DOBA, or Daba, a town of Arabia, in the province of Oman; 144 miles N.N.W. of Maſcat.

DOBARUA, or Dobarowa, a town of Abyſſinia; 120 miles E. of Siré.

DOBB'S Ferry, a ferry on Hudſon's river in America; 26 miles above the city of New York.

DOBBER, a town of Arabia; 36 miles N.W. of Sana.

DOBBERAN, a ſmall town of Germany, in the duchy of Mecklenburg-Schwerin, about ten miles N.E. of Roſtock, and two S. of the Baltic ſea, had formerly a celebrated monaſtery founded in 1170, and re-built in 1186, in the church of which are the tombs of two kings of the Obotrites, and of ſeveral princes of Mecklenburg. But it has acquired far greater celebrity within the laſt twenty years as a watering place, the firſt for ſea-bathing in Germany. The bathing-houſe is charmingly ſituated in a wood on the ſhore of the Baltic, about two miles from the town. There are nine cold and one warm baths, and excellent bathing machines for thoſe who wiſh to bathe in the ſea. There are alſo good accommodations for invalids and infirm perſons, who cannot walk or ride from Dobberan to the bathing place. Dobberan itſelf has very good lodging houſes, and two extenſive and well kept hotels, in which the company dine together, as at the hotels of Harrowgate. The duke of Mecklenburg-Schwerin patronizes this eſtabliſhment, and frequently dines with the company, which is generally ſelect, and compoſed of the firſt families in the north of Germany. The ſituation of the town is cheerful, the climate ſalubrious, and the place affords all the amuſements that are ſought for in the beſt watering places. F. L. Röper's Geſchichte ŭnd Anecdoten von Dobberan in Mecklenburg nebſt einer Beſchreibŭng der Bæder ŭnd des Badehaŭſes. Neu Strelitz, 1797.

DOBBS, a county of North Carolina.

Dobbs, *Cape*, a cape in Hudſon's bay, at the S. ſide of the entrance of Wager's river. N. lat. 65°. W. long. 86° 30′.

DOB CHICK, in *Ornithology*. See Didapper.

DOBELEHN, or Doblehn, in *Geography*, a ſmall town of Ruſſia, in the government of Courland, in the province of Semgallen, or Semigallia, with an old caſtle.

DOBELN, a town of Germany, in the circle of Upper Saxony, and circle of Leipſic; 24 miles W.N.W. of Dreſden, and 14 W. of Meiſſen.

DOBERA, in *Botany*, (Dober of the Arabians,) Juſſ. 425. Claſs and order, *Tetrandria Monogynia*. Nat. Ord. uncertain. Juſſ.

Gen. Ch. *Cal.* Perianth, urceolate, with four ſpreading teeth. *Cor.* Petals four, twice as long as the calyx, linear-lanceolate, ſomewhat ſpreading. Nectary of four erect, roundiſh, abrupt, green, fleſhy glands, between the petals and ſtamens, one third as long as the filaments. *Stam.* Filaments four, erect, awl-ſhaped, united at their baſe into a ſquare tube; anthers erect, lanceolate, as long as the filaments. *Piſt.* Germen ſuperior, cylindrical, ſomewhat ſwelling, half the length of the calyx; ſtyle half the length of the germen; ſtigma capitate, of two lobes. *Peric.* Drupa oval, fleſhy, internally viſcid. *Seed* one, ovate-oblong, fleſhy.

Eſſ. Ch. Calyx four-toothed. Petals four. Nectary of four glands, betwixt the petals and ſtamens. Drupa ſuperior, with one ſeed.

D. *glabra*. (Tomex glabra; Forſk. Ægypt. Arab. 32.) Frequent at Surdûd, and called by the Arabians Dober. It is, according to Forſkall, the only botaniſt who has ſeen it, a very large tree, with oppoſite, ovate, ſtalked, coriaceous, entire *leaves*, tapering at each end. *Flowers* white. *Fruit* eatable, an inch long, green, with violet-coloured viſcid inſipid pulp.

DOBERI, in *Ancient Geography*, a people of Macedonia, in Pæonia, called *Doberes* by Herodotus, and probably the inhabitants of the town called *Doberos* by Thucydides.

DOBERSCHAU, anciently *Dobrus*, in *Geography*, a ſmall, but very old town of Saxony, in the circle of Miſnia, on the river Spree; 3 miles S. of Bautzen. It is mentioned as a ſtrong place in a document of the year 1228, which fixes the limit between the kingdom of Bohemia and Miſnia.

DOBERSDORP, a town of Germany, in the duchy of Holſtein; 10 miles W. of Lutkenburg.

DOBERSPERG, a town of Germany, in the archduchy of Auſtria; 4 miles N. of Bohmiſch Waidrofen.

DOBERTIN, or Dobbertin, a ſmall town of Germany, in the duchy of Mecklenburg-Schwerin, ſituated on a ſmall lake; 15 miles S. of Guſtrow, with a Lutheran convent for ladies, which poſſeſſes twenty-eight villages.

DOBLEN. See Dobelehn.

DOBORBICA, in *Ancient Geography*, a ſtrong town of Illyria.

DOBOREVA, in *Geography*, a town of Boſnia; 28 miles S.S.E. of Serajo.

DOBOSNA, a town of Lithuania, in the palatinate of Minſk; 12 miles N.W. of Rohaczow.

DOBOY, a ſmall American iſland in the Atlantic, near the coaſt of Georgia. N. lat. 31° 28′. W. long. 81° 31′.

DOBRA, a town of Tranſilvania; 20 miles W.N.W. of Millenbach.—Alſo, a town of Servia; 17 miles W. of Orſova.

DOBRADIEN. See Gutentag.

DOBRAKOTZ, a town of Hungary; 19 miles S. of Symontornya.

DOBRATA, a town of European Turkey, in the province of Moldavia; 40 miles W. of Jaſſy.

DOBRATICZ, a town of Lithuania, in the palatinate of Brzeſc; 6 miles S. of Brzeſc.

DOBRAWIZ, a town of Bohemia, in the circle of Boleſlau; 4 miles S. of Jung-Buntzlau.

DOBRE, a town of Poland, in the palatinate of Belez; 56 miles W.S.W. of Belez.

DOBRENIZ, a town of Bohemia, in the circle of Konigingratz; 8 miles S.W. of Konigingratz.

DOBRIANKA, a town of Ruſſia, in the government of Mogilev; 116 miles S. of Mogilev.

DOBRILOW, a town of Poland, in the palatinate of Red Ruſſia; 32 miles S. of Halicz.

DOBRILUGK, Doberlug or *Dobralug*, a ſmall town of Saxony, in Lower Luſatia; 15 miles from Luckau, with an ancient caſtle, which originally was a monaſtery founded in 1181. It has 800 inhabitants.

DOBRITZ, a ſmall town of Saxony, in the circle of Miſnia, not far from the town of Meiſſen, or Miſnia; at the foot of a mountain called the *Hohe Eyſer*, the top of which has ſome ruins of an old caſtle, known by the name of *Altenburg*. This caſtle is ſuppoſed to have been built in 1068, by Wratiſlaus, king of Bohemia, and margrave of Miſnia, and to have been deſtroyed by the Saxons, who refuſed to acknowledge him for their ruler.

DOBROFORT, a town of Poland, in the palatinate of Belez; 8 miles S. E. of Belez.

DOBROMIL, a town of Poland, in the palatinate of Lemberg; 32 miles S.W. of Lemberg.

DOBRONIVA, a town and caſtle of Hungary; 6 miles N.E. of Schemnitz.

DOBRUSKA, a town of Bohemia, in the circle of Konigingratz; 3 miles N.E. of Konigingratz.

DOBRZIN, or Dobrzyn, a ſmall town of the grand duchy of Warſaw, not far from the Viſtula, ſituated on a rock; 15 miles E. of Wladiſlaw of Jungenleſlau, in a diſtrict of the ſame name; in that part of Poland called Cujavia, which at the partition of that kingdom fell to the lot of Pruſſia; but by the peace of Tilſit has been transferred to the king of Saxony.

DOBSHENA, a town of Hungary; 12 miles S.S.W. of Kapſdorf.

DOBSON, William, in *Biography*, an eminent painter and engraver, was born at London in 1610; and having received ſome inſtruction from Francis Cleyn, was indebted for his principal improvement to ſome pictures of Titian and Vandyck, which he copied, retaining in ſome degree the manner of theſe two maſters. It is ſaid that his advancement from an obſcure condition was owing to the following circumſtance: as Vandyck was paſſing by a ſhop on Snow-hill, in London, he ſaw in a window a picture of Dobſon's painting, which ſtruck him ſo much, as to induce him immediately to enquire after the author. He ſoon found him at work in a poor garret, reſcued him from this ſituation ſo unſuitable to a perſon of his diſtinguiſhed merit, and provided him with accommodations, correſponding to his talents. He afterwards recommended him to king Charles I., who took him into his ſervice, and honoured him with the flattering appellation of the Engliſh Tintoret. His proſpects of thus acquiring an eaſy fortune were beclouded by his diſſolute life, by which he ruined his conſtitution, and diſſipated all his gains, ſo that he was impriſoned for debt and died in London, ſoon after his releaſe, A.D. 1646, at the age of 36, or, as Strutt ſays, A.D. 1647, aged 37 years. "The manner of this artiſt is bold, free, and ſweet, with a charming tone of colour; and although he was inferior to Vandyck in the gracefulneſs of his figures, yet he gave life, dignity, and ſentiment to his portraits; and for truth, character, and reſemblance, few have ſurpaſſed him." At Wilton there is a picture of the "Decollation of St. John" by Dobſon; and at Blenheim, Northumberland Houſe, and the duke of Devonſhire's, there are ſeveral capital pictures of this maſter. Pilkington and Strutt.

DOBULA, in *Ichthyology*, a ſpecies of *Cyprinus*; which ſee.

DOBUNI, in *Ancient Geography*, called by Dio *Boduni*, ancient inhabitants of Britain, who were ſeated in the counties of Glouceſter and Oxford. Both the names of this Britiſh nation ſeem to have been derived from the low ſituation of a great part of the country which they inhabited: for both *Duvn* and *Bodun* ſignify profound or low, in the ancient language of Gaul and Britain. (Baxt. Gloſſ. Brit.) The Dobuni are not mentioned among the Britiſh nations which reſiſted the Romans under Julius Cæſar; which was probably owing to the diſtance of their country from the ſcene of action; and before the next invaſion under Claudius, they had been ſo much oppreſſed by their ambitious neighbours the Cattivellauni, that they ſubmitted with pleaſure to the Romans, in order to be delivered from that oppreſſion. Cogidunus, who was at that time (as his name imports) prince of the Dobuni, recommended himſelf ſo effectually to the favour of the emperor Claudius, by his ready ſubmiſſion, and other means, that he was not only continued in the government of his own territories, but had ſome other ſtates put under his authority. (Tacit. Vit. Agric. c. 14.) This prince lived ſo long, and remained ſo ſteady a friend and ally to the Romans, that his ſubjects being habituated to their obedience in his time, never revolted, nor ſtood in need of any forts or forces to keep them in ſubjection. This is certainly the reaſon why we meet with ſo few Roman towers and ſtations in the country anciently inhabited by the Dobuni.

The Durocornovium of Antoninus, and the Corinium of Ptolemy, are ſuppoſed by antiquaries to have been the ſame place, the capital of the Dobuni, and ſituated at Cirenceſter in Glouceſterſhire, where are many marks of a Roman ſtation. Clevum, or Glevum, in the 13th iter of Antoninus, ſtood where the city of Glouceſter now ſtands; and Abone, in the 14th iter, was probably ſituated at Avinton on the Severn. The country of the Dobuni was comprehended in the Roman province, Britannia Prima.

DOBYGUR, a fortreſs of Hindooſtan, in the Carnatic; 14 miles S. of Velore. This fortreſs, and alſo that of Carnatic-gur, lie in the ridge of hills on the weſt of Arnee; the latter bears about N. by W. at the diſtance of about 3 miles from the former.

DO-CARMO, a town of South America, in the country of Brazil. S. lat. 20° 20′. W. long. 26° 35′.

DOCE, or *Freſh water-river*, a river of Brazil, which runs into the Atlantic. S. lat. 19° 10′. W. long. 25° 20′.

DOCEA, in *Ancient Geography*, a town of Aſia, in the Leſſer Armenia.

DOCELA, a town of Aſia, in the Greater Phrygia.

DOCETÆ, from δοκειν. *to appear*, in *Eccleſiaſtical Hiſtory*, the followers of Julius Caſſianus, one of the Valentinian ſect, towards the cloſe of the ſecond century, who revived a notion that had been adopted by a branch of the Gnoſtics, againſt whom St. John, Ignatius, and Polycarp, had aſſerted the truth of the incarnation. They believed and taught, as their name imports, that the actions and ſufferings of Jeſus Chriſt were not in reality, but only in appearance.

DOCETTES, in *Geography*, a town of France, in the department of the Voſges; 2½ leagues from Remiremont.

DOCHABAD, a diſtrict of Perſia, forming the weſtern boundary of the empire of Candahar, about 30 or 40 miles to the eaſt of Tunhiz.

DOCIMASIA, Δοκιμασια, from δοκιμαζω, *I try*, in *Antiquity*, a cuſtom among the Athenians, by which every man, before he was admitted to a public employment, was obliged to give an account of himſelf and his paſt life, before certain judges in the forum; for if any man had lived a vicious and ſcandalous life, he was thought unworthy of the meaneſt office. Nor was this thought enough; for in the firſt ordinary aſſembly after their election, they were a ſecond time brought to the teſt; when, if any thing ſcandalous was found againſt them, they were deprived of their honours. Pott. Archæol. Græc. lib. ii. cap. 11. tom. i. p. 72.

Docimasia, or *Docimaſtic Art*, is that part of practical chemiſtry which relates to the analyſis of minerals, and to all operations in metallurgy.

DOCIMASTICAL Experiments. See Assaying.

DOCIMENUM Marmor, a name given by the ancients to a ſpecies of marble, of a bright and clear white, much uſed in the large ſumptuous buildings, as temples and the like. It had its name from Docimenos, a city of Phrygia, afterwards called Synaia, near which it was dug, and from whence it was ſent to Rome. It was accounted little inferior to the Parian in colour, but not capable of ſo elegant a poliſh: whence it was leſs uſed by the ſtatuaries, or in other ſmaller works. The emperor Adrian is ſaid to have uſed this marble in building the temple of Jupiter, and many other of the great works of the Romans are of it.

DOCK, in *Agriculture*, the common name of a well-known plant, which is extremely troubleſome as a weed in paſture and other lands, where the ſoil inclines to be deep, heavy, and rather moiſt. It is a plant which riſes with a ſtrong ſtem to ſome feet in height, ſending forth large broad leaves of conſiderable length; and which ſtrikes downwards with a ſtrong perennial tap-root, in a ſomewhat ſimilar manner to that of the carrot, by which means it becomes firmly eſtabliſhed in the ground, without being liable to be deſtroyed, except by particular attention and trouble. It ripens its ſeed quickly in great abundance, but which drops about the foot of the plant, not having the means of being diſperſed to any great diſtance. It has the ſingular property, that if the root be divided below the crown, the portion which is left in the earth ſends forth ſhoots from almoſt any depth, provided it be not confined above, and have a ſuitable ſtate of the ſoil. Beſides, where the upper part is cut or torn off, the plant is capable of ſurviving, and of ſending forth new ſhoots. Even when turned upſide down, by the operation of the plough, it is found to recoil and force its way again quickly to the ſurface. It is therefore evident that the plough alone is not only incapable of perfectly eradicating this injurious plant, but that it often tends to render it more prevalent, by breaking the root into different parts, which readily afford new ſhoots. It is conſequently evident, that, in order to fully eradicate this noxious weed, it is neceſſary to go over the whole of the land with the drawing iron, or ſpade, ſometimes before the buſineſs of ploughing be attempted. By this means, and proper attention at the time of ploughing, to have the bottom and other parts of the roots, which may have previouſly eſcaped, completely removed, theſe weeds may be effectually cleared from the ground.

In meadow and paſture lands they may, however, be ſpeedily removed by the careful uſe of the docking-iron, without having recourſe to the plough.

It is ſcarcely neceſſary to obſerve, that the ripening and diſſemination of the ſeeds of theſe plants, ſhould be effectually prevented, by their ſtems being cut over in due time by the ſcythe, as in this way the multiplication of them will be materially prevented. And the ſowing of the ſeed of this weed, with any ſort of crop, ſhould likewiſe be cautiouſly avoided. See Weeds.

Dock is likewiſe a term applied to the trimming of the buttocks and other parts of ſheep; and alſo to the cutting off the tails of horſes.

Dock, in *Botany*. See Rumex.

Dock, *Docking*, in *Law*, a means or expedient for cutting off an eſtate tail in lands, or tenements, by means of a common recovery; that the owner may be enabled to ſell, give, or bequeath the ſame.

Dock, in the *Manege*, is uſed for a large caſe of leather, as long as the dock of a horſe's tail, which ſerves it for a cover. The French call the *dock*, *trouſſequeue*. It is made faſt by ſtraps to the crupper; and has leather thongs that paſs between his thighs, and along the flanks to the ſaddle-ſtraps, in order to keep the tail tight, and to prevent its whiſking about.

Dock, among *Sportſmen*, is uſed for the fleſhy part of a boar's chine, between the middle and the buttock.

Docks, probably from δοχιον, *receptaculum*, of δεχομαι, *I receive*, are artificial baſons, or excavations, under different denominations, formed for the convenience of receiving ſhips, in rivers and harbours, for the purpoſe of repairing, or for loading and unloading their cargoes, out of the influence of the tide. They are conſtructed of brick, ſtone, or timber; with locks or flood-gates, pointed to or from the tide, to keep the water in or out, as the object and nature of the docks require.

Wet Docks are for the reception of ſhips to lie afloat while loading or unloading, with gates pointed from the tide, to keep the water in at low water. Locks are attached thereto, with double gates, for the more eaſy admiſſion and egreſs of ſhipping, without loſing more water than neceſſary; and to aid the operation of opening and ſhutting theſe gates, ſluices are made within the ſame, to regulate the water within the locks, until the ſame level is produced within as without, ſo that the gates may open with facility.

Dry Docks are of various kinds,

1. Baſons, or docks open to the tide, are called dry docks, becauſe the veſſels frequenting them ground at low water, and lie dry on the ebb tide, and float again on the next riſe of the tide. They are uſed at Liverpool as entrances to the wet docks, and are frequented by coaſters, and ſmall or light veſſels, that do not injure by lying on the ſhore.

2. *Graving Docks*, for repairing of ſhips, are excavations with flood-gates pointed towards the tide, to keep the water out while ſhips are under repair. Veſſels are admitted at high water, and the gates are ſhut at low water; and when

the repairs are completed, the gates are again opened before the riſe of the tide, and the veſſel is on the flood hauled out of dock. In ſome countries, where there is little or no tide, theſe docks are ſo conſtructed, as to have the water within forced out by pumps, or other mechanical operations, as in Ruſſia and other parts.

In ſome places, as at Portſmouth, floating gates are conſtructed, in the form of a veſſel, with each end like the bow of a ſhip, neatly fitted to the lock, and to work up or down a groove in the lock with the tide, by pumping water into, or out of the veſſel, ſufficient to float or ſink it, as occaſion might require. A veſſel of this kind was alſo uſed at the London docks, to keep the water out while they were making.

3. *Slips* for the building of ſhips, may be claſſed under this head. They alſo are excavations, ſloping and inclined towards the tide, well framed and floored with timber, &c. Ships, when built, are generally launched at ſpring tides, by driving away the ſhoars and props which ſupported them, when they are eaſily launched from off the ſlips.

Naval Docks.—Portſmouth, Plymouth, Chatham, Sheerneſs, Woolwich, and Deptford, are the principal naval arſenals of Great Britain; where ſhips of war of every deſcription from ſloops to ſhips of the line of 130 guns, are built and repaired, and when finiſhed are turned out of dock: other countries have ſimilar eſtabliſhments.

Commercial Docks.—The convenience and advantages of wet docks for the ſecurity of ſhipping and the diſpatch of buſineſs are become objects of great attention in many countries for commercial purpoſes. The adoption of them within this laſt century has been no where more general than in Great Britain. The docks now made and making, at London, Liverpool, Hull, Briſtol, Leith, &c. have contributed, and will greatly contribute (combined with our natural advantages) to the increaſe of our commerce, wealth, and population. They have formed our great leading ports into depots, and have given, aided by the extenſion of the bonding ſyſtem, great facilities to commerce by ſuſpending, in many caſes, the payment of duties until goods are taken out for home conſumption. Docks, while giving protection, convenience, and diſpatch to commerce, ſhipping, and revenue, happily link and unite, by means of rivers, roads, and canals, our foreign with our domeſtic commerce.

Liverpool Docks.—The port of Liverpool, from the badneſs of its harbour, the rapidity of the Merſey, and the ſhifting of its ſands, was obliged, at an early period, to reſort to docks: for this purpoſe an act was paſſed in 1708. What neceſſity firſt dictated, has ſince been one of the principal cauſes of the town becoming, through the enterpriſing ſpirit and induſtry of its inhabitants, the ſecond port in the kingdom, for commerce, ſize, and population. In the courſe of one century there have been eſtabliſhed within that port, five wet docks, three dry docks, and five graving docks, independent of the duke of Bridgewater's dock, for canal purpoſes; and a plan is now in execution for making two additional wet docks, and enlarging Queen's dock, which is propoſed to be connected with the Merſey by means of a new floating dock, and a dry harbour baſon. Almoſt all theſe docks are, more or leſs, encroachments on the banks of the river.

By the act paſſed in 1708, authority was obtained to make the firſt dock and baſon for the ſecurity of ſhipping and the loading and unloading of the ſame. The management of the undertaking was inveſted in the corporation for the term of 21 years, which gave for this purpoſe four acres of land, and they were impowered to borrow the ſum of 6000*l.* In 1717, the term was prolonged for 14 years, and they were authorized to borrow 4000*l.* more. In 1737, the term was further extended to 31 years, and powers given to make an additional dock, to build a pier in the open harbour, and to light the docks. The corporation on this occaſion gave ſeven acres of land, and they were impowered to borrow 6000*l.* In 1761, the commerce of Liverpool was ſo much increaſed, and its ſhipping had become ſo numerous, and ſo enlarged in ſize, that further accommodation was wanting. The term of the corporation's management was again extended for 21 years, with powers to make another dock, and to erect a light-houſe for the benefit of the port; for theſe purpoſes they were authoriſed to borrow the ſum of 25,000*l.*, and to raiſe the further ſum of 2000*l.* on the light-houſe duties. In 1784, the powers of all the former acts were enlarged, and the term extended to 41 years, with liberty to make two additional docks and piers, and to borrow for this purpoſe 70,000*l.* In 1799, an act was paſſed to alter and enlarge the powers of former acts, and to render the docks and the port more commodious and ſafe; by which a further extenſion of term was granted for 30 years. The corporation again gave ſome lands, and they were impowered to make two additional docks, and other docks; with liberty to raiſe the ſum of 120,000*l.*, and to double the former tolls.

Under the authority of theſe various acts of parliament the ſeveral docks have been conſtructed, and it has been found that each ſucceſſive improvement, by affording additional convenience to foreign trade, has been followed by its increaſe, and prepared the way for the further extenſion of this excellent ſyſtem of accommodation at future periods. The names and dimenſions of the docks are as follows, and a plan is annexed on a ſcale of double the ſize of the plan of the docks for London. See *Plate of Docks.*

Docks.	Long.	Broad.	Area.	Stat. Mea.	Dock Gates.		Quay.
					Broad.	Deep.	
No.	Yards.	Yards.	Square Yds.	A. R. P.	Feet.	Feet.	Yards.
1 Old Dock - - -	200	70 to 90	17,070	3 2 4	34	23	652
2 Salthouſe - - -	irregular.		22 420	4 2 21	34	23	640
3 George's - - -	250	100	26,068	5 1 2	38	25	670
4 King's - - - -	290	90	25,650	5 1 8	42	25	715
5 Queen's - - - -	270	130	33,600	6 3 31	42	25	780
Baſons.			124,808	25 2 26			
6 To the Old Dock - - - - - -			19,298	3 3 34			
7 To George's Dock - - - - - -			12,090	2 3 0			
8 To King's and Queen's Docks - - - -			14,420	2 3 37			
			170,616	35 1 17			

Theſe wet docks are all for ſhips from foreign voyages. The dry docks are for coaſters, and other ſmall and light veſſels. There are five graving docks, which are from 390 to 490 feet long, and hold two or three veſſels for repair, at a time. No. 9. The duke of Bridgewater has a dock at Liverpool, connected with his canal concerns, calculated to hold 42 canal flats, of 50 tons, ſuch as No. 10 in *Plate of Docks*.

The docks are ſurrounded with convenient and ſpacious warehouſes for the reception of goods; and a tobacco warehouſe capable of containing 7000 hogſheads.

The ſeveral docks are connected with each other by means of tunnels or ſluices under ground, for the purpoſe of ſcouring them when they want cleanſing. This is effected by letting the water off from any one of them, and opening the ſluices into it in different directions; while a number of men with ſhovels throw the mud into the currents, which is thus waſhed into the river, and in the courſe of about 12 or 14 days the dock is ſufficiently cleared.

Accurate tide tables are kept, from which it appears that the riſe of the tide in the river is about 30 feet at ſpring tides, at which times there are about 20 feet water at the Salt-houſe dock gates, and two feet more at the other dock gates.

The corporation make all neceſſary regulations relating to the docks; and the accounts of the receipt and expenditure are annually examined and publiſhed by commiſſioners unconnected with the corporation. Ships are here diſcharged by their own crews, but cooking on board is not permitted, and all lights muſt be put out at ſtated hours.

It cannot be doubted that the docks have greatly encouraged the increaſe which has taken place in the trade of Liverpool, and by their future enlargement, or the formation of additional ones, the port will readily accommodate the future increaſe of its commerce to any poſſible extent. In the year 1571, the inhabitants, addreſſing queen Elizabeth, ſtyled the place the poor decayed town of Liverpool; and in fact, about that period it was only a little fiſhing town, having 12 barks, whoſe tonnage amounted to 223 tons, and which employed only 75 men. In the year 1805, the number of Britiſh built ſhips belonging to the port of Liverpool was 741, and their tonnage amounted to 111,227 tons: the tonnage of the ſhips which entered the docks in that year was 463,482 tons.

Statement of the amount of the dock duties at different periods: each year ending 24th. June.

Years.	Ships.	Duties.		
		£.	s.	d.
1755	——	2,417	13	11
1760	1245	2,330	6	7
1765	1930	3,455	8	4
1770	2073	4,142	17	2
1775	2291	5.384	4	9
1780	2261	3,528	7	9
1785	3429	8,411	5	3
1790	4223	10,037	6	2½
1795	3948	9,368	16	4
1800	4746	23,379	13	6½
1805	4618	33,364	13	1
1808	5225	40.688	0	0

The tonnage of the ſhips which entered the docks in the year ending 24th June 1808, amounted to 516,836 tons.

London.—When it is conſidered that the port of London commands about three-fifths of the commerce of the whole kingdom, that it has frequently riding within it from 1300 to 1400 ſail of veſſels at a time, and in the courſe of the year about 14,000; that from the year 1700 to 1792 its imports had increaſed from 4,785,538 *l.* to 12,072,674 *l.* and its exports from 5,387,787 *l.* to 14,742,516 *l.*, it appears ſurprizing that proper accommodations for its commerce ſhould have been ſo long wanting. The legal quays, which were only 1464 feet long, having remained the ſame as at the time of the fire of London, in the year 1666, were, with the aid of the ſufferance wharfs, totally inadequate to the increaſe of its commerce. The inconveniences ariſing from the crowded ſtate of the Thames at all times, but particularly at thoſe periods when ſhips arrive in large fleets, were long felt and complained of by all the principal merchants; and from reference to the reports of committees, and other publications on the improvement of the port of London, it appears that different plans had been frequently ſuggeſted to extend the convenience of the legal quays both above and below London bridge. It was not, however, till the year 1793, that a plan was firſt projected for making wet docks for the port of London, in Wapping, the iſle of Dogs, and at Rotherhithe, and the preference intended to have been given, in the firſt inſtance, to Wapping, from its vicinity to the city, the ſeat of buſineſs, and to the cuſtom-houſe; one end of the ſpot fixed upon being within a quarter of a mile of the Tower of London, and the eaſtern extremity of it about one mile. The plan of docks meeting with approbation and encouragement, they were circulated generally to all the great leading intereſts in and out of parliament, and to all the principal perſons connected with the commercial intereſt.

In 1794, a general meeting of merchants was convened, to conſider the great inconveniences of the port of London, ariſing from the crowded ſtate of the river, and the confined extent of the legal quays; when a committee was appointed to conſider of the beſt mode of relief, who took into conſideration all the plans which had been ſuggeſted, when they approved of the plan for making wet docks in Wapping with wharfs and warehouſes on their borders, as the moſt effectual means of remedying the evils of the port. In conſequence of this determination, Mr. Daniel Alexander, an ingenious architect and ſurveyor, who had been making great alterations at Rocheſter bridge, and who was converſant with operations connected with the tide, was directed to make a ſurvey, and prepare plans and eſtimates for forming docks at Wapping, with the addition of a cut or canal leading to them, from that part of Blackwall where the preſent Eaſt India docks have been made, and along a line where the Weſt India docks have been ſince formed. The plans and eſtimates were laid before a general meeting of merchants on 22d December, 1795, when they were unanimouſly approved, and a ſubſcription of 800,000 *l.* was filled in a few hours, for carrying the ſame into execution. A committee was appointed to make application to parliament, who preſented a petition in January 1796, which was referred to a ſelect committee of the houſe of commons, who were directed "to enquire into the beſt mode of providing ſufficient accommodation for the increaſed trade and ſhipping of the port of London."

The application of the merchants experienced great oppoſition both from the corporation of the city of London and from private intereſts; and a great variety of plans and projects were brought forward for the extenſion of the legal quays above and below the bridge, and the improvement of the river, with or without docks. This cauſed much delay, but the neceſſity of providing ſome additional accommodation for the increaſing multitude of ſhips which filled the river became every day more evident; and, upon a compariſon of the various plans for making docks in different ſituations, it was generally admitted, that wet docks might be formed in various ſituations at a much leſs expence than on the ſpot fixed upon for the London docks at Wapping,

ping, but that the ſituation of the latter, from its vicinity to the ſeat of commerce, would much more than counterbalance the additional expence of their formation. Through the great exertions and perſeverance of William Vaughan, eſquire, aſſiſted by other highly reſpectable mercantile characters, the various obſtacles to the plan of the London docks were ſucceſſively overcome, and in Auguſt 1798, the ſubſcribers gave notice, that in the enſuing ſeſſion of parliament they meant to renew their application for forming docks at Wapping, and in December following they petitioned for leave to bring in a bill for this purpoſe. A few days after a petition was preſented by the corporation of London, with a view to ſimilar objects, and by making a navigable canal or paſſage acroſs the iſle of Dogs from Blackwall to Limehouſe, purchaſing the mooring-chains in the river, which were moſtly private property, and appointing harbour-maſters to regulate the navigating and mooring of veſſels in the port; they alſo propoſed to make wet docks in ſome part of the iſle of Dogs for the reception and diſcharge of Weſt India ſhipping. The latter part of the plan had however been taken up by a number of Weſt India merchants and planters, who had formed themſelves into a company diſtinct from the ſubſcribers to the London docks, for the purpoſe of forming docks for the reception of the Weſt India trade only, either alone, or in conjunction with the other improvements projected by the corporation. The general conviction of the neceſſity of ſome meaſure of this kind was not ſufficient to produce a union of intereſts in favour of either of the propoſed plans; at length the committee of the houſe of commons made a report, recommending the formation of wet docks as the only remedy for the evils of the port, and that they ſhould be made both at Wapping and the iſle of Dogs, but that the latter ſhould be adopted firſt.

The corporation of London and the Weſt India merchants forming a junction, the act for making the Weſt India docks paſſed in July 1799. In the next ſeſſion, on the 30th June 1800, an act was paſſed for forming the docks at Wapping, and another act has ſince been paſſed for making docks at Blackwall for the Eaſt India trade. Theſe ſeveral undertakings, all ariſing out of the original project of the London docks, have been ſince carried into execution, to the great convenience of the commerce of the port of London, and the permanent benefit of the ſubſcribers, by whom the large ſums neceſſary for accompliſhing them were advanced. For ſome particulars of the progreſs of their formation, ſee Thames river, under the article Canals.

Weſt India Docks.—The act for eſtabliſhing the Weſt India Dock Company, was paſſed 12th July 1799. Their original capital was 500,000*l.*, which they were impowered to increaſe to 600,000*l.* This capital was, however, found inſufficient for completing the undertaking, and in 1802 the company were authoriſed to add 200,000*l.* to it, making their capital 800,000*l.* which has been ſince increaſed to 1,200,000*l.* The dividends to be paid thereon to the ſubſcribers, are not to exceed 10 *per cent. per annum*, to which rate they have already attained.

The concerns of the company are under the management of twenty-one directors, eight of whom are choſen by the corporation of London, four of them being aldermen, and four common-council men.

The works were begun 2d February 1800, and the firſt ſhip entered the homeward-bound dock on 27th Auguſt 1802. The homeward-bound dock, ſee *Plate* N. *fig.* B. 1. which is 2600 feet long, and 500 feet broad, is eſtimated capable of holding 300 ſail of veſſels of 300 tons and upwards each. The outward-bound dock, B 2, is 2600 feet long, and 400 feet broad. They both communicate by means of locks at the end (next Blackwall) with a baſon of about ſix acres, with ſloping banks, which is connected with the river by the entrance lock; and at the end next Limehouſe, where there is another baſon of about two acres, built of brick, through which all veſſels go out, which have occaſion to go into the river to repair. The two docks are ſeparated and ſurrounded by ſtrong walls.

The uſe of theſe docks is limited to the Weſt India trade for 21 years. The company take the ſhips under their ſole direction, of unloading and management from the moment they enter the docks, diſcharging the ſame by their own ſervants; when the crews are diſmiſſed, and neither cooking nor reſidence allowed on board any of the veſſels while they remain in the homeward-bound docks, the gates of which aae ſhut every evening at ſtated hours. A military guard is ſtationed without the docks day and night. The diſtance from the ſtandard in Cornhill, to the neareſt dock gates, is rather more than three miles, and to the further extremity of the dock wall, about half a mile more; a conſiderable expence of cartage is unavoidably incurred, by the ſhips diſcharging at this diſtance, but there is an excellent road both to theſe docks, and to the Eaſt India docks.

Both the docks and warehouſes are handſome and ſpacious, the whole forming a noble and intereſting object, which muſt impreſs every one with an idea of the vaſt magnitude of the branch of commerce, to which they are appropriated. The warehouſes on the north and weſt ſides, are ten in number, with partition walls up to, but not through the roof, and are capable of containing 8000 hogſheads of ſugar each; on the ſouth ſide are extenſive warehouſes for rum. The docks were planned and executed by William Jeſſop, eſq. civil engineer, and the warehouſes by Mr. Gwylt, ſurveyor and architect.

Under the Weſt India dock act, the corporation of London were empowered to make a canal from Limehouſe to Blackwall, of about three quarters of a mile in length, to ſave the navigation round the Iſle of Dogs, which has been completed, and may probably at ſome future period be converted into a dock. See *Plate of Docks*, *fig.* D.

London Docks.—The act for eſtabliſhing this company was paſſed 20th June 1800. Their original capital ſtock was 1,200,000*l.*, and they were authoriſed to borrow, at intereſt, the further ſum of 300,000*l.*; but a larger capital being found neceſſary for completing the undertaking, they applied to parliament, in 1804, for leave to augment their capital ſtock by 500,000*l.*; and having ſince obtained another act for the liberty of raiſing a further ſum of 500,000*l.*, the total capital ſtock the company are now authoriſed to raiſe, if it ſhall be found neceſſary, is 2,200,000*l.* The dividends to be paid thereon to the ſubſcribers, are limited to 10 *per cent. per annum.* The management is veſted in 24 directors, elected annually, of whom the lord mayor is one.

The original plan of theſe docks (with the canal, which had been abandoned) was ſubmitted by the directors to the conſideration of four civil engineers of the firſt eminence and reſpectability, *viz.* Meſſrs. Robert Mylne, John Rennie, Joſeph Huddart, and William Chapman, and underwent ſome alterations by them. The dock and baſon, as altered by them, were then executed under the direction of Mr. Rennie, and the warehouſes and wall by Mr. Alexander.

The dock, baſon, and warehouſes, which are compleated, are of brick and ſtone, are well deſigned, in a chaſte and grand ſtyle, and happily executed, producing a noble effect. The length of the dock, as in *Plate of Docks*, *fig.* A. 1. is 1260 feet long, and 690 feet broad, containing 20 acres, and the baſon marked A. 2. as three acres, and the whole capable of containing about 230 ſhips of 300 tons burthen and upwards.

In the act a power was preſerved to make a ſecond dock and baſon to the eaſtward, with an entrance at Shadwell, containing an area of 14 acres, as denoted in the plan marked A 3 and 4. There are at preſent, on the north ſide of the dock, five ſtacks of warehouſes furniſhed with party and croſs ſub-diviſionary walls through the roofs, as a further protection againſt fire. On the ſouth ſide are other warehouſes, beſides vacant ſpaces left in different parts of the premiſes for additional warehouſes. On the eaſt ſide is the tobacco warehouſe, planned to contain 24,000 hogſheads of tobacco, and ſpacious arched vaults underneath for wine and tobacco. The latter are now wholly appropriated to wine, and hold many thouſand pipes. The whole building ſtands upon an area of near five acres, covering more ground, under one roof, than any public building or undertaking, except the pyramids of Egypt. Its roof is light, airy, and ſimple, and adds greatly to the beauty and boldneſs of the deſign, and ſtands unrivalled in architectural buildings of its kind.

The company was required to complete the docks within ſeven years, which was afterwards extended to twelve years. On the 24th January 1805, they gave notice, by advertiſement, that the baſon at Bell-dock, and the dock communicating therewith, and alſo part of the warehouſes, vaults, and quays, were ready for the reception of ſhips and landing their cargoes, in conſequence of which the dock was opened for public uſe in the following week.

All ſhips laden with wine, brandy, geneva, and other ſpirits, tobacco, and rice, muſt unload in theſe docks for the term of twenty-one years; with all other veſſels the uſe of the docks is optional, excepting thoſe from the Eaſt and Weſt Indies. The ſhips diſcharge their cargoes under the company's cranes, by their own crews. In theſe docks, cooking and reſidence on board are allowed, but no lights are permitted after certain hours. The whole is ſurrounded by a wall, the gates of which are ſhut at ſtated hours.

There is a neat ſwivel caſt-iron bridge over the entrance lock at Wapping, and an excellent double ſteam-engine erected, which was uſed while the docks were making, to carry off the water; it is not now worked.

The riſe of the tide at the entrance lock of the baſon, is four feet lower than the dock itſelf.

Eaſt India Docks.—The act for eſtabliſhing the company paſſed 27th July 1803. Their original capital was 200,000*l.* divided into ſhares of 100*l.* each; and they were authorized to increaſe the capital to 300,000*l.* if it ſhould be found neceſſary. In 1806 they were impowered to add 100,000*l.* more to their capital, making with the former ſum 400,000*l.*, nearly the whole of which has been raiſed. The dividends to be paid thereon to the ſubſcribers, are, as in the two preceding companies, limited to 10 *per cent. per annum.* The concern is under the management of 13 directors, who muſt be holders of at leaſt 20 ſhares of the company's ſtock, and four of them muſt be directors of the Eaſt India company.

The firſt ſtone of theſe docks was laid in March 1805, and the firſt ſhip entered them in Auguſt 1806. The dimenſions of the dock for unloading inwards are 1410 feet in length, and 560 feet in width, containing about 18$\frac{1}{8}$ acres: the dock for loading outwards, which was a part of Mr. Perry's dock, is 780 feet in length, and 520 feet in width, containing 9$\frac{1}{4}$ acres. The extent of the entrance baſon, which connects them with the river, is 2$\frac{3}{4}$ acres; the length of the entrance lock 210 feet, the width of the gates 48 feet in the clear, and the depth of water at ordinary ſpring-tides 24 feet. See *Plate* N. C. 1. 2.

Theſe docks are appropriated ſolely to the reception of Eaſt India ſhipping, and the company undertake to deliver the whole of the cargoes. No cooking, fire, or reſidence on board, are permitted in theſe docks, the gates of which are ſhut every afternoon at four o'clock. The diſtance from the Eaſt India warehouſes being about four miles, the goods are conveyed thither in caravans of a particular conſtruction, by an excellent road, towards the formation of which 10,000*l.* was contributed by the company.

Perry's Dock at Blackwall, and *Greenland Dock* on the oppoſite ſide of the river, were private property, having been formed by enterpriſing individuals, long before any public accommodation of this kind exiſted in the port of London. The firſt now forms one of the Eaſt India docks; and Greenland dock, hitherto appropriated to the purpoſes of the whale fiſhery, has likewiſe been purchaſed by a company.

The Surrey canal company have a dock at the entrance of their canal for ſmall veſſels, and have raiſed a conſiderable capital.

It affords a ſtriking proof of the wealth and proſperity of the city of London to find, that in the courſe of about ten years, there has been expended a capital of between four and five millions in theſe great undertakings for providing accommodation and ſecurity to its ſhipping and commerce.

Hull Dock, is ſituated on the Humber, and was formed under the authority of an act paſſed in 1774. It is about 480 yards long, and 88 yards wide, containing nearly 10 acres, and will accommodate about 130 veſſels at a time. The original capital of the company conſiſted of 120 ſhares, which have ſince been increaſed to 180 ſhares. It has been a moſt profitable concern to the ſubſcribers, as they have uſually made a large dividend; this, however, has varied very conſiderably: in the year 1806 they divided 72*l.* 15*s.* 10*d.* *per* ſhare; but in 1807, after having admitted 25 new ſhares, the dividend was only 49*l.* 9*s.* 1*d.* *per* ſhare. The formation of another dock, with other improvements, has been undertaken.

Briſtol.—Briſtol, with a large trade carried on in an inconvenient harbour from the great height of its tides, has, at length, undertaken an extenſive plan, according to which a very capacious wet dock is to be formed by damming up the river Avon for about two miles of its length, and turning the river into a new cut which has been formed to receive it.

Other ports, ſuch as Lancaſter, Grimſby, Dover, and Margate, &c. have their docks or piers for the ſafety and accommodation of the ſhipping frequenting them.

At *Leith*, in Scotland, a large range of docks are making on an extenſive ſcale, which are to be capable of receiving the men of war which may frequent that part of the coaſt, the old harbour having been found very inadequate: one of the docks is already completed, and a dry dock is nearly ſo. From Leith being within one mile of Edinburgh, and the ſpirit of improvement prevailing in Scotland, there is every probability of theſe docks and the intended incloſed harbour being executed on an extenſive and judicious plan, and becoming of much public utility.

On the continent, ſeveral ports, ſuch as Havre, Oſtend, &c. have wet docks on an extenſive ſcale, under various regulations.

DOCK-*Yards*, are magazines of all ſorts of naval ſtore, and timber for ſhip building; the royal dock-yards in England, are thoſe at Chatham, Portſmouth, Plymouth, Woolwich, Deptford, and Sheerneſs. In time of peace, ſhips of war are laid up in theſe docks, thoſe of the firſt rates moſtly at Chatham, where, and at other yards, they receive, from time to time, ſuch repairs as are neceſſary.

Theſe yards are generally ſupplied from the northern crowns, with hemp, pitch, tar, roſin, canvas, oak-plank, and ſeveral other ſpecies. But as for maſts, particularly thoſe of the largeſt ſize, they have been uſually brought from New England.

The principal dock-yards are governed by a commiſſioner, reſident at the port, who ſuperintends all the muſters of the officers, artificers and labourers, employed in the dock-yard and ordinary. He alſo controuls their payments; examines the accounts; contracts and draws bills on the navy-office to ſupply the deficiency of ſtores, and regulates whatever belongs to the yard, maintaining due order in the reſpective offices.

DOCKEN, in *Agriculture*, a provincial term, ſometimes applied to the dock.

DOCKER, in *Geography*, a river of England, in the county of Lancaſter, which runs into the ſea five miles N. of Lancaſter

DOCKET ſometimes denotes a little bill tied to wares or goods, and directed to the perſon and place they are to be ſent to.

DOCKET, or *Dogget*, in *Law*, is a brief in writing, on a ſmall piece of paper, or parchment containing the purport and effect of a larger writing. The rolls of judgment are docketted, when they are brought into the court of common-pleas and entered on the docket of that term; ſo that by ſearching theſe dockets any judgment may be found, if the attorney's name is known (4 & 5 W. & M. c. 20.) Decrees in chancery, and commiſſions of bankruptcy, are alſo docketted.

DOCKING IRON, in *Agriculture*, an implement of the ſmall ſpade kind, contrived with a narrow long blade, ſo as to raiſe the root of the dock from the bottom.

DOCKUM, or DOKKUM, a town of Holland, in the department of Frieſland, ſituated in a fertile country at the mouth of the Avers, at a diſtance of ſix miles from the North ſea, with which it communicates by means of the Dockum Diep, a canal through which the largeſt veſſels paſs at high water. It is 12 miles N. E. of Leeuwarden, with which it communicates by a canal called the Ee, and 27 miles N. W. of Groningue. Lat. 53° 18′.

DOCLEA, in *Ancient Geography*, a town of Illyria, in Dalmatia; the ſame with *Dioclea*.

DOCTOR, a perſon who has paſſed all the degrees of a faculty, and is empowered to teach or practiſe the ſame.

The title of doctor was firſt created towards the middle of the twelfth century; to ſucceed to that of maſter, which was become too common and familiar.

The eſtabliſhment of the doctorate, ſuch as is now in uſe among us, is ordinarily attributed to Irnerius, who himſelf drew up the formulary. The firſt ceremony of this kind was performed at Bologna, in the perſon of Bulgarus, who began to profeſs the Roman law, and on that occaſion was ſolemnly promoted to the doctorate, *i. e.* inſtalled "juris utriuſque doctor." But the cuſtom was ſoon transferred from the faculty of law to that of theology; the firſt inſtance whereof was given in the univerſity of Paris, where Peter Lombard, and Gilbert de la Potree, the two chief divines of thoſe days, were created doctors in theology, "ſacræ theologiæ doctores."

Spelman takes the title of doctor not to have commenced till after the publication of Lombard's Sentences, about the year 1140; and affirms, that ſuch as explained that work to their ſcholars, were the firſt that had the appellation of doctors.

Others go much higher, and hold Bede to have been the firſt doctor at Cambridge, and John de Beverley at Oxford, which latter died in the year 721. But Spelman will not allow doctor to have been the name of any title or degree in England till the reign of king John, about the year 1207.

The firſt obſcure mention of academical degrees conferred by the univerſity of Paris, from which the other univerſities are ſuppoſed to have borrowed moſt of their cuſtoms and inſtitutions, occurs in A.D. 1215. (Crevier Hiſt. de l'Univ. de Paris, tom. i.) And they were completely eſtabliſhed A.D. 1231. The high degree of eſtimation in which they were held is evident from the following circumſtance. Doctors in the different faculties contended with knights for precedence; and the diſpute was terminated in many inſtances by advancing the former to the dignity of knighthood. It was even aſſerted, that a doctor had a right to that title without creation.

To paſs doctor in divinity at Oxford, it is neceſſary the candidate have been four years bachelor of divinity. For doctor of laws, he muſt have been ſeven years in the univerſity, to commence bachelor of law; five years after which, he may be admitted doctor of laws. Otherwiſe, in three years after taking the degree of maſter of arts, he may take the degree of bachelor in law; and in four years more, that of L.L.D. which ſame method and time are likewiſe required to paſs the degree of doctor in phyſic.

At Cambridge, to take the degree of doctor in divinity, it is required the candidate have been ſeven years bachelor of divinity. Though in ſeveral of the colleges the taking of the bachelor of divinity's degree is diſpenſed with, and they may go out *per ſaltum*. To commence doctor in laws, the candidate muſt have been five years bachelor of law, or ſeven years maſter of arts. To paſs doctor in phyſic, he muſt have been bachelor in phyſic five years, or ſeven years maſter of arts.

A doctor of the civil law, may exerciſe eccleſiaſtical juriſdiction, though a layman, ſtat. 37 Hen. VIII. cap. 17. ſect. 4.

DOCTOR, in *Muſic*. See *Academical* DEGREES.

DOCTOR *of the Law*, was a title of honour or dignity among the Jews.

The Jews, it is certain, had doctors long before Jeſus Chriſt. The inveſtiture, if we may ſo ſay, of this order, was performed by putting a key, and a table-book in their hands, which is what ſome authors imagine our Saviour had in view, Luke xi. 52. where ſpeaking of the doctors of the law, he ſays, "Woe unto you, doctors of the law; for you have taken away the key of knowledge; you entered not in yourſelves, and them that were entering, you hindered."

The Greek text of St. Luke calls them νομικοι; and the Vulgate "legiſperiti;" agreeably to which, our Engliſh tranſlators call them "lawyers." But the French verſion of "docteurs de la loi" ſeems the moſt adequate. In effect, the word "lawyer," "legiſperitus," is only found in St. Luke, and St. Paul, Titus, iii. 13. And νομικος, in St. Matthew, xxii. 35. is rendered by the Vulgate, "legis doctor;" though the Engliſh verſion ſtill retains the word "lawyer."

Theſe Jewiſh doctors are the ſame whom they otherwiſe call rabbins.

DOCTOR *of the Church*, a title given to certain of the fathers, whoſe doctrines and opinions have been the moſt generally followed and authorized.

We uſually reckon four doctors of the Greek church, and three of the Latin. The firſt are, St. Athanaſius, St. Baſil, St. Gregory Nazianzen, and St. Chryſoſtom. The latter are, St. Jerom, St. Auguſtine, and Gregory the Great.

In the Roman Breviary, there is a particular office for the doctors. It only differs from that of the confeſſors, by the anthem of the Magnificat, and the leſſons.

Doctor is alſo an appellation adjoined to ſeveral ſpecific epithets, expreſſing wherein the merit of ſuch as the ſchools owned for their maſters, conſiſted.

Thus Alexander Hales is called the "Irrefragable Doctor," and the "Fountain of Life," as mentioned in Poſſevinus. Thomas Aquinas is called the "Angelical Doctor;" St. Bonaventure, the "Seraphic Doctor;" John Duns Scotus, the "Subtile Doctor;" Raimond Lully, the "Illuminous Doctor;" Roger Bacon, the "Admirable Doctor;" &c.

Doctor, Διδασκαλος, in the Greek church, is a particular officer, appointed to interpret part of the ſcriptures.

He who interprets the goſpel, is called, "Doctor of the Goſpel;" he who interprets St. Paul's epiſtles, "Doctor of the Apoſtle;" he who interprets the pſalms, "Doctor of the Pſalter."

Doctors, *Chriſtian*, in *Eccleſiaſtical Hiſtory*, were divided, towards the cloſe of the 12th century, into two claſſes, *viz.* thoſe who were called by the various names of "biblici," *i. e.* bible doctors; "dogmatici," and "poſitivi," *i. e.* didactic divines; and alſo "veteres," or ancients; and the "ſcholaſtics," who were alſo diſtinguiſhed by the titles of "ſententiarii," after the "Maſter of the Sentences," and "novi," to expreſs their recent origin. The *former* expounded, though in a wretched manner, the ſacred writings in their public ſchools, illuſtrated the doctrines of Chriſtianity, without deriving any ſuccours from reaſon or philoſophy, and confirmed their opinions by the united teſtimonies of ſcripture and tradition. (See Bible *Doctors.*) The *latter* expounded, inſtead of the Bible, the famous "Book of Sentences;" reduced under the province of their ſubtile philoſophy, whatever the goſpel propoſed as an object of faith, or rule of practice; and perplexed and obſcured its divine doctrines and precepts by a multitude of vain queſtions and idle ſpeculations. The method of the "ſcholaſtics" exhibited a pompous aſpect of learning; and thoſe ſubtle doctors ſeemed to ſurpaſs their adverſaries in ſagacity and genius; hence they excited the admiration of the ſtudious youth, who flocked in multitudes to their ſchools, while the "biblici," or "doctors of the ſacred page," as they were alſo called, had the mortification to ſee their auditories unfrequented, and almoſt deſerted. The ſcholaſtic theology continued in high repute in all the European colleges until the time of Luther. Moſh. E. H. vol. iii. p. 92, 8vo.

Doctor's *Commons.* See College *of Civilians.*

DOCTRINE, from *doceo*, I teach, denotes in general any thing that is taught, as a matter either of faith or practice; and the term has accordingly been applied to a variety of opinions, that have been adopted and inculcated in philoſophy, religion, &c. There are certain doctrines reſpecting the political conſtitution of Great Britain, the aſſerting and publiſhing of which are made illegal by ſtatute. Thus, if any perſon maliciouſly or adviſedly affirm, that both, or either of the houſes of parliament, have any legiſlative authority without the king, ſuch perſon ſhall incur all the penalties of a præmunire. (13 Car. II. cap. 1.) Alſo, if a perſon affirm and maintain, by writing or printing, that the king and parliament have no right to direct the ſucceſſion of the crown, he is guilty of high treaſon; during the life of the queen and after her deceaſe, ſhall be guilty of a miſdemeanor, and forfeit his goods and chattels (13 Eliz. cap. 1.); and if he maintains the ſame doctrine by teaching, or adviſed ſpeaking, he incurs a præmunire. (6 Anne, cap. 7.) There are alſo other doctrines of a religious nature, which it is unlawful publicly to maintain and preach. See Blasphemy, Common *Prayer*, Heresy, Trinity, &c.

Doctrine, *Chriſtian*, *Fathers of.* See Fathers.

DOCUMENT, in *Law*, ſome written monument produced in proof of any fact aſſerted, eſpecially an ancient one.

DODANIM, in *Ancient Geography*, the children of Javan, mentioned in the book of Geneſis, and ſuppoſed by ſome to be the name of the firſt inhabitants of Epirus, traces of which they obſerve in the name of Dodona, the moſt ancient of oracles; others ſuppoſe that they were an ancient people called "Pelaſgi," who formed a wandering nation, and that the term Dodanim was formed of *did*, or *dod*, which in the eaſtern dialect denoted *wandering.*

DODART, Denis, in *Biography*, Doctor Regent of the faculty of medicine at Paris, where he was born, in 1634, exhibited early ſuch traits of genius and learning, that Guy Patin, not in general very laviſh of praiſe, conſidered him as one of the moſt learned men of his time; and in a letter to a friend, he called him Monſtrum ſine Vitio. Having, in 1660, taken his degree of doctor, he ſoon attained to diſtinction in his profeſſion, being the following year called to attend the princeſs-dowager of Conti, and the princes, her children, and ſome time after he was appointed phyſician to the king, Louis XIV. In 1673, he was made a member of the Academie des Sciences, and in compliance with their wiſhes, he wrote a preface to the "Memoires pour ſervir a l'Hiſtoire de Plantes," publiſhed folio magno by the academy, in 1676.

He employed ſome labour in making chymical analyſes of plants, with the view of acquiring a more intimate knowledge of their medical virtues, agreeably to the opinions that then prevailed, but which further experience has ſhewn not to be well founded. He purſued his ſtatical experiments, to find the proportion that perſpiration bears to the other excretions, for more than thirty years. The reſults firſt appeared in 1699, in the Memoirs of the Academy. They were afterwards publiſhed ſeparately, under the title of "Medicina Statica Gallica." In the courſe of thoſe experiments he found, that during the Lent in one year, he had loſt in weight eight pounds five ounces: returning to his ordinary way of living, he recovered what he had loſt in a very ſhort time. He once purpoſed writing a hiſtory of muſic, but only finiſhed a memoir on the voice, which is publiſhed among the Memoirs of the Academy. He was of a grave diſpoſition, Fontenelle ſays, pious and abſtemious; and his death, which happened Nov. 5th, 1707, was much regretted.

His ſon, Claude-John-Baptiſte Dodart, following in the ſteps of his father, was made doctor in medicine in 1688. In 1718, he was appointed firſt phyſician to Louis XV. The only work in which he was concerned, was in editing "Pomet's Hiſtory of Drugs," with ſome uſeful notes. He died at Paris in 1730. Haller Bib. Eloy Dict. Hiſt. General Biography.

DODARTIA, in *Botany*, (named by Tournefort in honour of Denis Dodart, M.D. a French botaniſt and academician of his time, author of a large thin volume of deſcriptions of plants, with uncoloured plates, executed in the very fineſt ſtyle of the age of Louis XIV,) Tourn. Cor. 47. t. 478. Linn. Gen. 322. Schreb. 422. Willd. Sp. Pl. v. 3. 355. Juſſ. 119. Gærtn. t. 53. Mart. Mill. v. 2. Claſs and order, *Didynamia Angioſpermia.* Nat. Ord. *Perſonatæ*, Linn. *Scrophulariæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, bell-ſhaped, tubular, with ten angles and five teeth, nearly regular, permanent. *Cor.* of one petal, ringent; tube cylindrical, deflexed, much longer than the calyx; upper lip ſmall, notched, aſcending; lower ſpreading, three-cleft, broader and twice as long, obtuſe, its middle ſegment narroweſt. *Stam.* Filaments four, aſcending towards the upper lip, but not ſo long; anthers ſmall, roundiſh, of two lobes. *Piſt.* Germen ſuperior, roundiſh; ſtyle awl-ſhaped, the length of the corolla; ſtigma compreſſed, oblong, obtuſe, cloven into two cohering plates. *Peric.* Capſule globoſe, of two cells, with a parallel partition. *Seeds* numerous, minute. *Receptacle* convex, united with the partition.

Eſſ. Ch. Calyx with five teeth. Lower lip of the corolla twice as long as the upper. Capſule globoſe, of two cells, with many ſeeds.

1. D. *orientalis*. Linn. Sp. Pl. 883. Mill. Ic. t. 127. (D. orientalis, flore purpuraſcente; Tourn. Voy. v. 2. 144. cum ic. Coris juncea aphyllos; Amm. Ruth. 34. t. 5.) "Leaves linear, entire, ſmooth."—Diſcovered by Tournefort in his journey through Armenia towards Mount Ararat. He brought ſeeds to Paris, from whence the plant was diſtributed among the curious, and it is ſtill ſometimes met with in botanic gardens, though it has no charms to claim general cultivation. Gmelin found it in the deſerts of Siberia very abundantly. The *root* creeps extenſively. The *ſtem* is a foot or two in height, much branched, buſhy, but has a naked appearance, from the ſmallneſs of the leaves. A few violet-coloured *flowers* an inch long, reſembling ſome *Juſticiæ*, are ſcattered here and there, on ſlender ſimple ſtalks.

2. D. *indica*. Linn. Sp. Pl. 883. "Leaves ovate, ſerrated, villoſe."—Native of the Eaſt Indies.—The whole plant is clothed with ſhort ſhaggy pubeſcence. *Leaves* ovate, broad, bluntly ſerrated; the floral ones ſmaller, in the upper part of the branches. *Flowers* about the ſize of the former, yellow, with a hairy calyx.

DODBROOKE, in *Geography*, a pariſh and market town in the hundred of Coleridge, Devonſhire, England, is chiefly entitled to notice from being the firſt place where *White Ale* was brewed, and for which the rector was entitled to a tithe ſhare. A ſmall ſum is now paid by each innkeeper in lieu of it. Here is a charity ſchool; and a market is kept every third Wedneſday in the month: beſides which there are four quarterly markets in every year. It has alſo one fair annually. The living is a rectory, and the town contains 84 houſes, with 608 inhabitants.

DODD, William, in *Biography*, a preacher of conſiderable note, was born in the year 1729, at Bourne in Lincolnſhire, of which place his father was vicar. He was initiated in the learned languages at a private ſchool, but finiſhed his ſtudies at Clare-hall, Cambridge. In the year 1750, he took his degree of B. A., and in the following year he married, and ſoon found himſelf deſtitute of the means of ſupport. It was not till 1753, that he was admitted into orders, when he quickly diſtinguiſhed himſelf as one of the moſt popular preachers of the metropolis. By his pulpit exertions, and by the publication of ſermons and other pieces of a practical religious tendency, he acquired a handſome income, which, however, was inadequate to the ſtyle and manner of living in which he had embarked, as well probably to gratify his own vanity, as the inclinations of his wife, who was ſaid to be wholly deſtitute of thoſe principles of economy which ought to characterize perſons in their rank of life. To augment his income, which was never equal to his expences, he became the author or editor of ſeveral works, which were purchaſed with avidity, and which afforded Mr. Dodd large profits. In 1757, he took his degree of M. A., was choſen preacher to the Magdalen hoſpital, an inſtitution that owed much of its early proſperity to his pulpit talents. In 1763, he obtained, through the patronage of Dr. Squire, biſhop of St. David's, the prebendary of Brecon, and by the ſame intereſt he was appointed tutor to Philip Stanhope, eſq. afterward earl of Cheſterfield. In the following year he was choſen one of his majeſty's chaplains, and ſoon after took his degree of LL.D. In 1772, he was active in the formation of a ſociety for the relief of priſoners confined for ſmall debts, and was in the ſame year preſented to the rectory of Hockliffe in Buckinghamſhire. Hitherto his character was eſtimable, and his exertions were always on the ſide of humanity; but he now found himſelf involved in debts which his regular income was unable to defray. The rectory of St. George's, Hanover ſquare, fell vacant, and Dr. Dodd offered a bribe to the lord chancellor's lady, if ſhe would obtain the preſentation of that living for him. Indignant at the baſe and infamous attack upon her probity, ſhe communicated the fact to her lord, who traced the buſineſs to the true author, and had his name ſtruck out with ignominy from the liſt of the king's chaplains. Dr. Dodd, to avoid the diſgrace which muſt attach to his conduct, went to Geneva, where he met with his pupil, who afterwards preſented him with the living of Winge in Buckinghamſhire. In 1777, he committed a forgery upon his friend and patron; by this he obtained a large ſum of money, which he probably hoped to replace ere the deed was detected. But the offence was ſcarcely committed before the criminal was diſcovered, impriſoned, tried, convicted, and, notwithſtanding every effort made in his behalf, executed at Tyburn. He died with all the marks of ſincere and deep contrition for the vices and follies of which he had been guilty, uttering expreſſions of the moſt bitter regret for the ſcandal, which by his conduct he had brought upon his profeſſion, and on the religion of which he was a miniſter. For a liſt of his works, which were very numerous, we refer to the Gentleman's Magazine for 1777, or to the Gen. Biog.

DODDED, in *Rural Economy*, a term often applied to ſuch ſheep as are without horns.

DODDER, in *Agriculture*, the common name of a troubleſome weed in arable and other lands. See Bindweed.

Dodder, in *Botany*. See Cuscuta.

DODDRIDGE, Philip, in *Biography*, an eminent nonconformiſt miniſter and tutor of the laſt century, was deſcended of an ancient and reſpectable family in Devonſhire. His great grandfather was an eminent merchant at Barnſtaple; and he had a brother, John Doddridge, born at this place in 1555, who paſſed through ſeveral eminent ſtages of the law, in the reign of king James I., and at length became one of the judges of the court of king's bench. This learned judge publiſhed a variety of works on the ſubject of antiquities and law, which did honour to his literary character and legal profeſſion, and died in 1628. The grandfather of our author was educated at Oxford, and ejected from the rectory of Shepperton in Middleſex in 1662, by the act of uniformity. His father was an oilman in London, and as the eldeſt ſurviving branch of the family, was heir at law to a conſiderable eſtate, amounting to about 2000*l.* a-year, but the hazard and expence attending a ſuit for its recovery deterred him from undertaking it. His mother was the daughter of Mr. Bauman, a miniſter at Prague in Bohemia, who abandoned his friends and his country, where he had a conſiderable eſtate, about the year 1626, on account of his adherence to the proteſtant religion. Our author was the laſt and twentieth child of his father's marriage, and was born in London, June 26th, 1702. At his birth his life was deſpaired of, and he was regarded as dead; but by attention and care, the expiring flame of exiſtence was cheriſhed, and under the favour of Providence, his exiſtence was prolonged for the benefit of the world. His conſtitution, however, was always feeble; and his life was wonderfully preſerved for many years, conſidering the aſſiduity with which he proſecuted the ſtudies and ſervices to which he devoted it. To his pious parents he was indebted for early inſtruction in religion, and for thoſe ſalutary impreſſions which were never eraſed from his mind. His claſſical education commenced in London and its vicinity. But being left an orphan in his 13th year, he was removed to a private ſchool at St. Alban's, where he had the happineſs of commencing an acquaintance with Mr. (afterwards Dr.) Samuel Clark, the diſſenting miniſter of the place; to whoſe inſtruction and patronage he was afterwards ſingularly indebted. Having loſt his whole patrimony after his father's death, the protection of ſuch a friend was of the greateſt importance to him; as he was thus enabled to purſue the courſe of his ſtudies. In the year 1718, he left St. Alban's and retired to the houſe of his ſiſter, who was married to Mr. John Nettleton, a diſſenting miniſter at Ongar, in Eſſex. In this retirement, he deliberated on the courſe of life which he ſhould purſue. During this period of heſitation and ſuſpence, he received offers of encouragement and ſupport from the ducheſs of Bedford, if he choſe to be educated in one of the univerſities for the church of England; but as he could not conſcientiouſly comply with the terms of conformity, he declined theſe offers with becoming reſpect and gratitude. Others to whom he applied for advice diſſuaded him from purſuing the miniſtry among proteſtant diſſenters, and adviſed him to devote himſelf to the profeſſion of the law. The latter profeſſion was recommended to him with flattering propoſals; but at the moment of deliberation, and juſt before he had finally determined to accept theſe propoſals, he received a letter from Mr. Clark with generous offers of aſſiſtance, if he choſe the miniſtry upon Chriſtian principles. Theſe offers he thankfully accepted; and after continuing for ſome months at St. Alban's in the houſe of his benefactor, he was placed, in October 1719, under the tuition of the reverend John Jennings, who kept an academy for the education of non-conformiſt miniſters at Kibworth in Leiceſterſhire. The advantages he enjoyed in this ſeminary were very conſiderable, and he improved them with the moſt exemplary ardour and diligence. In this ſituation he paid particular attention to claſſical literature, and cultivated ſuch an acquaintance with the Greek writers, and alſo with the beſt authors of his own country, as ſeemed to form an eaſe and elegance of ſtyle, which he otherwiſe could not have attained.

In 1722, having obtained an ample teſtimonial from a committee of miniſters, by whom he was examined, he commenced the exerciſe of his miniſterial office, as a preacher, and his firſt ſervices were acceptable to thoſe who heard him. His firſt ſettlement was at Kibworth, which he preferred, becauſe it was an obſcure village and the congregation was ſmall, ſo that he could purſue his ſtudies with little interruption. During his reſidence at this place, from June 1723 to October 1725, he paid particular attention to his compoſitions, and he thus acquired a habit of delivering his ſentiments uſually with judgment, and always with eaſe and freedom of language, when he was afterwards, by a multiplicity of engagements, reduced to the neceſſity of extempore ſpeaking. It has been ſaid, that our author excelled as a preacher during this period. In the year 1725, he removed to Market-Harborough, with a view to the benefit which he expected to derive from the converſation and advice of Mr. Some, the excellent paſtor of the congregation in this place, but he ſtill retained his relation to the people at Kibworth, and after the year 1727, when he was choſen aſſiſtant to Mr. Some, he preached alternately at Kibworth and Market-Harborough. During the interval that had elapſed ſince his entrance on the miniſterial office, he received ſeveral invitations from congregations much more numerous than that with which he firſt ſettled: and he was particularly urged to undertake the paſtoral charge of a large ſociety of diſſenters in the city of London. But he determined to adhere to the plan, which he had adopted, of purſuing his ſchemes of improvement in a more private reſidence. When he left the academy, his tutor, Mr. Jennings, not long before his death, which happened in 1723, adviſed him to keep in view the improvement of the courſe of lectures on which he had attended; and this advice he aſſiduouſly regarded during his retirement at Kibworth. Mr. Jennings foreſaw, that, in caſe of his own death, Mr. Doddridge was the moſt likely of any of his pupils to purſue and complete the ſchemes which he had formed, and to undertake the conduct of a theological academy. Mr. Doddridge's qualifications for the office of tutor were generally known and approved, in conſequence of a plan for conducting the preparatory ſtudies of young perſons intended for the miniſtry, which he had drawn up at the deſire of a friend, whoſe death prevented his carrying it into effect. This plan was ſhewn to Dr. Watts, who had then no perſonal acquaintance with the author; but he was ſo much pleaſed with it, that he concurred with others in the opinion, that the perſon who had drawn it up was beſt qualified for executing it. Accordingly he was unanimouſly ſolicited to undertake the arduous office; and after ſome heſitation, and with a very great degree of diffidence, he conſented to undertake it. Availing himſelf of all the information and aſſiſtance which he could obtain from converſation and correſpondence with his numerous friends, he opened his academy at midſummer, in the year 1729, at Market Harborough. Having continued in this ſituation for a few months, he was invited to accept the paſtoral office of a congregation at Northampton; and he removed thither in December 1729; and in March of the following year, he was ordained according to the mode uſually practiſed among diſſenters. It is needleſs to ſtate the faithfulneſs and affection, the aſſiduity and zeal, with which he diſcharged, for more than twenty-one years, the duties of his paſtoral relation, or the condeſcenſion and tenderneſs, with which he treated ſome narrow bigots and weak enthuſiaſts, who belonged to his church and who occaſionally exerciſed his patience. It is ſufficient to ſay, that he engaged, in a very high degree, the love and attachment of his congregation; and to adduce the teſtimoney which he bore to their character, when he obſerves, in his laſt will, "that he had ſpent the moſt delightful hours of his life in aſſiſting the devotions of as ſerious, as grateful, and as deſerving a people, as perhaps any miniſter had ever the happineſs to ſerve."

In the year 1730, Mr. Doddridge entered into the matrimonial relation, with a lady, who poſſeſſed every qualification that could conduce to his happineſs, and who, after a courſe of uninterrupted conjugal felicity, ſurvived him many years. At the firſt removal of the academy to Northampton, the number of ſtudents was ſmall; but it increaſed every year; ſo that, in 1734, it became neceſſary to have a ſtated aſſiſtant, to whom the care of ſome of the junior pupils was committed. Thoſe who wiſh to acquaint themſelves with the diſcipline of the family and the order of the lectures, will find ample ſatisfaction in the Biographia Britannica.

We ſhall only obſerve, that the number of ſtudents was, one year with another, 34; and that during the 22 years in which this academy ſubſiſted under the tuition of our author, he had about 200 young men under his care, of whom 120 entered upon the miniſtry, others occupied reſpectable ſtations in civil life. The ſyſtem of education was liberal and comprehenſive; and many received inſtruction in this ſeminary, who were members of the eſtabliſhment, and who were allowed to attend the worſhip of the epiſcopalian church. On the abilities of the ſubject of this article, and on the high reputation which he acquired, both as a miniſter and a tutor, it is needleſs to enlarge. Of his talents as a writer, his numerous works will ſufficiently enable the public to judge. To enumerate them all would extend this article far beyond its proper limits; but we cannot forbear mentioning a few of the moſt conſiderable. The firſt diſtinct publication of our author was printed, without his name, in the year 1730, and entitled, "Free Thoughts on the moſt probable means of reviving the Diſſenting Intereſt, occaſioned by the late Enquiry into the cauſes of its Decay;" and it exhibits a pleaſing ſpecimen of candour and politeneſs in controverſial writing. In 1732 he publiſhed "Sermons on the Education of Children," principally deſigned for the uſe of his own congregation; and in 1735 "Sermons to young People," which were favourably received, and have paſſed through ſeveral editions. In 1736 there appeared "Ten Sermons on the Power and Grace of Chriſt," and "the Evidences of his glorious Goſpel." The three laſt were afterwards printed ſeparately, at the particular requeſt of one of the firſt dignitaries of the church of England. In the courſe of this year the two colleges of the univerſity of Aberdeen concurred in conferring upon our author the title of doctor in divinity; an honour which was never more fitly beſtowed. In 1739, Dr. Doddridge preſented to the public the firſt volume of his valuable work, "The Family Expoſitor, or, a Paraphraſe and Verſion of the New Teſtament, with critical Notes, and a practical Improvement of each Section." The ſecond volume of this work was publiſhed in 1740, and concluded the evangelical hiſtory; and in the following year, our author publiſhed a volume of "Practical Diſcourſes on Regeneration." In the years 1742 and 1743, Dr. Doddridge publiſhed "Three Letters" to the author of a treatiſe, entitled, "Chriſtianity not founded on Argument." Theſe letters, which are written with the utmoſt politeneſs and candour, met with very favourable reception, and procured for the author the thanks of ſeveral perſons of diſtinguiſhed rank and abilities. He alſo publiſhed, in 1743, "The Principles of the Chriſtian Religion, expreſſed in plain and eaſy Verſe, and divided into ſhort Leſſons, for the uſe of Children and Youth." In this ſmall tract, written with eaſe, plainneſs, and elegance, the author has too freely introduced doctrines of a diſputable nature, which has, in ſome degree, reſtrained its circulation and diminiſhed its uſefulneſs. The ſame objection has been urged by ſome perſons againſt another more popular tract, publiſhed in 1745, and entitled "The Riſe and Progreſs of Religion in the Soul," illuſtrated in a courſe of ſerious and practical addreſſes, ſuited to perſons of every character and circumſtance, with a devout meditation and prayer added to each chapter. This work was written at the requeſt of Dr. Watts, and obtained a very extenſive circulation, not only in this country, but in America, and on the continent of Europe, where it was tranſlated into the Dutch, German, Daniſh, and French languages.

In the year 1747, our author publiſhed "Some remarkable Paſſages in the Life of the Hon. Colonel James Gardiner," a work which was very generally and very highly commended, but in which, as ſome have thought, and particularly his friend and biographer Mr. Orton, "he too much indulged the emotions of private friendſhip and affection." In the year 1748, appeared the third volume of "The Family Expoſitor, containing the Acts of the Apoſtles, with additional Notes on the Harmony of the Evangeliſts;" and "Two Diſſertations," 1. On ſir Iſaac Newton's Syſtem of the Harmony; 2. On "The Inſpiration of the New Teſtament." In this ſame year Dr. Doddridge reviſed the "Expoſitory Works," and other remains of archbiſhop Leighton, and tranſlated his "Latin Prelections." The laſt work publiſhed by our author in his life time, was entitled "A plain and ſerious Addreſs to the Maſter of a Family, on the important ſubject of Family Religion," accompanied with two prayers. Of the author's grand work, "The Family Expoſitor," three volumes remained to be publiſhed after his death. It was a favourable circumſtance, however, for the public, that the author himſelf had finiſhed the whole of the copy, in ſhort hand, a few ſlight notes towards the concluſion excepted, and that the larger part had been tranſcribed for the preſs. This was the caſe with the whole of the fourth volume, which was publiſhed in 1754, and contained St. Paul's epiſtle to the Romans, and his firſt and ſecond epiſtles to the Corinthians. The two remaining volumes, *viz.* the fifth and ſixth, were publiſhed by Mr. Orton in 1756. The greateſt part had been tranſcribed by the author himſelf; and the remainder was tranſcribed either by the editor himſelf, or by ſome of the doctor's pupils, and the tranſcript was compared ſeveral times with the ſhort-hand copy. This is the moſt valuable and the moſt important of all Dr. Doddridge's publications; and on this his literary reputation chiefly depends. Many of his notes diſplay a ſagacious and judicious ſpirit of criticiſm; and the practical reflections are of general utility. The extent and permanence of its ſale evince the eſtimation in which it has been held, and in which it is ſtill held, as we may learn by the demand for a 7th edition. Rapid as he was as a writer, and ready as was his acceſs to the various ſources of information, this work muſt have employed a very conſiderable part of his time, ſo much occupied with numerous other engagements, as a miniſter, a tutor, and an author; more eſpecially, as he has every where interwoven the text with the paraphraſe, and carefully diſtinguiſhed the former from the latter by the italic character. This tranſlation has been extracted from the paraphraſe, and was publiſhed in 1765, in two volumes, 12mo., with ſome alterations and improvements by the editor, together with an introduction, and a number of very ſhort notes. The laſt work of Dr. Doddridge preſented to the public, in 1763, 4to. by the Rev. Samuel Clark of Birmingham, the ſon of the author's earlieſt benefactor, was "His Courſe of Lectures on the principal Subjects of Pneumatology, Ethics, and Divinity; with references to the moſt conſiderable Authors on each Subject." This is a work, formed originally on the plan of the courſe of lectures delivered by Mr. Jennings, the author's tutor, which, notwithſtanding the objections that may be urged againſt the mathematical form in which it appears, in the hands of a judicious lecturer, may be of great uſe; but it admits of continual improvement by the inſertion of new and appropriate references. A ſpecimen of this improvement appears in the new edition of 1794, in two volumes 8vo. We ſhould have mentioned a collection of Dr. Doddridge's hymns, publiſhed by Mr. Orton in 1755, the ſixth edition of which appeared in 1788. Although their poetical merit does not rank high, they are well calculated to anſwer the purpoſe for which they were intended, in their connection with particular texts of Scripture; and though the numbers are not ſo flowing and harmonious as thoſe of Dr. Watts, they are leſs exceptionable to mixed aſſemblies than many of the hymns of the latter. But Dr. Doddridge, independently of his hymns, has given evidence of his poetical taſte and powers.

The excellent lines which he wrote on the motto to the arms of his family, "dum vivimus vivamus," are highly commended by Dr. Johnſon, and repreſented as containing one of the fineſt epigrams in the Engliſh language.

"Live, while you live," the Epicure would ſay,
"And ſeize the pleaſures of the preſent day."
"Live, while you live," the ſacred Preacher cries,
"And give to God each moment as it flies,"
Lord, in my views let both united be,
I live in pleaſure, when I live to thee.

His talent at ſatirical epigram appears in the following lines, written on one of his pupils, a weak young man, who thought that he had invented a method of flying to the moon.

"And will Volatio leave this world ſo ſoon,
To fly to his own native ſeat, the moon?
'Twill ſtand, however, in ſome little ſtead!
That he ſets out with ſuch an empty head."

From the brief view we have above given of Dr. Doddridge's life and labours, it will ſufficiently appear that his application muſt have been inceſſant, and that he could allow himſelf little time for exerciſe and recreation. His conſtitution was always feeble; and his friends deprecated the injurious effects of his unintermitting aſſiduity and exertion. By degrees, however, his delicate frame was ſo impaired, that it could not bear the attack of diſeaſe. In December 1750, he went to St. Alban's to preach the funeral ſermon of his venerable friend and father, Dr. Clark. The ſervice was trying, and in the courſe of his journey he caught a cold, which brought on a pulmonary complaint, that made rapid progreſs, and which reſiſted every remedy.

In the advance of the following ſpring it was thought to abate, and his friends flattered themſelves that his life would be ſpared. Notwithſtanding the advice and remonſtrances of thoſe who apprehended his death, and wiſhed to prolong his uſefulneſs, he would not decline or diminiſh the employments, in the academy and with his congregation, in which he took great delight. At length he was obliged to ſubmit; and to withdraw from all public ſervices to the houſe of his friend, Mr. Orton, at Shrewſbury. Notwithſtanding ſome relief which his receſs from buſineſs afforded him, his diſorder gained ground; and his medical friends adviſed him to make trial of the Briſtol waters. The phyſicians of this place afforded him little hope of laſting benefit; and he received their report of his caſe with Chriſtian fortitude and reſignation. As the laſt reſort in his caſe, he was adviſed to paſs the winter in a warmer climate; and at length he was prevailed upon to go to Liſbon, where he met with every attention, which friendſhip and medical ſkill could afford him. But his caſe was hopeleſs. Arriving at Liſbon on the 13th of October, the rainy ſeaſon came on, and prevented his deriving any benefit from air and exerciſe, and in a few days he was ſeized with a colliquative diarrhœa, which rapidly exhauſted his remaining ſtrength. He preſerved, however, to the laſt, the ſame calmneſs, vigour, and joy of mind, which he had felt and expreſſed through the whole of his diſeaſe. The only anxiety he ſeemed to feel was occaſioned by the ſitutation in which Mrs. Doddridge would be left upon his removal. To his children, his congregation, and his friends in general, he deſired to be remembered in the moſt affectionate manner; nor did he forget a ſingle perſon, not even his ſervant, in the effuſions of his benevolence. Many devout ſentiments and aſpirations were uttered by him on the laſt day but one preceding that of his death. At length his releaſe took place on the 26th of October, O. S. about 3 o'clock in the morning; and though he died in a foreign land, and in a certain ſenſe among ſtrangers, his deceaſe was embalmed with many tears, nor was he moleſted, in his laſt moments, by the officious zeal of any of the prieſts of the church of Rome. His body was opened, and his lungs were found to be in a very ulcerated ſtate. His remains were depoſited in the moſt reſpectful manner in the burying ground belonging to the Britiſh factory at Liſbon. His congregation erected in his meeting-houſe a handſome monument to his memory, on which is an inſcription, drawn up by his much eſteemed and ingenious friend, Gilbert Weſt, eſq. Dr. Doddridge left four children, one ſon and three daughters, and his widow ſurvived him more than 40 years. His funeral ſermon was preached by Mr. Orton from 1 Cor. xv. 54; and it was extenſively circulated under the title of "The Chriſtian's triumph over death." His character is ſo well delineated by one of his biographers, that we ſhall give it in his words. "Dr. Doddridge poſſeſſed a quick conception, a lively fancy, and a remarkable ſtrength of memory, to which were united an invincible reſolution and perſeverance in the proſecution of his ſtudies. It is not ſurpriſing, therefore, that his mind was furniſhed with a rich ſtock of various learning. His acquaintance with books, ancient and modern, was very extenſive; and if, with regard to the learned languages he could not be called a profound linguiſt, he was ſufficiently converſant in them to read the moſt valuable pieces of antiquity with taſte and pleaſure, and to be able to illuſtrate the force and beauty of the ſacred writings in the ſpirit of true criticiſm. To hiſtory, eccleſiaſtical as well as civil, he had paid no ſmall degree of attention; and while from his diſpoſition he was led to cultivate a taſte for polite literature in general, more than for the abſtruſer parts of ſcience, he was far from being a ſtranger to mathematical and philoſophical ſtudies. But the favourite object of his purſuit, and that, in which his chief excellence lay, was divinity, taking that word in its largeſt ſenſe. As a preacher, Dr. Doddridge was much eſteemed, and very popular. Like thoſe of all other preachers, his diſcourſes poſſeſſed different merits and produced different impreſſions, according to the circumſtances in which he was placed, when he prepared, or when he delivered them. When he was enabled to beſtow on them proper pains, he was perſpicuous in his method, natural and orderly in the arrangement of his ſentiments, and correct and elegant, but ſimple in his language. And his manner of delivery was diſtinguiſhed by energy, a pleaſing variety of modulation, and an impreſſive pathos. Of Dr. Doddridge's moral and religious character, it is not eaſy to ſpeak in too high terms. His piety was ardent, unaffected, and cheerful, and particularly diſplayed in the reſignation and ſerenity with which he bore his affliction. His moral conduct was not only irreproachable, but in every reſpect exemplary. To his piety he joined the warmeſt benevolence towards his fellow-creatures, which was manifeſted in the moſt active exertions for their welfare within the compaſs of his abilities or influence. His private manners were polite, affable, and engaging; which rendered him the delight of thoſe who had the happineſs of his acquaintance. No man exerciſed more candour and moderation towards thoſe who differed from him in religious opinions. Of theſe qualities there are abundant proofs in the extenſive correſpondence which he maintained, not only with his diſſenting brethren, but with ſome of the brighteſt ornaments, both among the clergy and laity of the eſtabliſhed church. He was, indeed, ſo ſolicitous to be upon friendly terms, as far as poſſible, with all men, however varying in their ſentiments, that he has been accuſed by ſome of uſing a language of compliance and accommodation in his correſpondence and different connections, not eaſily reconcileable with ſincerity. But how much ſoever we may diſapprove of the ambiguity of ſome of the phraſes which he was accuſtomed to make uſe of, we can by no means admit that they warrant us in attaching to his character ſuch an injurious ſuſpicion. On a view of his whole life, we have no heſitation in ſubſcribing to the opinion of Dr. Kippis, that "Dr. Doddridge was not only a great man, but one of the moſt excellent and uſeful Chriſtians, and Chriſtian miniſters, that ever exiſted."

His reputation was ſuch, and the reſpect of perſons of all parties and denominations for his various excellent qualities was ſo great, that in the cloſe of his life, and in the ſcene of his laſt decline, all ſeemed to vie in teſtifying their ſolicitude for his recovery, and their wiſhes for his obtaining every accommodation, that would render his mind and his circumſtances eaſy. During his ſtay at Briſtol, previouſly to his voyage to Liſbon, he received very particular expreſſions of regard from a clergyman of the eſtabliſhed church. When Dr. Doddridge undeſignedly threw out a hint of the principal reaſon which cauſed him to demur about the voyage, and that was the expence of it, this gentleman was both generous and active in promoting a ſubſcription to defray the charges of his voyage. Nathaniel Neal, eſq. an eminent ſolicitor in London, was alſo very zealous in the management of this buſineſs, which he conducted with ſuch ſucceſs as to be able to inform the doctor, that inſtead of ſelling what our author had in the funds, he ſhould be able, through the benevolence of friends, to add ſomething to it, after the expence of the voyage was defrayed. As Mrs. Doddridge forfeited a conſiderable annuity, to which, as a widow, ſhe would have been intitled, by her huſband's dying abroad, a ſubſcription was opened for her chiefly in London, and, in a great meaſure, under the direction of Mr. Neal; by means of which a ſum was raiſed, which was more than equal to the annuity that had been forfeited. Many other expreſſions of unfeigned and affectionate reſpect for the worth, and memory, and family of Dr. Doddridge, might be mentioned. Orton's Memoirs of the Life, &c. of Dr. Doddridge. Biog. Brit. Gen. Biog.

DODECACHORDON, *Gr.* The title given by Glarianus to the book, in which he propoſes to augment the number of eccleſiaſtical tones or modes of the Romiſh church from eight to twelve. This publication bred ſchiſm among the writers on canto fermo. He pretended by theſe four additional modes, to eſtabliſh in their original purity the twelve modes of Ariſtoxenus, which, however, were thirteen; but this attempt was confuted by John Baptiſt Doni, in his treatiſe on the modes and genera.

The dodecachordon, however, is not only a ſcarce but a valuable book, from the great number of curious compoſitions it contains of the moſt eminent early contrapuntiſts; particularly of the admirable Juſquin Du Prey, and his maſter Okenheim.

DODECACTIS, in *Natural Hiſtory*, a name by which Linkius, and ſome other authors, have called a kind of aſtrophyte, or branched ſtar-fiſh, which has twelve rays, firſt parting from the body, and each of theſe finally divided into many others.

DODECADACTYLON, in *Anatomy*, a name given by ſome of the old authors to the gut called the duodenum, from its being anciently ſuppoſed to be about twelve fingers-breadth long.

DODECADIA, in *Botany*, (from δυωδεκα, *twelve*, in alluſion to the number of ſegments in the parts of the flower,) Loureir. Cochinch. 318. Claſs and order, *Polyandria Monogynia.* Nat. Ord. *Sapotæ*, Juſſ.?

Gen. Ch. *Cal.* Perianth inferior, ſpreading, in 12 ſegments, which are obtuſe, and very ſhort. *Cor.* of one petal, bell-ſhaped, with a ſhort thick tube; limb in 12 acute hairy ſegments, longer than the calyx. *Stam.* Filaments 30; thread-ſhaped, inſerted into the tube of the corolla, longer than the limb; anthers roundiſh. *Piſt.* Germen ovate, ſuperior; ſtyle awl-ſhaped, longer than the ſtamens; ſtigma ſimple. *Peric.* Berry ſmall, ovate, with ſeveral ſeeds.

Eſſ. Ch. Calyx inferior, in 12 ſegments. Corolla in 12 ſegments, bell-ſhaped. Berry.

D. *agreſtis*, a native of the woods of Cochinchina, where it is called Cây Chong dúng.

Loureiro, from whom alone we have any account of this plant, deſcribes it as a large tree with ſpreading branches. *Leaves* alternate, ovato-lanceolate, entire, ſmooth. *Flowers* in axillary ſimple cluſters, ſmall, white. The author had ſeen only unripe berries, and therefore could not correctly deſcribe either the cells or ſeeds. It does not appear on what principle he refers this genus to the claſs *Icoſandria*, inſtead of *Polyandria*, to which it manifeſtly belongs.

DODECAGON, from δωδεκα, *twelve*, and γωνια, *angle*, a regular polygon or figure, with twelve equal ſides and angles.

If the radius of a circle O A D F (*Plate* VI. *Geometry*, *fig.* 83.) be ſo divided into two parts that the rectangle under the whole and the one part ſhall be equal to the ſquare of the other part; then this laſt part will be equal to the ſide C D of a regular decagon A B C D E F, &c. inſcribed in the circle; and that line whoſe ſquare is equal to the two ſquares of the whole, and of the ſame part, will be equal to the ſide A C of a regular *pentagon* inſcribed in the ſame circle. For, draw the radii O A, O C, O D, O F; alſo draw A D, cutting O C in G, and let A H be perpendicular to O G. The triangle O D G, having the angle C O D ($= \frac{1}{2}$ D O F = O A D) = O D A, is iſoſceles: the triangle A O G, having A G O (= G D O + D O G = 2 D O C) = A O C, is likewiſe iſoſceles; as is alſo the triangle C D G; becauſe, C G D being = A G O, and C D G (C D A) = F A D, the triangles A O G and C D G are equiangular; conſequently, C D, A O; C G, G O, being correſponding ſides, we have C G × A O (C G × C O) = C D × G O = GO^2, becauſe G O = G D = D C, the ſide of the decagon, &c. Moreover, becauſe A G = A O, H G will be = H O; and G C being the difference of the ſegments H O and H C, we have $AC^2 - AO^2 = CO \times GC = OG^2$; and conſequently AC^2 (*i. e.* the ſquare of the ſide of the pentagon) $= AO^2 + OG^2$.

Let $CO = a$, $GO = x$, then will $CG = a - x$; and by this propoſition, $\overline{a-x} \times a = x^2$, and $x^2 + ax = a^2$; and reſolving this quadratic equation, we ſhall have $x^2 + ax + \frac{1}{4}a^2 = a^2 + \frac{1}{4}a^2 = \frac{5}{4}a^2$; whence $x + \frac{1}{2}a = \sqrt{\frac{5}{4}a^2}$, and $x = \sqrt{\frac{5}{4}a^2} - \frac{1}{2}a$. Let the radius a be = 1, and G O, or the ſide of a regular decagon inſcribed in the circle is $= \sqrt{\frac{5}{4}} - \frac{1}{2}$. Hence it appears that the ſine of 18° (or half the ſide of a decagon inſcribed in the circle) is $= \frac{1}{2}\sqrt{\frac{5}{4}} - \frac{1}{4} = \frac{1}{2}\sqrt{1.25} - \frac{1}{4} = \frac{1.11803398}{2}$, &c. $- \frac{1}{4} = .55901699$, &c. $- .25 = .30901699$, &c.

If the ſide of a dodecagon be 1, its area will be equal to 3 times the tang. of 75° $= 3 \times \overline{2 + \sqrt{3}} = 11.1961524$ nearly; and, the areas of plane figures, being as the ſquares of their ſides, 11.1961524 multiplied by the ſquare of the ſide of any dodecagon, will give its area. Hutton's Menſuration, p. 114.

To inſcribe a Dodecagon in a given Circle. Carry the radius ſix times round the circumference, which will divide it into ſix equal parts, or form an hexagon (ſee Hexagon); then biſect each of thoſe parts, which will divide the whole into 12 parts, for the dodecagon. For another method, ſee Pentagon; and ſee alſo Hutton's Menſuration, p. 26, &c. See Polygon.

Dials are ſometimes drawn on all the ſides of a dodecagon. In *Fortification*, a place ſurrounded with twelve baſtions is called a dodecagon; ſuch is Palma Nova in Friuli, &c.

DODECAGYNIA, in *Botany*, (from δωδεκα and γυνη, expreſſive of 12 piſtils or female organs in the flower,) an order of the Linnæan artificial ſyſtem, which occurs only in the 11th claſs, *Dodecandria*, and the character of which is to have not leſs than 12 piſtils, in ſome inſtances 15 or more, as in the genus *Sempervivum.* It is extremely rare for a flower to have more piſtils than ſtamens, and when that circumſtance does occur, the diſproportion is very great, as in *Myoſurus* and *Aliſma*, both of which have ſeveral ſcore piſtils to about five or ſix ſtamens. Hence the order in queſtion is not to be found in any claſs with leſs than 12 ſtamens.

DODECAHEDRON, from δωδεκα, *twelve*, and ἑδρα, *ſeat*, in *Geometry*, one of the regular bodies comprehended under twelve equal ſides, each of which is a pentagon. See Body and Regular *Bodies.*

Or, a dodecahedron may be conceived to conſiſt of twelve quinquangular pyramids, whoſe vertices, or tops, meet in the centre of a ſphere conceived to circumſcribe the ſolid; conſequently they have their baſes and altitudes equal.

To find the Solidity of the Dodecahedron. Find that of one of the pyramids, and multiply it by the number of baſes, *viz.* 12; the product is the ſolidity of the whole body. Or its ſolidity is found by multiplying the baſe into $\frac{1}{3}$d of its diſtance from the centre, twelve times; and to find this diſtance, take the diſtance of two parallel faces; the half is the height.

The diameter of the ſphere being given, the ſide of the dodecahedron is found by this theorem; the ſquare of the diameter of the ſphere is equal to the rectangle under the aggregate of the ſides of a dodecahedron, and hexahedron inſcribed in the ſame, and triple the ſide of the dodecahedron. Thus, if the diameter of the ſphere be 1, the ſide of the dodecahedron inſcribed will be $(\sqrt{\frac{5}{3}} - \sqrt{\frac{1}{3}}) \div 2$; conſequently, that is to this as 2 to $(\sqrt{\frac{5}{3}} - \sqrt{\frac{1}{3}})$ and the ſquare of that, to the ſquare of this, as $6 : 3 - \sqrt{5}$. Therefore the diameter of the ſphere is incommenſurable to the ſide of an inſcribed dodecahedron, both in itſelf and its power.

If the ſide, or linear edge, of a dodecahedron be s, its ſurface will be $15\,s^2 \sqrt{1 + \frac{2}{5}\sqrt{5}} = 20.6457788\,s^2$: and

its ſolidity $5\,s^3 \sqrt{\dfrac{47 + 21\sqrt{5}}{40}} = 7.66311896\,s^3$.

If the radius of the ſphere that circumſcribes a dodecahedron be r, then is

its ſide or linear edge $= \dfrac{\sqrt{15} - \sqrt{3}}{3}\,r$,

its ſuperficies $= 10\,r^3 \sqrt{2 - \frac{2}{3}\sqrt{5}}$, and

its ſolidity $= \dfrac{20\,r^3}{3} \sqrt{\dfrac{3 + \sqrt{5}}{30}}$.

The ſide of a dodecahedron inſcribed in a ſphere is equal to the greater part of the ſide of a cube inſcribed in the ſame ſphere, and cut according to extreme and mean proportion. If a line be ſo cut, and the leſſer ſegment be taken for the ſide of a dodecahedron, the greater ſegment will be the ſide of a cube inſcribed in the ſame ſphere. The ſide of the cube is equal to the right line which ſubtends the angle of a pentagon, of the dodecahedron inſcribed in the ſame ſphere. (See Hutton's Menſuration, p. 253.) See Polyhedron.

DODECANDRIA, in *Botany*, (from δωδεκα, *twelve*, and ανηρ, *a man*,) the 11th claſs of the ſexual or artificial ſyſtem of Linnæus, containing ſuch plants as have 12, or from that number to 15 or 19, ſeparate or diſtinct ſtamens, in the ſame flower with the piſtil or piſtils. It compriſes ſix orders, *Monogynia*, which is the moſt numerous and various of the whole; *Digynia*, *Trigynia*, *Tetragynia*, *Pentagynia*, and *Dodecagynia*, which ſee.

DODECAPOLIS, in *Ancient Geography*, a place of Aſia Minor, in Caria; called alſo *Sciritis.*

DODECAS, in *Botany*, (from δωδεκα, *twelve*, alluding to the number of ſtamens, which is rather an unuſual one,) Linn. Suppl. 36. Schreb. 316. Willd. Sp. Pl. v. 2. 841. Juſſ. 323. Mart. Mill. Dict. v. 2. Claſs and order, *Dodecandria Monogynia.* Nat. Ord. *Onagræ*, Juſſ. and not *Myrti*, as he has placed it.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, turbinate, divided half way down into four ovate, ſpreading ſegments. *Cor.* Petals four, roundiſh, ſeſſile, inſerted into the calyx. *Stam.* Filaments 12, capillary, ſhorter than the calyx, inſerted into the receptacle, according to Linnæus; anthers oblong. *Piſt.* Germen half ſuperior; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma obtuſe. *Peric.* Capſule nearly altogether inferior, ovate, of one cell, crowned with the ſpreading permanent calyx, within which the naked ſummit of the capſule opens by four valves. *Seeds* numerous, oblong, minute.

Eſſ. Ch. Calyx half four-cleft, ſuperior, bearing the corolla. Petals five. Capſule of one cell, crowned by the calyx.

1. D. *ſurinamenſis.* Sent by Dalberg from Surinam, in ſpirits, to Linnæus, who was in doubt whether to refer it to *Juſſiæa*, to which it ſeems very nearly allied. The *ſtem* is ſhrubby, with ſmooth angular branches. *Leaves* oppoſite, obovate-oblong, obtuſe, entire, ſmooth, tapering at the baſe, without ſtipulas. *Flowers* ſmall, on ſhort, axillary, ſimple, ſolitary ſtalks. *Bracteas* two under the *calyx*, which is obovate, with a quadrangular tube. Linnæus repeats that the ſtamens are inſerted, not into the calyx, but into the receptacle cloſe to the germen, which is contrary to all the apparent affinities of the plant.

DODECATEMORY, from δωδεκα, *twelve*, and μερος, *part*, the twelfth part of a circle.

The term is chiefly applied to the twelve houſes, or parts of the zodiac of the primum mobile; to diſtinguiſh them from the twelve ſigns.

Dodecatemory is alſo a denomination ſome authors give to each of the twelve ſigns of the zodiac, becauſe they contain a twelfth part of the zodiac a-piece.

DODECATHEON, in *Botany*, (from δωδεκα, *twelve*, and θεος, *a divinity*, an old name for the cowſlip, ſuppoſed to allude to the 12 Cæſars, who were commemorated in the circle of 12 flowers, or thereabouts, compoſing its umbel. The idea is rather far-fetched, and the Cæſars, for the moſt part, were unworthy of any ſuch elegant commemoration. However this may be, Linnæus retained the appellation for a new genus, akin to the cowſlip, which had been called *Meadia*, after Dr. Mead, a name which Linnæus, on the repreſentation of the Engliſh botaniſts of the day, rejected as unworthy for generic, though he preſerved it in the ſpecific, one.) American Cowſlip, or Meadia. Linn. Gen. 81. Schreb. 107. Willd. Sp. Pl. v. 1. 808. Juſſ. 97. Gærtn. t. 50. Mart. Mill. Dict. v. 2. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Preciæ*, Linn. *Lyſimachiæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, half five-cleft, permanent; its ſegments reflexed, at length elongated, permanent. *Cor.* of one petal, deeply five-cleft; tube ſhorter than the calyx; limb reflexed, its ſegments very long, lanceolate. *Stam.* Filaments five, very ſhort, obtuſe, inſerted into the tube; anthers projecting, arrow-ſhaped, approaching each other in a conical form. *Piſt.* Germen conical; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma obtuſe. *Peric.* Capſule elliptic-oblong, of one cell, ſplitting at the top into ſeveral horny recurved ſegments. *Seeds* numerous, ſmall, inſerted upon a central, elliptical, unconnected *receptacle*.

Eſſ. Ch. Corolla wheel-ſhaped, reflexed. Stamens inſerted into the tube. Capſule oblong, ſuperior, of one cell. Stigma obtuſe.

D. *Meadia*, *Curt. Mag. t.*, the only ſpecies, is a native of Virginia, from whence Bartram ſent its ſeeds to Peter Collinſon. They were raiſed in his garden at Mill Hill, and the leaves proved ſo like a lettuce, that he apprehended ſome miſtake, till the beautiful flowers came forth. Biſhop Compton, however, is recorded to have had this plant in his celebrated garden in 1709, but it probably had ſubſequently diſappeared. It is now not uncommon, being a hardy perennial, that bears our ſevereſt cold, and flowers in June. It will notwithſtanding bear forcing well, ſo as to bloſſom three months earlier, though ſome of its near allies, the *Primulæ*, will not endure the leaſt artificial heat.

DODO, in *Ornithology*. See DIDUS.

DODOENS. See DODONÆUS.

DODON, in *Ancient Geography*, a fountain of Greece, in Epirus; ſituated in or near the temple of Jupiter Dodonæus, to whom it was conſecrated. Steph. Byz. is of opinion, that this fountain was the ſource of the river *Dodon*. Pliny and Mela alſo mention this fountain. Ancient naturaliſts aſſure us, that it had a property of rekindling torches, &c. when newly extinguiſhed; which it is ſuppoſed to have done by means of ſome ſulphureous fumes exhaling from it, as we ſtill find to be the caſe with a fountain in Dauphine, called the "burning fountain." It is alſo ſaid to have extinguiſhed torches, in which reſpect its powers were not very miraculous, ſince plunging them into a place where the ſulphur was denſe, or into the water, would produce that effect.

DODONA, a famous city of Epirus, placed by ſome writers in Theſprotia, and by others in Moloſſis; but Strabo reconciles theſe diſcordant opinions by informing us, that anciently it belonged to Theſprotia, and afterwards to Moloſſis, for it ſtood on the confines of theſe two provinces. This city is ſaid to have been built by Deucalion, who, in that univerſal deluge, retreated to this place, which, by reaſon of its height, ſecured him from the waters; and hither reſorted to him all thoſe who had eſcaped from the inundation. With theſe he peopled his new-built city, calling it Dodona, according to ſome, from a ſea-nymph of that name; according to others, from Dodon, the ſon, or Dodona, the daughter, of Jupiter and Europa. At the ſame time, Deucalion is ſaid to have founded a temple, which he conſecrated to Jupiter, who is from thence ſtyled *Dodonæus*. Euſebius ſays, (in Chron.) that Dodanim, the ſon of Javan, and grandſon of Japhet, (ſee DODANIM) firſt ſettled in an iſland of Rhodes; and that ſome of his deſcendants, being ſtraitened there for want of room, paſſed over to the continent, and fixed their abode in Epirus, where they built a city, calling it Dodona, from their progenitor Dodanim. The temple of Jupiter Dodonæus was the firſt temple of Greece: for the Epirots were anciently reckoned among the Greeks. But the oracle of Dodona ſeems to have ſubſiſted for a conſiderable time before it, for Herodotus informs us, that it was the moſt ancient of all the oracles of Greece. As to the origin of this oracle, it is ſaid, that two pigeons, taking their flight from Thebes in Egypt, one of them came to Libya; and the other having flown as far as the foreſt of Dodona in Chaonia, a province of Epirus, alighted there; and gave the inhabitants of the country information that it was the will of Jupiter to have an oracle in that place. This prodigy aſtoniſhed thoſe who were witneſſes to it, and the oracle being founded, a great number of perſons reſorted hither to conſult it. Servius (in 3d Æneid, v. 406.) adds, that Jupiter had given to his daughter Thebé theſe two pigeons, and communicated to them the gift of ſpeech. Herodotus, (l. i.) who judged rightly that the fact, which gave riſe to the inſtitution of the oracle, was couched under this fable, has inveſtigated its hiſtorical foundation. Phœnician merchants, ſays this author, ſome time ago carried off two prieſteſſes of Thebes; ſhe who was ſold in Greece took up her reſidence in the foreſt of Dodona, where the Greeks came to gather acorns, their ancient food; there ſhe erected a ſmall chapel at the foot of an oak, in honour of Jupiter, whoſe prieſteſs ſhe had been at Thebes; and this was the foundation of that ancient oracle, ſo famous in preceding ages. The ſame author ſubjoins, that the woman was called the "pigeon," becauſe they did not underſtand her language, but ſoon becoming acquainted with it, they reported that the pigeon ſpoke.

In order to explain the ancient fables, it frequently happened that the Greeks, who were ignorant of the eaſtern languages, whence they were derived, invented new ones. The learned Bochart thought that he had diſcovered the origin of that under our preſent conſideration in two Phœnician, or Arabian words of a double meaning; one of them ſignifying a pigeon, the other a prieſteſs. The Greeks, always inclined to the marvellous, inſtead of ſaying that a prieſteſs of Jupiter had declared the will of that god, choſe to ſay it in a fabulous way, that it was pronounced by a pigeon. Whatever probability may be attached to the conjecture of this learned author, there appears to be more in what is offered by the abbé Salliar (Mem. Acad. Belles Lett. t. v. p. 35.) who takes this fable to have been founded upon the double meaning of the word πελειαι, which ſignified pigeons in Attica, and ſeveral other provinces of Greece, while in the dialect of Epirus it imported old women. Servius, (in 3 Æn. v. 466.) who fully comprehended the ſenſe of this fable, miſtook the proper application of it, by changing the appellative "Peleias" into a proper name. "There was," ſays he, "in the foreſt of Dodona, a fountain from which water iſſued with a ſoft murmuring noiſe, at the foot of an oak: an old woman, named *Pelias*, "interpreted this inarticulate ſound, and by means thereof gave predictions to thoſe who came to conſult her." In ancient times, the oracle of Dodona ſeems to have given its reſponſes by the murmuring of the fountain already mentioned (ſee Dodon); but afterwards they had recourſe to other formalities; which we ſhall explain. In order to which we may previouſly obſerve, that near the temple was a ſacred grove of oaks and beeches, which was ſuppoſed to be inhabited by the Dryades, Fauni, and Satyri, who, we are told, were often ſeen dancing under the ſhades of the trees. Before ſowing was invented, when man lived upon acorns, thoſe of this wood were in great requeſt, as appears from the following verſes of Virgil: (Georg. l. i. v. 7.)

> “ Liber, et Alma Ceres, veſtro ſi munere tellus
> Chaonium pingui glandem mutavit ariſta.”

Theſe oaks, or beeches, were ſaid to be endued with a human voice, and prophetical ſpirit; for which reaſon they are called “ ſpeaking and propheſying oaks.” What gave occaſion to this fiction was, that the prophets, when they gave anſwers, placed themſelves in one of theſe trees, ſo that the oracle was thought to be uttered by the oak, which was only pronounced out of its hollow ſtock, or from among its hollow branches. Some were of opinion, that the oracles were delivered from the branches of the trees, becauſe the prophetical pigeons are reported, by Herodotus, to have perched upon a tree (l. ii. c. 52. 55. 57); and the ſcholiaſt upon Sophocles tells us, that above the oracle there were two pigeons. Others are inclined to believe, that the oracles were uttered from the hollow ſtock, becauſe the propheteſs could beſt be concealed there. It is ſaid alſo, that brazen kettles were uſed for announcing the oracles, and they were no leſs famous than the ſpeaking oaks. Accordingly, they ſuſpended, as Suidas intimates, theſe kettles in the air, near a ſtatue of the ſame metal, which was likewiſe ſuſpended, with a laſh in its hand. This figure, being agitated by the wind, ſtruck againſt the kettle that was next to it, which communicating the motion to the reſt, occaſioned a kind of clattering, which continued for ſome time; and by means of this noiſe they formed predictions. (Voſſii de Idololatria, l. i. c. 7.) As ſoon as the ſound of the kettles ceaſed, the women named Dodonidæ, as Plutarch informs us, delivered their oracles, either in verſe, as appears from the collection made of them; or by the lots, as Cicero intimates in his books of divination. Hence ſome have ſaid, the foreſt of Dodona took its name; *dodo* in Hebrew ſignifying a kettle. From the ſpeaking oaks of this foreſt was deduced another fable about the maſt of the ſhip Argo, cut in this foreſt, which, according to Onomacritus, Apollonius of Rhodes, and Valerius Flaccus, gave oracles to the Argonauts. Van Dale, in his Hiſtory of Oracles, after remarking that Suidas hath merely copied Euſtathius, reports the opinion of Ariſtotle and ſeveral other authors; and takes particular notice how much the ancients vary in their accounts of this oracle; this variation being owing, without doubt, to the care that was taken, not to allow thoſe who came to conſult the oracle to approach too near it; ſo that they could only hear a confuſed ſound, but could by no means judge whence it proceeded.

Dodona, in the period of its celebrity, was a populous city, and became the ſee of a biſhop, ſuffragan of Nicopolis. But in proceſs of time it was ſo completely deſtroyed, that it is not now poſſible to aſcertain its preciſe ſituation.

DODONÆA, in *Botany*, (ſo named by Linnæus, after Rembertus Dodonæus, a celebrated botaniſt of the 16th century. Plumier had previouſly dedicated a genus to his honour, which Linnæus referred to *Ilex*.) Linn. Gen. ed. t. 541. Hort. Cliff. 144. Syſt. Veg. ed. 13. 299. Jacq. Amer. 109. Schreb. 357. Willd. Sp. Pl. v. 2. 343. Juſſ. 375. Gærtn. t. 111. (Ptelæa; Linn. Sp. Pl. ed. 1. 118. ed. 2. 173.) Claſs and order, *Octandria Monogynia*. Nat. Ord. *Terebintaceis affine*, Juſſ.

Gen. Ch. *Cal.* Perianth ſpreading, of four ovate, deciduous leaves. *Cor.* none. *Stam.* Filaments eight, very ſhort; anthers oblong, curved, approaching each other, angular, obtuſe, of two cells, burſting longitudinally at their outer edges, ſometimes rough or briſtly. *Piſt.* in the ſame or a ſeparate flower. Germen triangular, the length of the calyx; ſtyle cylindrical, with three furrows, erect; ſtigma three-cleft, ſharpiſh. *Per.* Capſule triangular, inflated, of three cells; the angles large and membranous. *Seeds* two in each cell, roundiſh.

Eſſ. Ch. Calyx of four leaves. Corolla none. Capſule inflated, of three cells, with three wings. Seeds in pairs.

1. D. *viſcoſa*. Linn. Suppl. 218. Mart. Mill. Dict. v. 2. Willd. Sp. Pl. v. 2. 343. (Aceri vel Paliuro affinis, &c. Sloane Jam. v. 2. t. 162. f. 3.) Leaves obovato-lanceolate, viſcid. Calyx-leaves elliptical, obtuſe, almoſt naked. Flowers diœcious? Native of the Eaſt and Weſt Indies, in ſandy ground. A tree ten or twelve feet high, according to Sloane, with fibrous deciduous bark. *Branches* round; when young unequally quadrangular. *Leaves* deciduous, alternate, nearly ſeſſile, obovate with a taper baſe, nearly entire, bluntiſh with a little point, about two or three inches long, very glutinous, eſpecially when young, deſtitute of all pubeſcence. *Stipulas* none. *Flowers* greeniſh, in little terminal, often branched, cluſters. *Calyx-leaves* elliptical, concave, aſcending, ribbed, very nearly if not quite ſmooth. *Anthers* not longer than the calyx, incurved, rather turgid, ſmooth and naked, tipped with a little hooked point. *Fruit* we ſuſpect always on a different plant, conſiſting of inflated, membranous, winged, veiny capſules, about half an inch in diameter. 2. D. *ſpatulata*. Leaves linear obovate, viſcid. Calyx-leaves ovate, acute, naked. Flowers diœcious. Brought by Mr. Archibald Menzies from the Sandwich Iſlands, where this ſhrub grows on high mountains as well as on the ſea ſhore. It is ſmaller than the laſt, with ſmaller and differently-ſhaped *leaves*. The *calyx* is eſſentially different, its leaves being flat, horizontal, ovate and acute. The *anthers* are ſhort and turgid. The *fruit* we have not ſeen. 3. D. *anguſtifolia*. Linn. Suppl. 218. Willd. Sp. Pl. v. 2. 344. Thunb. Prod. 77. (Triopteris; Brown Jam. 191. t. 18. f. 1.) Leaves linear-lanceolate, viſcid. Calyx-leaves elliptical, obtuſe, fringed.—Native of the Cape of Good Hope and of the Weſt Indies. The *flowers* appear to be diœcious. The narrow *leaves* and fringed *calyx* diſtinguiſh it from the firſt ſpecies. The *fruit* is generally reddiſh. Our Cape ſpecimens are leſs viſcid, and have narrower leaves, than the Jamaica ones, to which laſt Brown's ſynonym certainly belongs, and not to the firſt ſpecies. Mutis's plant from Mexico, which he thought a new genus, and named *Palavia*, is the ſame as Browne's. 4. D. *triquetra*. Willd. Sp. Pl. v. 2. 343. Andr. Repos. t. 230. Leaves elliptic-lanceolate, ſmooth. Calyx-leaves naked. Anthers linear, elongated. Flowers diœcious.—Common in New South Wales, from whence the late Abbé Cavanilles obtained it and ſent it to us. The elliptic-lanceolate, ſmooth (not viſcid) *leaves*, and the yellow *anthers*, five times as long as the calyx, mark it eſſentially. *Fruit* on a ſeparate plant. Mr. Andrews unjuſtly lays the blame on profeſſor Martyn for confounding this with the firſt ſpecies; for the error is Forſter's, whoſe D. *viſcoſa*. Prod. 27, ſeems to include our firſt and ſecond ſpecies as well as the preſent, and who ſurely did not much

attend to the ſubject. 5. D. *cuneata*. Leaves wedge-ſhaped, obſcurely three-toothed. Calyx-leaves elliptical, obtuſe, fringed, reflexed. Flowers diœcious.—Native of New South Wales, from whence ſeveral ſpecimens have been ſent, but we have not met with it in the gardens. All the ſpecimens we have ſeen are male. The *branches* are ſlender and ſtraggling. *Leaves* about an inch long, viſcid, wedge-ſhaped and very obtuſe, with three teeth, more or leſs obvious, at the extremity. *Flower-ſtalks* capillary. *Calyx* reflexed, or rather revolute, expoſing the ſhort, turgid *anthers*. 6. D. *eriocarpa*. Leaves elliptic-lanceolate, wavy, hairy as well as the fruit. Calyx-leaves elliptical, reflexed, briſtly.—Gathered by Mr. A. Menzies on the Alps of the Sandwich Iſlands. Its moſt remarkable character conſiſts in the hairy *leaves* and *fruit*. The young *branches* alſo are hairy. The *calyx* is reflexed, but ſcarcely revolute, its form like the laſt, but its edges are hairy or briſtly. We have ſeen no *anthers*, the flowers being probably diœcious. 7. D. *pinnata*. Leaves pinnate, hairy. Anthers briſtly at the ſummit.—Communicated by earl St. Vincent, who received it from New-South Wales. It differs from all the foregoing in its pinnate *leaves*, which are an inch or inch and half long, conſiſting of ſix or eight pair of little alternate, obovate, pointed, entire, revolute leaflets, hairy all over, with an odd one, their common ſtalk interruptedly winged. We have ſeen only male *flowers*, which are tawny, with ſpreading, ovate, hairy *calyx-leaves*, almoſt as long as the *anthers*. The latter are ſingularly briſtly at their ſummits.

We have been more particular than uſual on the ſpecies of this genus, becauſe they ſeem not to have been well diſcriminated by any botaniſt, and leaſt of all by thoſe who have gathered them wild. This, however, will certainly not be the caſe with Mr. R. Brown, who has probably found more than have come to our knowledge, and who cannot fail to illuſtrate the ſubject much further. To us the genus of *Dodonæa* ſeems almoſt, if not altogether, diœcious. All the ſpecies give out a ſtrong yellow ſtain on the application of ſpirits of wine after they are dried. Of their uſes or qualities we are ignorant. Such as have been introduced into the gardens are hardy green-houſe ſhrubs, but have little beauty to boaſt. S.

DODONÆUS, Dodonian, in *Antiquity*, an epithet given to Jupiter, as adored or worſhipped in the temple of Dodona, in a foreſt of the ſame name. See Dodona. It appears, both from Homer and Heſiod, that Jupiter Dodonæus was regarded as a Pelaſgian divinity. Strabo, citing a paſſage from a writer named Suidas, intimates, that the oracle of Jupiter had been tranſported from Theſſaly to Dodona, and that hence was derived the appellation of Jupiter Pelaſgian.

Dodonæus, or Dodoens, Rembertus, in *Biography*, a learned phyſician and botaniſt, of a Weſt Frieſland family of good repute, was born at Mechlin in 1517. His grand-father, long a magiſtrate of great credit and authority in Leuwarden, was named Rembertus Jœnckema. The ſon of this man was called Dodo, or Dodonæus, whence the grandſon obtained the name of Rembertus Dodonæus. He became phyſician to the emperors Maximilian II. and Rodolph II. Having been obliged during the civil wars of his time to quit the imperial court, in order to take care of his property at Mechlin and Antwerp, he reſided a while at Cologne, from whence he was perſuaded to return to Antwerp, but ſoon afterwards he became profeſſor of phyſic in the newly founded univerſity of Leyden with an ample ſtipend. This took place in 1582, and he ſuſtained the credit of his appointment by his lectures and various writings till death put a period to his labours in March 1585, in the 68th year of his age. It appears, by his epitaph at Leyden, that he left a ſon of his own name behind him.

Dodonæus is recorded to have excelled in a knowledge of the hiſtory of his own country, and eſpecially in genealogical inquiries, as well as in medicine. His chief fame at preſent reſts on his botanical publications, particularly his *Pemptades*, or thirty books of the hiſtory of plants, in one volume folio, publiſhed at Antwerp in 1583, and again in 1612 and 1616. This is ſtill a book of general reference on account of the wooden cuts, which are numerous and expreſſive. Haller reckons it "a good and uſeful work, though not of the firſt rate." The author had previouſly publiſhed ſome leſſer works in 8vo. as *Frugum Hiſtoria*, printed at Antwerp in 1552, including the various kinds of corn and pulſe, with their virtues and qualities, often copied, as Haller remarks, literally from ancient authors, who perhaps do not always ſpeak of the ſame plants. This work likewiſe is illuſtrated by wooden cuts.

His *Herbarium Belgicum* firſt appeared in the German language, in 1553, and again in 1557; which laſt Cluſius tranſlated into French. From the French edition "Henry Lyte eſquyer" compoſed his Herbal, which is pretty nearly a tranſlation of the whole. It was publiſhed in 1578, and went through ſeveral ſubſequent editions. This work, in its various languages and editions, is accompanied by wooden cuts, very inferior, for the moſt part, to thoſe in the above-mentioned *Pemptades*. Haller records an epitome of Dodonæus by William Kam, printed at London, in 4to. in 1606, under the title of Little Dodoen. This we have never ſeen.

Dodonæus publiſhed two 8vo. volumes of *Imagines* or wooden cuts of plants, with a few remarks, which went through ſeveral impreſſions, but are now ſeldom uſed, being ſuperſeded by his *Pemptades*. Some of the beſt of theſe cuts were employed in his *Florum et Coronariarum Odoratarumque nonnullarum Herbarum Hiſtoria*, 8vo. publiſhed at Antwerp, in 1569, an elegant little volume, reſembling the 8vo. editions of Cluſius; but all theſe figures are reprinted in the *Pemptades*.

Haller ſpeaks with praiſe of the figures in his work on Purging and Poiſonous herbs, barks and roots, Antwerp, 1574, 8vo. and mentions a little book on the Vine, &c. without cuts, neither of which has come under our inſpection. Melch. Adami, Vitæ Germ. Med. Haller. Bibl. Bot.

DODONIA, in *Ancient Geography*, one of the names formerly given to Epirus.

DODRA, in *Roman Antiquity*, a drink prepared from nine different ingredients; which are enumerated by the epigrammatiſt in the following line.

"Jus, aqua, mel, vinum, panis, piper, herba, oleum, ſal."

Vide Auſon, Epigram 86.

DODRANS, in *Antiquity*, a diviſion of the as; being $\frac{3}{4}$ thereof, or nine unciæ.

DODRED Wheat, in *Agriculture*, a name often provincially applied to ſuch ſorts of this grain as are without beards.

DODSLEY, Robert, in *Biography*, was born in very humble life at Mansfield in Nottinghamſhire, and without the advantages of education was enabled to make a conſiderable figure in the literary world. While young, he had acquired the neceſſary elements of reading and writing, and when in the ſtation of livery ſervant to a lady of faſhion, he publiſhed by ſubſcription a volume of poems, entitled, "The Muſe in Livery." It was received with much approbation, and from the encouragement of this firſt eſſay, he proceeded to drama, and produced the "Toy-ſhop," intended as a ſatire upon the prevailing follies of the times. By the influence of Mr. Pope it was brought upon the ſtage, and became very popular. By the profits ariſing from this, and from his poems, he opened a bookſeller's ſhop in Pall-Mall, where, by perſevering induſtry and great good conduct, he arrived at conſiderable diſtinction. His next productions as an author were, "The King and the Miller of Mansfield," a farce founded on the old ballad ſtory of that name; and a ſequel, entitled, "Sir John Cockle at Court." Theſe, though not ſo much diſtinguiſhed by humour as by their moral and ſentimental tendency, were well received by the public, who conſidered Dodſley as under their peculiar patronage. A work which he publiſhed ſoon after, obtained for the author a larger ſhare of celebrity; this was the "Economy of Human Life," which at the time was ſuppoſed to have been written by the earl of Cheſterfield. Few books in the Engliſh language have paſſed through more editions than this, and it is ſtill regarded as one admirably adapted to the peruſal of young perſons. In 1758, he offered Mr. Garrick a tragedy, entitled "Cleone," which was refuſed; but at the other theatre it was admitted, and amply repaid the managers, as it long drew together very large audiences. Two years afterwards Mr. Dodſley publiſhed his "Select Fables," in three volumes, many of which are original; and to the whole was prefixed an "Eſſay on Fable." Mr. Dodſley is well known as the editor of the "Preceptor," a work of much merit; of "A collection of Plays," in twelve volumes, which has been re-publiſhed by Mr. Reid; and of "A collection of Poems, by different Hands," in ſix volumes. This is reckoned one of the moſt valuable publications of the kind. The exertions of Mr. Dodſley as an author, an editor, and bookſeller, were crowned with ſucceſs; he acquired a handſome fortune, and retired from buſineſs. In retirement, as in active life, he was reſpected and beloved: modeſt in proſperity, grateful to his early friends and patrons, and diſpoſed to beſtow on others the ſame aſſiſtance which he had himſelf experienced. He died of the gout in the year 1764. His works have been ſince publiſhed, in two volumes, 8vo. Biog. Brit.

DODSON, Michael, a learned Engliſh barriſter, and biblical ſcholar, was born at Marlborough, in September, 1732. He was educated partly under his father, who was a diſſenting miniſter, and partly at the grammar ſchool of his native town. Under the direction of his maternal uncle, ſir Michael Foſter, one of the juſtices of the court of king's bench, Mr. Dodſon was brought up to the profeſſion of the law. He was admitted of the Middle Temple in 1754, and practiſed many years as a ſpecial pleader with much reputation: in 1770, he was appointed one of the commiſſioners of bankrupts, an office in which he continued till his death. In 1783, he was called to the bar, having declined that honour till then, which was intended to diminiſh rather than increaſe his buſineſs, his habits never leading him to deſire practice at the bar.

As an author and editor, Mr. Dodſon was well known and highly diſtinguiſhed. In 1776 and 1792, he publiſhed, with additions, new editions of Mr. juſtice Foſter's work, entitled "A report of ſome proceedings on the Commiſſion for the trial of the Rebels in the Year 1746, &c. &c." And in 1795, he drew up a life of his uncle ſir Michael, which was printed in the ſixth volume of the Biographia Britannica. As a biblical writer he publiſhed many papers in a work entitled "Commentaries and Eſſays," and in 1790 he laid before the public, as the reſult of many years ſtudy and deep inveſtigation, "A new tranſlation of Iſaiah, with notes ſupplementary to thoſe of Dr. Lowth, late biſhop of London, and containing remarks on many parts of his tranſlation and notes by a Layman." Mr. Dodſon enjoyed a life of uninterrupted good health, till a few months before his death. He died in October 1799, aged 67 years. Mr. Dodſon's legal knowledge and diſcrimination were highly eſtimated by thoſe to whom he was known, and who had occaſion to confer with him upon queſtions of law. He was deliberate in forming his opinion, and very diffident in delivering it, but always clear in the principles and reaſons on which it was founded. His general knowledge of the laws, and his veneration for the conſtitution of his country, evinced his extenſive acquaintance with the genuine principles of juriſprudence, and his regard for the permanence of the liberties of Britain. His counſel, on any and every occaſion, was founded in judgment, and communicated with diſcretion, ſincerity, and kindneſs. He was mild in his manners, even in his temper, warm in his affections, and ſteady in his attachments. In matters of religion, he contended for the rights of private judgment in their moſt extenſive ſenſe. He was himſelf a firm believer in the Chriſtian religion; holding the unity of God as the fundamental principle of rational worſhip, and regarding Jeſus Chriſt as a man, the delegated and ſpecial meſſenger of the Almighty to declare his will to the world.

DODWELL, Henry, was born at Dublin in the year 1641. His father loſing his property in the great Iriſh rebellion, came to England in the year 1648, in order to obtain ſome effectual aſſiſtance from his relations in London. He ſoon left the metropolis for York, where his ſon Henry was educated. At an early age this youth was left an orphan, his father being carried off by the plague in Ireland, whither he went to look after his eſtate, and his mother falling a victim to conſumption. He was now deſtitute of almoſt all the common neceſſaries of life; attached to books and ſtudy, but without pens and ink to prepare his exerciſe, and frequently ſubject to much ill treatment from the perſon who had undertaken to provide for him, on account of the uncertainty of his ever being repaid his diſburſements. Some of his more preſſing wants were ſupplied by ſir Henry Slingſby, his maternal uncle, whoſe ſituation did not allow him to do much for his nephew. At the age of 13 he was taken under the protection of another uncle, Mr. Henry Dodwell, rector of Newbourn and Hemley in Suffolk, who aſſiſted the youth in his ſtudies. He was afterwards admitted of Trinity college, Dublin, where he was very conſpicuous for the diligence of his application and for his exemplary piety, and was in due time elected fellow. In 1666, he quitted his fellowſhip, becauſe he could no longer hold it without entering into orders, to which he objected, thinking he might be more uſeful to the intereſts of religion as a layman, than if he aſſumed the clerical profeſſion. He now came to England, and reſided ſome time at Oxford, for the ſake of the advantages of a public library: he then returned to Ireland and commenced his courſe of authorſhip. Of his numerous publications we can notice but few: his firſt piece was a preface to a poſthumous piece of Dr. Stearn, his late tutor; it was entitled "Prolegomena apologetica, de uſu dogmatum Philoſophicorum." He then publiſhed two letters of advice on theological ſubjects, to a ſecond edition of which he annexed "A Diſcourſe concerning the Phœnician Hiſtory of Sanchoniathon," which he attempts to prove a forgery by Philo-Biblius.

In 1674, he came again to England, ſettled in London, and became intimately acquainted with the moſt learned and diſtinguiſhed divines of the time; particularly with Dr. Lloyd, afterwards biſhop of Worceſter; whom he accompanied to Holland, when he was appointed chaplain to the princeſs of Orange. As a writer he about this period attacked the Roman catholics, and ſoon after the proteſtant diſſenters. The laſt gave riſe to a controverſy between Mr. Dodwell and the celebrated Richard Baxter. In the year 1688, without any application on his part, and as an honourable reward of literary exertions, he was elected Camden profeſſor of hiſtory by the univerſity of Oxford. This honour he enjoyed but a ſhort time, as his notions of government would not permit him to take the oaths of allegiance required by the leaders of the revolution. Quitting his profeſſorſhip, he wrote a defence of his nonjuring principles, and other treatiſes on topics connected with it. In 1692, he publiſhed his Camdenian lectures, of which the ſubjects are the authors who wrote the hiſtory of the Roman emperors from the time of Trajan to that of Diocletian. Soon after he loſt the profeſſorſhip he retired to Cookham, a village in Berkſhire, and there, or in the neighbouring village of Shotteſbrooke, he chiefly ſpent the remainder of his days. Here he married, and became the father of 10 children.

In 1696, Mr. Dodwell drew up annals of Thucydides and Xenophon, to accompany editions of thoſe authors by Dr. Hudſon and Mr. Wells, which were afterwards ſeparately reprinted at Oxford. In the year 1701, he publiſhed, in quarto, an account of the Greek and Roman cycles, which was highly eſteemed by Dr. Halley, and is the moſt elaborate of all Mr. Dodwell's works, and was probably the reſult of his enquiries on the ſubjects diſcuſſed during the greateſt part of his life. Paſſing over many other pieces of this author we obſerve that, in 1706, he publiſhed a work which expoſed him to much cenſure, and diſguſted many who had heretofore been his zealous admirers. This was entitled an Epiſtolary Diſcourſe, proving, from the ſcriptures and the firſt fathers, that the ſoul is a principle naturally mortal, but immortalized actually by the pleaſure of God, to puniſhment or reward, by its union with the divine baptiſmal ſpirit; where it is proved that none have the power of giving this divine immortalizing ſpirit ſince the apoſtles, but only the biſhops. At the end of the preface is a diſſertation to prove, that "ſacerdotal abſolution is neceſſary for the remiſſion of ſins, even of thoſe who are truly penitent." This work met with powerful opponents, who expoſed its philoſophy and theology. The principal writers againſt Mr. Dodwell, on the occaſion, were Mr. Chiſhull, Mr. Mills, afterwards biſhop of Waterford, Mr. Norris, and the celebrated Dr. Clarke. The author endeavoured to vindicate himſelf in ſeparate treatiſes, but by every candid, judicious, and liberal mind, it was ſeen that his cauſe was wholly indefenſible. Mr. Dodwell died in 1711, in the ſeventieth year of his age. Contemporaries knew his merit, and how to eſtimate his various talents: he was a man of much application, extenſive reading, and poſſeſſed great learning. His judgment and taſte have met with few admirers: he was fond of ſtrange and paradoxical notions; his religious ſentiments were extremely narrow; and he entertained a ſort of ſuperſtitious reverence for the prieſtly character. His piety was, however, undiſſembled; his integrity unimpeached, and his whole deportment unaffectedly humble and modeſt. His moral conduct was eminently virtuous, and his benevolence highly exemplary: he carried the principle of abſtemiouſneſs to exceſs, religiouſly abſtaining from almoſt all food three days in a week. Of Mr. Dodwell's children two require a ſhort notice, *viz.* Henry, the eldeſt ſon, who was bred to the profeſſion of the law, and took an active part in the Society for the Encouragement of Arts, Manufactures, &c. As a writer he enliſted in the cauſe of infidelity, and attacked revelation in the diſguiſe of a friend, and publiſhed a treatiſe, entitled "Chriſtianity not founded upon Argument," which was ably anſwered by Drs. Benſon, Randolf, Doddridge, and Leland. The other ſon, William, educated at Trinity College, Oxford, roſe to ſome conſiderable preferment in the church, and publiſhed many works, among which was, "A Free Anſwer to Dr. Middleton's Free Enquiry," for which he was preſented by the univerſity with a diploma, in full convocation:—"A Diſſertation on Jephtha's Vow," and two volumes of ſermons, one of which was written in oppoſition to his brother's pamphlet. Biog. Britan.

DOE, the female of the buck. See Cervus and Deer.

Doé, in *Geography*. See Doué.

DOEBELN, formerly Dobelin, or *Döbelen*, a ſmall town of Saxony, in the circle of Leipzic, ſituated in an iſland formed by the river Mulda, 30 miles W. of Dreſden, and 35 S. E. of Leipzic, with a population of 3500 individuals, and remarkable for its manufactures of woollen and linen cloth, flannel, hats, and ſtockings. In its neighbourhood are ſlate quarries, and a very good fuller's earth.

DOEHLEN, a ſmall town of Saxony, in the circle of Miſnia, which holds part of the royal ſtud, known by the name of the Torgau ſtud.

DOEL, a town of Flanders, on the Scheldt, oppoſite to Lillo.

DOEN, a town of European Turkey, in the province of Bulgaria, on the Danube; 56 miles N. N. E. of Siliſtria.

DOEMITZ. See Domitz.

DOES, Jacob Vander, the *Old*, in *Biography*, a painter and engraver, was born at Amſterdam in 1623, and after having been a diſciple of N. Moyart, travelled to Rome and formed himſelf on the manner of Bamboccio. He excelled in landſcapes and animals. His temper was melancholy and auſtere, ſo that he incurred the diſpleaſure of all his acquaintance, and was deſerted by them. He died at Amſterdam in 1673. "His tone is dark, but his compoſition has dignity, his figures are well deſigned, and touched with ſpirit, and his animals, eſpecially the ſheep, are painted with equal truth and delicacy." The etchings of this maſter from compoſitions of his own, ornamented with animals, are executed in a ſlight, free, maſterly ſtyle. Pilkington by Fuſeli and Strutt.

Does, Jacob Vander, the *Young*, was the ſon of the former, and born at Amſterdam in 1654. He was ſucceſſively a diſciple of Karel du Jardin, Netſcher, and Gerard Laireſſe. He was a very ready deſigner, and poſſeſſed a lively imagination and good invention; but the impetuoſity of his temper was ſuch, that he deſtroyed his compoſitions, if his pictures did not pleaſe him in the progreſs of their execution; nor could the interpoſition and remonſtrances of his beſt friends avail for their preſervation. His death, A. D. 1693, at the age of 39 years, prevented his acquiring that fortune and high reputation, which the fame of his abilities and performances gave him reaſon to expect. Pilkington.

Does, Simon Vander, the ſon of the firſt of the artiſts above-mentioned, was born at Amſterdam in 1653. Having learned the art of painting from his father, and purſuing the ſame ſtyle and manner in the choice of the ſame ſubjects, he travelled to Frieſland and to England, and afterwards ſettled at the Hague. Notwithſtanding the difficulties in which the extravagance of a diſſolute wife involved him, and the depreſſion of circumſtances and ſpirits which they occaſioned, he perſevered in the exerciſe of his profeſſion. On ſome occaſions he painted portraits, reſembling in their touch and colouring thoſe of the old Netſcher; but though his works were much admired and ſought after, he fell into great poverty, and died in 1717 at the age of 64 years. The works of this artiſt are peculiarly pleaſing; and though his figures want elegance, and his colouring inclines to the yellow and light brown, yet his cattle are ſo correct, his touch ſo free and eaſy, his diſtances and the forms of his trees ſo agreeable, his colouring ſo tranſparent and delicate, and his paſtoral ſubjects diſtinguiſhed by ſo much nature and ſimplicity of rural life, that his works have been very highly eſteemed, and have been ſold for very large prices. This artiſt has etched ſome few ſmall landſcapes, with animals, from his own compoſitions. Pilkington. Strutt.

DOESBOURG, or Doesburg, in *Geography*, a ſmall but well fortified town of Holland, in the department of Gueldre, ſituated at the confluence of the Old and New Yſſel, 12 miles S. of Zutphen, lat. 51° 59′ 30″ The New Yſſel is alſo called Druſus' canal. It is a cut made from the Rhine near Arnhem to the Old Yſſel, by Druſus, ſon-in-law to Auguſtus. (Buſching. 4to. vol. vi. p. 478.)

DOEVEREN, Walter, Van, in *Biography*, a ſkilful anatomiſt and accoucheur, and profeſſor of medicine, in the univerſity at Leyden, publiſhed, in 1753, "Diſſertatio de vermibus in Inteſtinis hominum genitis," which was tranſlated into French in 1764. It contains a very accurate deſcription of the different ſpecies of worms, and the moſt approved method of treating the diſeaſes occaſioned by them. "Sermo academicus de erroribus medicorum utilitate non carentibus," 1762, 4to. This has been much commended, as containing a ſpecimen of ingenious and acute argumentation. But the moſt valuable of his productions, is his "Obſervationum academicarum ad monſtrorum hiſtoriam, anatomiam, pathologiam, et artem obſtetricam præcipue ſpectantium." Groning. 1765, 4to. It contains obſervations on the rupture of the bladder in a pregnant woman, and of the uterus in the courſe of a difficult labour, of a polypus of the uterus, ſucceſsfully removed by ligature; a deſcription of a lamb, with two heads, and of a child born without a head. Haller. Bib. Chir.

DOFAR, in *Geography*. See Dafar.

DOFFIR, a town of Arabia, in the country of Yemen; 12 miles S. of Chamir.

DOFRE, a town of Norway; 36 miles E. of Romſdael.

DOG, in *Aſtronomy*, a name common to two conſtellations, called the Great and Little Dog; but among aſtronomers, more uſually, Canis major, and minor. See Canis *major & minor*.

Dog, in *Zoology*, the firſt ſpecies of the Canis tribe, the C. familiaris of the Linnæan ſchool. Linnæus was led to believe that the dog might be diſtinguiſhed by the form and ſituation of the tail, which he obſerves is recurved and turned to the left: this character, it muſt, however, be allowed, is only partially diſtinctive; it preponderates in many varieties of the dog tribe, but is not always conſtant.

It has been well obſerved by Buffon, that the ſervices of this truly valuable creature have been ſo eminently uſeful to the domeſtic intereſts of man in all ages, that to give the hiſtory of the dog, would be little leſs than to trace mankind back to their original ſtate of ſimplicity and freedom, to mark the progreſs of civilization through the various changes of the world, and to follow, attentively, the gradual advancement of that order, which placed man at the head of the animal world, and gave him a manifeſt ſuperiority over every part of the brute creation. The dog, independent of the beauty of his form, his vivacity, force, and ſwiftneſs, is poſſeſſed of all thoſe internal qualifications that can conciliate the affections of man, and make the tyrant a protector. A natural ſhare of courage, an angry and ferocious diſpoſition, render the dog in his ſavage ſtate a formidable enemy to all other animals; but theſe readily give way to very different qualities in the domeſtic dog, whoſe only ambition ſeems the deſire to pleaſe. He is ſeen to come crouching along, to lay his force, his courage, and all his uſeful talents at the feet of his maſter. He waits his orders, to which he pays implicit obedience; conſults his looks, and a ſingle glance is ſufficient to put him in motion; he is more faithful even than the moſt boaſted among men: he is conſtant in his affections, friendly without intereſt, and grateful for the ſlighteſt favours: much more mindful of benefits received than of injuries offered: he is not driven off by unkindneſs; he ſtill continues humble, ſubmiſſive, and imploring, his only hope is to be ſerviceable, his only terror to diſpleaſe: he licks the hand juſt lifted to ſtrike him, and at laſt diſarms reſentment by ſubmiſſive perſeverance; more tractable than man, and more pliant than any other animal, the dog is not only ſoon inſtructed, but even conforms himſelf to the manners, movements, and habits of thoſe who govern him. He aſſumes the very tone of the family in which he lives. Like other ſervants he is haughty with the great, and ruſtic with the peaſant. Always eager to obey and to pleaſe his maſter, or his friends, he pays no attention to ſtrangers, and furiouſly repels beggars, whom he diſtinguiſhes by their dreſs, their voice, and their geſtures. When the charge of a houſe or garden is committed to him during the night, his boldneſs increaſes, and he ſometimes becomes perfectly ferocious. He watches, goes the rounds, ſmells ſtrangers at a diſtance, and if they ſtop or attempt to leap any barrier, he inſtantly darts upon them, and by barking, and other marks of paſſion, alarms the neighbourhood.

To conceive the importance of this ſpecies in the order of nature, let us ſuppoſe that it never exiſted. Without the aſſiſtance of the dog, how could men have conquered, tamed, and reduced other animals into ſlavery? How could he ſtill diſcover, hunt down, and deſtroy noxious and ſavage beaſts? For his own ſafety, and to render him maſter of the world, it was neceſſary to form a party among the animals themſelves, to conciliate by careſſes thoſe which were capable of attachment, and obedience, in order to oppoſe them to the other ſpecies. Hence the training of the dog ſeems to have been the firſt art invented by man; and the reſult of this art was the conqueſt and peaceable poſſeſſion of the earth.

The dog is one of thoſe animals which have been ſo long retained under the protection of mankind, that the real origin of the ſpecies remains in a ſtate of uncertainty. Wild dogs appear to be found in large troops in Congo, Lower Ethiopia, and towards the Cape of Good Hope. They are ſaid to be red haired, with ſlender bodies, and tails turned up like grey-hounds. Others reſembling hounds are of various colours, have erect ears, and are the ſize of a large fox hound; they deſtroy cattle and hunt down antelopes, and other ſuch animals, as our dogs do the ſtag. They run ſwiftly, have no fixed reſidence, and are very ſeldom killed, being ſo crafty as to ſhun all traps, and of ſo ſagacious a noſe as to avoid every thing that has been touched by man. They go in large packs and attack lions, tigers, and elephants; and among the ſheep of the Hottentots they commit terrific ravages. Their whelps are ſometimes taken, but as they grow old become ſo ferocious, that they cannot be domeſticated.

Modern naturaliſts are not inclined to allow that theſe wild dogs conſtitute the true or real ſpecies in a ſtate of nature, but that they are rather the deſcendants of dogs once domeſticated, and which have relapſed into a ſtate reſembling that of primitive wildneſs. Some conſider the wolf as the parent ſource from whence our numerous race of dogs originally ſprang. On this point it is remarked by Buffon, that "the wolf and the dog have never been regarded as the ſame ſpecies except by the nomenclators of natural hiſtory, who being acquainted with the ſurface of nature only, never extend their views beyond their own methods, which are always deceitful, and often erroneous, even in the moſt obvious facts. The wolf and dog, (he affirms,) cannot breed together, and produce an intermediate race: their diſpoſitions are oppoſite, and their conſtitutions different: the wolf alſo lives longer than the dog; the former breeds but once a year, but the dog twice or thrice. Theſe diſtinctions are more than ſufficient to demonſtrate the two animals to be of very different kinds. Beſides, on a cloſer inſpection, we eaſily perceive that even externally the wolf differs from the dog in eſſential and uniform characters. The appearance of the head and form of the bones are by no means the ſame. The cavity of the eye in the wolf is placed obliquely; the orbits are inclined; the eyes ſparkle and ſhine in the dark: inſtead of barking the wolf howls; his movements, though quick and precipitate, are more uniform and equal: his body is ſtronger, but not ſo flexible: his limbs are firmer, his jaws and teeth larger, and his hair coarſer and thicker." This, however, was the argument of Buffon, previous to the celebrated experiments made to produce a breed between the dog and wolf, and which being attended with the moſt complete ſucceſs clearly proved the fallacy of his reaſoning. It was found that not only a breed could be obtained by coupling theſe animals, but that the hybrids thus produced were alſo capable of producing offſpring, an account of which is amply detailed in the ſupplemental volumes of Buffon's work. This does not, nevertheleſs, afford ſufficient evidence that theſe two animals derive their origin from the ſame ſource; the like circumſtance being known to take place between the horſe and the aſs, the mules of which have ſometimes proved fertile, a fact very fully atteſted of ſome mules produced in New Holland. We are not, therefore, juſtified in ſuppoſing the ſpecies to be the ſame from the circumſtance of their coupling, and can only conclude from ſuch experiments that animals nearly allied to each other, though really different, may ſometimes intermix. It is even more probable that the origin of the dog may be traced to the jackal than the wolf, but it muſt be alſo at the ſame time allowed that nothing can be advanced with certainty on this ſubject. That kind of domeſticated dog which is generally ſuppoſed to approach neareſt to the primitive race is the ſhepherd's dog. Buffon propoſes a genealogical table of the different kinds of dog in which this variety is placed as the apparent ſtock.

Principal Varieties of Dogs.

Shepherd's Dog, Canis domeſticus of Linnæus, & le Chien de Berger of Buffon, is diſtinguiſhed by its upright ears and remarkable villoſity of the tail beneath; and ſtands at the head of the firſt claſs of farm dogs. This breed of dogs is ſaid to be preſerved in the greateſt purity in the northern parts of Scotland, where its aid is highly neceſſary in managing the numerous herds of ſheep bred in thoſe extenſive wilds. The ſame variety is diffuſed over moſt parts of Europe, and is obſerved in ſome countries to be larger and more robuſt than in England. Mr. Bewick remarks, that in thoſe extenſive tracts of land, which in many parts of our own iſland are ſolely appropriated to the feeding of ſheep and other cattle, this ſagacious animal is of the utmoſt importance. Immenſe flocks may be ſeen continually ranging over thoſe wilds, as far as the eye can reach, ſeemingly without controul: their only guide is the ſhepherd, attended by his dog, the conſtant companion of his toils: it receives his commands, and is always prompt to execute them; it is the watchful guardian of the flock, prevents them from ſtraggling, keeps them together, and conducts them from one part of their paſture to another: it will not ſuffer any ſtrangers to mix with them, but carefully keeps off every intruder. In driving a number of ſheep to any diſtant part, a well-trained dog never fails to confine them to the road; he watches every avenue that leads from it, where he takes his ſtand, threatening every delinquent, and purſues the ſtragglers, if any one ſhould eſcape, and forces them into order without doing them the leaſt injury. If the herdſman be at any time abſent from the flock, he depends upon his dog to keep them together; and as ſoon as he gives the well-known ſignal, this faithful creature conducts them to his maſter, though at a conſiderable diſtance. The ſame writer mentions, as a remarkable ſingularity in the feet of the ſhepherd's dog, that they have one and ſometimes two extra toes on the poſterior feet: theſe toes appear to be deſtitute of muſcles, and hang dangling at the hind part of the leg, more like an unnatural excreſcence than a neceſſary appendage. The ſame circumſtance is alſo obſerved in the feet of the cur and the ſpaniel, ſo that it is not peculiar to the firſt-mentioned variety of the dog kind. Neither Linnæus nor Buffon ſpeak of theſe excreſcences.

Wolf Dog, or *Pomeranian Dog*, Canis Pomeranius of Linnæus, is known by having the hair on the head long, the ears erect, and the tail very much curved on the rump. Buffon calls it Chien-loup. It bears much reſemblance to the ſhepherd's dog, but is larger.

Siberian, or *Greenland Dog*, le Chien de Sibirie of Buffon, Canis Sibiricus of Linnæus. This kind is nearly allied to the preceding, and comprehends ſeveral caſual varieties differing in ſtrength and ſize. Moſt of the Greenland dogs are white, but ſome are ſpotted, and ſome black, and are ſaid rather to howl than bark. The Greenlanders ſometimes eat their fleſh, and make garments of their ſkins. But they are principally uſed, both in this country and alſo in Kamtſchatka, for drawing ſledges over the frozen ſnow in winter. Four, five, or ſometimes ſix, as circumſtances require, are commonly yoked to the ſame ſledge, and will readily carry three perſons with their baggage, and thus perform a journey of fifty Engliſh miles in a day. The dogs of Kamtſchatka, which, according to Steller, are called *Koſka*, are uſually black or white: they are ſtrong, nimble, and active, and it is in ſledges, drawn by theſe animals only, that travelling is practicable, in that dreary country, during the winter. A remarkable inſtance of the expedition with which this mode of travelling is performed, is mentioned by captain King, who relates, that during his ſtay in Kamtſchatka, a courier with diſpatches accompliſhed a journey of 270 miles in leſs than four days.

Moſt commonly theſe ſledges are drawn by five dogs, four of which are harneſſed two abreaſt, and the fifth placed as a leader. The reins being faſtened to a collar round the leading dog's neck, are of little uſe in directing the pack, the driver depending chiefly upon their obedience to his voice, with which he animates them to proceed. Great care and attention are beſtowed in training up theſe leaders, and which are of courſe eſteemed more valuable according to their ſteadineſs and docility, and fetch from forty to fifty roubles (about ten pounds ſterling) each. The rider has a crooked ſtick, anſwering the purpoſe of both whip and reins, with which, by ſtriking on the ſnow, he regulates the ſpeed of the dogs, or ſtops them at pleaſure. When they are inattentive to their duty, he often chaſtiſes them by throwing it at them. He diſcovers great dexterity in regaining his ſtick, which is the greateſt difficulty attending his ſituation, for if he ſhould happen to loſe it, the dogs immediately diſcover the circumſtance, and never fail to ſet off at full ſpeed, and continue to run till their ſtrength is exhauſted, or till the carriage is overturned and daſhed to pieces, or hurried down a precipice. Notwithſtanding the uſefulneſs of theſe dogs, they are neither of a very tractable diſpoſition, nor remarkable for their fidelity, and their treatment in Kamtſchatka, in particular, is ill calculated for ſecuring their attachment. In the winter they are fed ſparingly with putrid fiſh, and in ſummer are turned looſe to ſhift for themſelves, till the return of the ſevere ſeaſon makes it neceſſary for their maſters to take them again into cuſtody. When yoking to the ſledge they ſet up a diſmal yell, which ceaſes on beginning the journey, and then gives place to ſilent ſubtlety, and a perpetual endeavour to weary out the patience of the driver by their ſtratagems, and againſt which it is always neceſſary for him to be on the guard. But with all their faults they are conſidered as conſtituting one of the great conveniencies of life, by the inhabitants of the frozen regions of Kamtſchatka. The Siberian, or Greenland dog, has the ears ſhort and erect, and the whole of the body covered with long hair. They are uſually white with a black face; they ſeldom bark, but make a ſort of hideous howl. They ſleep abroad, forming a lodge in the ſnow, and lying with only their noſes above it. The Greenlanders are not kinder maſters to their dogs than the Kamtſchatkans; they leave them to feed on muſcles or berries, unleſs they have made a great capture of ſeals, when they treat them with blood and garbage. They ſometimes eat their dogs, uſe their ſkins for coverlets, for clothing, or for bordering and ſeaming their habits; and from their guts they make their beſt thread. They faſten to their ſledges from four to ten dogs, and they travel over the ice, with a carriage, loaden with their maſter and five or ſix ſeals, 15 German, or 60 Engliſh miles a day. Theſe dogs are excellent ſwimmers, and will hunt in packs the arctic fox, ſeals on the ice, and the polar bear, in which latter chace they are ſometimes uſed by the natives.

Iceland Dog, Canis Iſlandicus of Linnæus, and called by the Icelanders, according to Olafsen, *Fiaar-hund*. It is covered with long hair, except on the ſnout, and the ears, which are erect, and pendulous at the tip.

Newfoundland Dog, a variety of large ſize, and which, from its ſuperior ſtrength, ſagacity, and docile diſpoſition, is one of thoſe beſt calculated for the ſecurity of a houſe. The feet of this kind of dog are more palmated than uſual, and the animal is remarkably partial to the water. The breed of Newfoundland dogs was originally brought from the country of which they bear the name, where they are extremely uſeful to the ſettlers on thoſe coaſts, who employ them as animals of burthen, to bring wood from the interior of the country to the ſea ſide: three or four of them yoked to a ſledge will draw two or three hundred weight of wood piled upon it for ſeveral miles with great eaſe. In this ſervice, it is affirmed they are ſo ſagacious and willing, that they never require a driver or perſon to guide them, but after delivering their loading, they return without delay to the woods, and receive food in reward for their induſtry. In theſe parts they are accuſtomed to feed principally on fiſh, which, either in a freſh or dried ſtate, theſe animals are remarkably fond of. From the ſtructure of the feet, the Newfoundland dog is enabled to ſwim extremely faſt, dive with eaſe, and bring up any thing from the bottom of the water.

Large rough water Dog, Canis aviarius aquaticus, Linn. Canis ſagax ad aquas, Aldrovandus, Grand barbet of Buffon, Budel of Ridinger: a variety diſtinguiſhed by its curly hair, which much reſembles wool. The webs between the toes are larger than in moſt other dogs, which ſufficiently accounts for the eaſe with which it ſwims, and renders it uſeful in hunting ducks and other water fowl. Dogs of this breed are alſo frequently kept on board ſhips, for the purpoſe of ſending into the water after any ſmall article that may chance to fall overboard.

Great Water Spaniel, is alſo known by its curled hair, and propenſity to the water. In point of form it is far more elegant than the rough water dog, and its aſpect more ſagacious and mild: the ears are long and pendulous, and the hair beautifully criſped and curled. It is chiefly uſed in diſcovering the haunts of water-fowl, and in finding birds that have been ſhot in marſhy places.

Small Water-ſpaniel, called by Buffon *le petit Barbet*, is a variety cloſely allied to the former, but of a ſmaller ſize, and poſſeſſes the ſame habits and diſpoſition.

King Charles's Dog, a variety of the moſt elegant kind, and which is ſufficiently known in this country, under the appellation abovementioned. It is the canis brevipilis of Gmelin, and the ſame apparently which Buffon calls Gredin. The head is ſmall and rounded, with the ſnout ſhort, and the tail curved back; its ears are long, hair curled, and feet webbed. The celebrity attached to this breed ſeems to ariſe chiefly from its having been the favourite companion of Charles II., who, it is recorded, ſcarcely ever walked out without being attended by ſeveral of them. The *Springer*, or *Cocker*, is a variety cloſely allied to this kind. The dog called *Pyrame*, by Buffon, is alſo a variety of the ſame, and is diſtinguiſhed by a patch of red on the legs, and another over each eye.

Malteſe Dog, Canis melitæus, Gmelin; Canis melitenſis hirſutus, Aldrovandus, and Bichon of Buffon, a variety with long ſoft and ſilky hair appertaining to the ſpaniel kind, very ſmall, and of a white colour in general. This is one of the moſt elegant of the lap-dog kind, and in ſome varieties, as in the ſhock, is almoſt concealed in the hair which covers it from head to foot.

Lion Dog, the Gmelinian Canis leoninus, an animal of ſmall ſize, having the head and fore-part of the body covered with ſhaggy hair, while the hind-part is quite ſmooth, except a tuft at the end of the tail. The *Comforter* is another ſmall dog allied to this, and is a general attendant on the ladies at the toilette, or in the drawing-room, but is of a ſnappiſh, ill-natured diſpoſition, and very noiſy.

Pug-dog, Canis fricator of Gmelin, and donquin of Buffon, has the noſe turned upwards, the ears pendulous, and body ſquare. In its outward appearance this animal reſembles the bull dog in miniature: it was formerly very common in England, but has of late years become ſcarce. They are the principal breed of lap-dogs kept by the ladies at Padua, and ſome other parts of Italy. The baſtard pug-dog, as its appellation implies, is a croſs breed between the common pug-dog and ſome other. This latter is the roquet of the French, Canis hybridus of Gmelin; and there are likewiſe ſeveral other hybrid varieties of this kind of dog.

Maſtiff, Canis moloſſus of Linnæus, Canis ſagax ſanguinarius of Geſner, Baerenbeiſſer of Ridinger. This is the ſize of a wolf, very robuſt in its form, and having the ſides of the lips pendulous. Its aſpect is ſullen, and its bark loud and terrific, and he appears every way formed for the important truſt of guarding property committed to his care, and as a houſe or yard dog may be perhaps more valuable than the Newfoundland breed, which is more commonly kept for this purpoſe. Dr. Caius, who lived in the reign of queen Elizabeth, and who has left us a curious treatiſe on Britiſh dogs, informs us, that three of theſe animals were reckoned a match for a bear, and four for a lion. From an experiment however, made in the preſence of James I., as related by Stow, the lion was found an unequal match for only three of them. Two of the dogs were diſabled by the combat, but the third forced the lion to ſeek for ſafety by flight. The two dogs were ſo much beaten and torn in the conflict, that they ſoon died of their wounds; the laſt ſurvived and was taken great care of by the king's ſon, who ſaid "he that had fought with the king of beaſts ſhould never after fight with any inferior creature."

The maſtiff, in its pure ſtate, is ſeldom met with. The generality of dogs, diſtinguiſhed by that name, are croſſed breeds between the maſtiff and bull-dog, or the ban dog.

Bull-dog, is of the maſtiff kind, and very nearly allied to the former, but is ſmaller, with a ſomewhat flatter ſnout, and ſtill more ferocious aſpect; the lip, as in the former, pendulous. This is reputed the fierceſt of all the dog kind; it is low in ſtature, but very ſtrong and muſcular: the noſe ſhort, and the under jaw projecting conſiderably beyond the lower one. Its courage in attacking the bull is well known: its fury in ſeizing, and its invincible obſtinacy in maintaining its hold, are truly aſtoniſhing: it always aims at the front, and generally faſtens upon the lip, or other part of the face, where it hangs in ſpite of every effort of the bull to diſengage himſelf.

This is the kind of dog employed in the diverſion of bull-baiting, an inhuman and diſgraceful cuſtom long practiſed in this country; but which of late years has been gradually on the decline, and in many parts has been entirely laid aſide. As an inſtance of the remarkable ardour of this breed of dogs in attacking the bull, it is related by Dr. Goldſmith, that ſome years ago, at a bull-bait in the north of England, when that barbarous cuſtom was very common, a young man, confident of the courage of his dog, laid ſome trifling wager that he would, at ſeparate times, cut off all the four feet of his dog; and that after every amputation it would attack the bull. The cruel experiment was tried, and the dog continued to ſeize the bull as eagerly as if he had been perfectly whole. The aſpect of the bull-dog is altogether ferociouſly brutal, and as he always makes his attack without barking, it is dangerous to approach him alone without the greateſt precaution.

The bull dogs of Great Britain were celebrated for their ſtrength and invincible courage in the early hiſtory of the country: even under the Roman emperors, while their forces colonized this iſland, an officer was appointed, whoſe ſole buſineſs it was to breed and tranſport from hence ſuch as would prove equal to the combats of the amphitheatre. There may not, however, remain ſufficient evidence on record to decide, whether the maſtiff or the bull dog was the breed in ſuch high requeſt: ſome writers affirm it to be the maſtiff, others the bull dog. Linnæus ſeems to conſider the maſtiff as the dog in queſtion, and gives it the trivial name of *anglicus* for that reaſon. Aldrovandus calls it *Canis bellicoſus anglicus*, and Ridinger *Engliſche Docke*. The true bull dog, the Linnæan canis moloſſus, nevertheleſs, appears to be an indigenous breed in this iſland, and from their acknowledged ſuperiority in courage, though inferior in point of ſize, may perhaps be regarded more truly as the genuine Britiſh race ſo highly celebrated by the Latin hiſtorians.

Ban-dog, a variety of this fierce tribe not often met with. It is lighter, ſmaller, more active and vigilant than the maſtiff, but not ſo powerful. Its noſe is ſmaller, its hair more rugged, and the colour generally of a yellowiſh grey ſtreaked with ſhades of black or brown. It attacks with eagerneſs, but more commonly ſeizes cattle by the flank than in front.

Dalmatian or *Coach Dog*, is an animal of great beauty, being of a white colour, elegantly marked on all parts with numerous round black ſpots. The native country of this breed is uncertain; it is commonly termed the Daniſh dog. Buffon calls it Brague de Bengal, but Pennant affirms that it is a native of Dalmatia, a diſtrict of European Turkey. It is ſaid to have been known and domeſticated in Italy for the laſt two centuries, and to be the common harrier of that country.

This kind is uſually kept in genteel houſes as an attendant on the carriage: its ſcent is indifferent.

Iriſh Greyhound, Canis Graius Hibernicus of Ray, and Le Matin of Buffon. This is the largeſt of the dog kind, and in its appearance the moſt beautiful and majeſtic. The breed is peculiar to Ireland, where it was formerly of great uſe in deſtroying the wolves, with which that country was much infeſted, but is now become extremely rare. In the third volume of the Linnæan Tranſactions is an account of a dog of this kind communicated by Aylmer Bourke Lambert, eſq. who aſſures us that the breed is now become nearly extinct in Ireland; thoſe in the poſſeſſion of the earl of Altamont (eight in number) being the only ones in the country. The ſpecimen deſcribed by Mr. Lambert meaſured ſixty-one inches from the noſe to the tip of the tail; but formerly they appear to have been of a much ſuperior ſize, and in ſhape more reſembling a greyhound. Dr. Goldſmith aſſures us he has ſeen a dozen of theſe dogs, and informs us that the largeſt was about four feet high, or as tall as a calf of a year old. Theſe dogs are generally of a white or cinnamon colour, and more robuſt than the greyhound, their aſpect mild, and their diſpoſition gentle and peaceable. It is ſaid that their ſtrength is ſo great that in combat the maſtiff or bull dog is far from equal to them. They commonly ſeize their antagoniſts by the back and ſhake them to death. Theſe dogs were never ſerviceable for hunting either the ſtag, the fox, or the hare: their chief utility was in hunting wolves, and to this breed may be in a great meaſure attributed the final extirpation of thoſe ferocious animals in the woody diſtricts of Wales and England in early times.

Scottiſh Highland Greyhound, or *Wolf Dog*, is a large, powerful, and fierce looking dog, with pendulous ears, and its eyes half concealed among the hair; its body was ſtrong and muſcular, and covered with harſh wiry hair of a reddiſh colour mixed with white. This is the animal formerly uſed by the chieftains of Scotland in their grand hunting parties.

Gazehound, an animal ſimilar to the greyhound; and, like that kind of dog, directed in its purſuit only by the eye. This was formerly in great repute, but appears at this time to be very imperfectly known. It was uſed chiefly in ſtag and fox hunting.

Greyhound, Le Levrier of Buffon, Canis grajus of Gmelin. The greyhound is remarkable for the ſlenderneſs of its form, its elongated ſnout, and extreme ſwiftneſs of its courſe. It is indeed eſteemed the fleeteſt of all the hunting dogs, but as it wants the faculty of ſcent, follows by the eye. Formerly, the greyhound was held in ſuch eſteem, that by the laws of king Canute, it was enacted that no one under the degree of a gentleman ſhould preſume to keep one. Buffon ſuppoſes this to be the Iriſh greyhound rendered thinner and more delicate by the influence of climate.

Italian Greyhound, called by Ridinger Windſpiel, and Levron by Buffon. This, like the former, has the body arched and the ſnout tapering, but its ſize is only half that of the common greyhound; it is a beautiful and delicate animal, and is not common in this country, the climate being too rigorous for its conſtitution.

Lurcher, the uſual attendant on the poacher in his illicit practices, is a dog of ſmaller ſize than the greyhound, and ſtouter in proportion; its hair rough and commonly of a pale yellowiſh colour, and the aſpect of its viſage remarkable for its ſullenneſs. As this dog poſſeſſes the advantage of a fine ſcent, it is moſt commonly employed in killing hares and rabbits during the night-time. When turned into the warren it lurks about with the utmoſt precaution, and darts upon the rabbits, while feeding, without barking or making the leaſt noiſe; and then conveys his booty in ſilence to his maſter, who remains in waiting in ſome convenient place to receive it. The lurcher is ſo deſtructive to game as to be generally proſcribed, and the breed in conſequence may therefore at no very remote period become extinct.

Naked Dog, a ſingular variety, naturally deſtitute of hair, which is imagined to have originated in ſome very warm countries. Many have ſuppoſed it to be of the Engliſh bull dog kind reduced and degenerated by the heat of the eaſtern climate. Buffon calls it *Le chien Turc*, and later writers depending on his authority have hence deſcribed it as a native of Turkey, but erroneouſly, for in that part of the world it appears to be altogether unknown. Sonnini, in the courſe of his travels through the Ottoman empire, had an ample opportunity of aſcertaining this fact, and ſpeaks decidedly to that effect. On the ſubject of dogs (obſerves this writer) which are in very great numbers in the towns of Turkey, I ſhall remark, that we might ſeek there in vain that ſpecies, rather uncommon and without hair, which we call *the Turkiſh dog*, and ſometimes the naked dog. It is not in the temperate climate of Turkey that dogs loſe their hair; it is not even under the burning ſky of Egypt, for thoſe ſeen in the moſt northern part, which is diſtinguiſhed by the name of Lower Egypt, are of the race of large greyhounds, deformed by want, which are found in the other towns of Turkey; and thoſe of Upper Egypt have long hair, and ſomewhat reſemble our ſhepherd's dog. M. Sonnini does not pretend to ſay from what country the Turkiſh dog originally came, but aſſures us he never met with a ſingle one in Turkey, nor could he learn after much enquiry that it is at all known in that country. I have even ſome reaſon to ſuſpect (ſays this writer) that this is a diſtinct and ſeparate ſpecies, and the ſcarcity of theſe dogs in Europe might lead us to preſume that they are a ſimple accidental variety in a ſpecies of animals the race of which are inceſſantly croſſed and mingled; a variety which may have been called Turkiſh dog, becauſe having ſcarcely any hair they have ſome reſemblance to the Turks, with whoſe ſcrupulous attention to eradicate their hair every one is well acquainted. The author of the ſportſman's cabinet tells us, the bull dog, the naked or Turkiſh dog, and the Iceland dogs are ſaid to conſtitute but one race, which being removed from cold countries where the fur, hair, or wool is always ſtrong, into the warmer climates of Africa and India, have loſt their hair. The Turkiſh dog, it is remarked likewiſe, is nothing but the ſmall Daniſh dog, which having been tranſported to a much warmer climate loſt its hair, and was afterwards returned to Turkey, and propagated more carefully on account of his ſingularity. This opinion is, however, diſcountenanced by the foregoing obſervations.

Terrier, a ſmall thickſet dog, of which there are two kinds, one with the legs ſhort, the back long, and moſt commonly of a black or yellowiſh colour mixed with white; the other of more ſprightly appearance, with the body ſhorter, and the colour reddiſh brown or black. In both the diſpoſition is nearly the ſame; it has an acute ſmell, is generally an attendant on every pack of hounds, and is very expert in forcing foxes and other game out of their coverts. Its determined hoſtility againſt rats, mice, and other animals of the like deſcription, renders it really ſerviceable. The terrier is well known to encounter the badger, which is a formidable animal, with great courage, and not often without ſucceſs, though it ſeldom fails to meet with ſevere treatment in thoſe engagements. To the fox as well as badger it is an implacable enemy, and purſues every kind of game ſecreted in ſubterraneous retreats with more alacrity than any other of the dog race. The huntſmen are exceedingly choice in their ſelection of terriers for a fox hunting eſtabliſhment; their ſize is not ſo much regarded as ſtrength, but they muſt poſſeſs, as an indiſpenſable qualification, the moſt invincible fortitude. The black, and black tanned, or rough wire-haired pied are preferred, for it is obſerved, that thoſe inclining to a reddiſh colour are ſometimes in the clamour of the chaſe.

Turnſpit, a ſpirited, active, and induſtrious kind of dog, conſidered once as an indiſpenſable attendant on the ſpit, which, by a peculiar contrivance, and the aid of its own exertions, it was enabled to turn at an even pace. This office of the canine turnſpit has, however, been gradually ſuperſeded by the introduction of the "*jack*" in this country, except in ſome particular places. It is ſtill practiſed in France and Germany. The turnſpit is diſtinguiſhed by having the body long, the legs very ſhort, and the tail curled on the back; its uſual colour is greyiſh with black ſpots. Gmelin has three varieties of this family of dogs, one of which has the feet ſtraight, another the feet curved, and the third having the body covered with long curly hair. The terrier is the Gmelinian *canis vertagus*.

Beagle. The ſmalleſt of thoſe dogs which are kept for the pleaſure of the chace in this country, and which is employed chiefly in hunting the hare. The huntſman diſtinguiſhes two or more diſtinct varieties, as the "rough beagle" and "ſmooth beagle," &c. and each kind has its particular admirers. The beagle is remarkable for the exquiſiteneſs of its ſcent, and the ſoft and muſical melody of its tone.

Harrier, another of the hunting dogs, cloſely allied to the beagle, and like that kind comprehending ſeveral varieties. This is larger than the beagle, more nimble, and vigorous, and better adapted to endure the labour of the chace. In the purſuit of the hare, it evinces the warmeſt ardour, and frequently outſtrips the ſpeed of the fleeteſt ſportſman. A hybrid breed between this and the terrier, is ſometimes kept for hunting the otter, the dog produced being a hound of great ſtrength and activity.

Fox-hound. The breeding and training of this kind of dog is attended to with ſo much care in this country, that it can admit of no ſurpriſe to find them ſuperior in ſtrength, agility, and ſwiftneſs, to thoſe of every other part of the world; the unrivalled excellence of the Britiſh fox-hound is univerſally acknowledged. In chooſing thoſe animals, ſuch as ſtand high and appear light in their make are deemed preferable. The fox-hound is not limited to the purſuit of the fox only, but is inſtructed alſo to hunt the ſtag and other deer, and are found equal to the moſt arduous conteſts of the chace. It is affirmed, that the fox-hounds reared in this country loſe much of their native vigour, on being tranſported into any other climate.

One of the moſt remarkable inſtances of the ſpeed and determined perſeverance of this kind of hounds, occurred many years ago in the north of England. A ſtag was hunted from Whinfield park, in the county of Weſtmoreland, till by fatigue or accident the whole pack was thrown out, except two fox-hounds bred by lord Thanet, who continued the chace during the greateſt part of the day. The ſtag returned to the park from whence he had been driven, and as his laſt effort leaped over the wall, and died as ſoon as he had accompliſhed it. One of the hounds ran to the wall, but being unable to get over it, laid down and almoſt immediately expired: the other hound was found dead about half a mile from the park. The length of this chace is uncertain, but as they were ſeen at Red-kirks, near Annan, in Scotland, diſtant on the poſt road about forty-ſix miles, it is conjectured, the circuitous courſe they took, could not make the diſtance ran leſs than one hundred and twenty miles. A chace of ſix or eight hours has been ſuſtained by theſe hounds on many occaſions, but their ſwiftneſs cannot perhaps be more forcibly inſtanced, than by ſome experiments that have been lately determined in the ſporting world. One eſpecially ſhould be noticed: about the year 1795, Merkin, a celebrated fox-hound bitch, was challenged to run any hound of her years, five miles over Newmarket, giving 220 yards, for 10,000 guineas, and as a run for trial, performed a race of four miles in ſeven minutes and a half.

Old Engliſh hound is diſtinguiſhed by its great ſize and ſtrength: the body is long, with a deep cheſt, its ears long and ſweeping, and the tone of its voice peculiarly deep and mellow. It poſſeſſes the moſt exquiſite ſenſe of ſmelling, and can often diſcover the ſcent an hour after the beagles have given it up. Dogs of this kind were once common in Britain, and are ſaid to be formerly much larger than at preſent.

The *Kibble hound* is a croſs breed between this and the beagle.

Blood hound, a dog of larger ſize than the old Engliſh hound, more beautiful in its formation, and poſſeſſing ſuperior activity and ſagacity. The prevailing colour is reddiſh brown. This ſort of hound was held in high requeſt among our anceſtors, and as it was remarkable for the moſt exquiſite ſenſe of ſmelling, was frequently employed in recovering game that had eſcaped from the hunter. It could follow, with great certainty, the footſteps of a man to a conſiderable diſtance, and was therefore of the utmoſt utility in thoſe barbarous and uncivilized times, in tracing murderers and other felons through the moſt ſecret coverts. In many diſtricts, infeſted with robbers, a certain number of theſe hounds were maintained at the public charge, and in general proved the means of diſcovering the perpetrators of crimes when every other endeavour failed of ſucceſs. Upon the Scottiſh borders, where it was known by the name of *Sleuth-hound*, it was eſpecially ſerviceable.

The breed of this kind of dog is not very generally cultivated at this time. Some few are kept for the purſuit of deer which have been previouſly wounded by a ſhot to draw blood, the ſcent of which enables the dog to purſue with the greateſt certainty. During the American war numbers of theſe dogs were ſent to that country, and employed in diſcovering fugitives concealed in the woods and other ſecret places: they were in uſe alſo, for a ſimilar purpoſe, during the late revolts in the Weſt Indian iſlands, and likewiſe in Ireland at the time of the laſt rebellion. They are ſometimes employed in diſcovering deer-ſtealers, whom they infallibly trace by the blood that iſſues from the wounds of their victims. They are alſo ſaid to be kept in convents ſituated in the lonely mountainous countries of Switzerland, both as a guard to the ſacred manſions as well as to find out the bodies of men who have been unfortunately loſt in croſſing thoſe wild and dreary tracts. As an inſtance of the certainty with which the blood-hound purſues the object it is required to ſeek, it is related by Mr. Boyle, that a perſon of quality, in order to try whether a young blood-hound was well inſtructed, cauſed one of his ſervants to walk to a town four miles off, and then to a market town three miles from thence. The dog, without ſeeing the man he was to purſue, followed him by the ſcent to the above-mentioned places, notwithſtanding the multitude of market people that went the ſame way, and travellers that had occaſion to croſs it: and when the blood-hound came to the chief market town, he paſſed through the ſtreets without taking notice of any of the people there, and did not quit the place till he had gone to the houſe where the man was reſting himſelf, and whom he found ſitting in one of the upper apartments.

Spaniſh Pointer, originally, as its name implies, a native of Spain, but long ſince naturalized in this country. This dog is remarkable for the aptneſs with which it receives inſtruction, and is much more readily broke and trained to the ſport than the Engliſh pointer, but is leſs capable of enduring fatigue. It is employed chiefly in finding partridges, pheaſants, &c. either for the dog or gun.

Engliſh Setter, a hardy, nimble, and handſome dog, poſſeſſed of an exquiſite ſcent and ſagacity in diſcovering various kinds of game, and which is upon the whole eſteemed one of the moſt valuable of our hunting dogs.

> "The Setter ranges in the new-ſhorn fields,
> His noſe in air erect; from ridge to ridge
> Panting he bounds, his quartered ground divides
> In equal intervals, nor careleſs leaves
> One inch untried: at length the tainted gales
> His noſtrils wide inhale: quick joy elates
> His beating heart, which awed by diſcipline
> Severe, he dares not own, but cautious creeps
> Low-cow'ring, ſtep by ſtep; at laſt attains
> His proper diſtance: there he ſtops at once,
> And points with his inſtructive noſe upon
> The trembling prey." Somerville.

Alco, a kind of dog deſcribed by Buffon, and which is ſaid to be diſtinguiſhed by the ſmallneſs of its head, and pendulous ears, curved back, and ſhort tail. The alco is reported to be the original, or indigenous dog found by the Spaniards in South America, at the time of the diſcovery of that vaſt continent. It is ſubject to two diſtinct varieties, one of which Hernandez calls *Ytzucinte porcotl:* this alſo bears, according to Fernandez, the name of *Michuacanens*; the other is called *Techichi*. The former has the head white in front, with the ears yellowiſh, the neck ſhort, the back curved, and covered with yellow hair: tail white, ſhort, and pendulous, belly large and ſpotted with black, and the legs white. The other correſponds pretty nearly with this, but has a wilder and more melancholy air. The beſt account extant of this kind of dog is not ſo ſatisfactory as we could wiſh; and the following variety alſo appertains ſo nearly to the wolf tribe, that we cannot admit it among the dog tribe without expreſſing ſome doubt as to its propriety.

Dingo, or New Holland Dog.—In this animal the ſnout is pointed, the ears erect, and the tail buſhy and pendulous; its ſtature is that of the largeſt ſhepherd's dog, and its colour a reddiſh dun brown, the hair long, thick, and ſtraight. It is capable of barking, though not ſo readily as the European dogs, but ſnarls and howls exactly like them, notwithſtanding which, it has been repreſented as unable to either bark or ſnarl. Thoſe which have been brought to Europe evince a ſavage and untractable diſpoſition, altogether diſtinct from that ſhewn by the dog race to the kind familiarity of man.

The above appear to conſtitute the leading varieties of this generous breed of animals; but of this let us be underſtood to ſpeak with heſitation, for it cannot be unknown that ſcarcely any two writers agree in this reſpect. By ſome the diſtinctive breeds or varieties of this race are multiplied perhaps in a ſuperfluous manner, while others condenſe them within a ſmaller compaſs than is neceſſary. It is indeed

deed a taſk of difficulty to mark the line of definition, by which the varieties ought, in every inſtance, to be divided. The tranſitions dependant on croſſing the breed, the influence of different climates, their employment, feed, and training, all contribute ſo materially to effect a change in their appearance, as to offer innumerable, if not inſurmountable, obſtacles, to the eſtabliſhment of any ſyſtematic arrangement that ſhall be free from objection. How, indeed, can we dwell on the permanency of diſtinctive varieties in dogs, when the ableſt and moſt experienced obſervers affirm, that the ſame breed, tranſported into different climates, becomes ſo diſſimilar, as to be ſcarcely, if at all, recognizable. Thus, the bull-dog, it is aſſerted, tranſported into the north of Europe, is become the little Daniſh dog, or nurtured in the hotter regions of Africa, the naked dog; and ſimilar changes are obſerved to be produced by change of climate in other varieties. By croſſing the breeds, likewiſe, we have varieties innumerable. Thus, it is believed, that the Daniſh dog, the Iriſh greyhound, and the common greyhound of this country, though they appear ſo different, are but one and the ſame dog. The ſhepherd's dog, the Pomeranian, the Siberian, the Lapland and Canadian dogs, are alſo ſaid to conſtitute only one kind: and the ſame is obſerved again of the hound, the harrier, the turnſpit, water-dog, and even ſpaniel. Among the croſs breeds, we may inſtance the bull-dog and little Dane producing the pug-dog; the ſmall Daniſh dog and the ſpaniel, the lion dog; and the little ſpaniel, and the leſſer water-dog, the Malteſe kind. Many other inſtances might be adduced, were not theſe eſteemed ſufficient to ſhew that ſeveral of the ſuppoſed primitive varieties are not really ſuch, but depend on the influence of climate, and intermixture of the breeds.

Dr. Caius, an Engliſh phyſician in the reign of queen Elizabeth, has given the following ſyſtematical arrangement of Britiſh dogs:

- I. The moſt generous kinds.
  - Dogs of chace.
    - Hounds.
      - Terrier.
      - Harrier.
      - Blood-hound.
    - Gaze-hound.
    - Grey-hound.
    - Leviner, or Lyemmer.
    - Tumbler.
  - Fowlers,
    - Spaniel.
    - Setter.
    - Water-ſpaniel, or Finder.
  - Lap-dogs,
    - Spaniel gentle, or Comforter.
- II. Farm-dogs.
  - Shepherd's-dog.
  - Maſtiff, or Ban-dog.
- III. Mongrels.
  - Wappe.
  - Turnſpit.
  - Dancer.

The law takes notice of a grey-hound, maſtiff-dog, ſpaniel, and tumbler; for trover will lie for them. (Cro. Eliz. 125. Cro. Jac. 44.) A man hath a property in a maſtiff; and where a maſtiff falls on another's dog, the owner of that dog cannot juſtify killing of the maſtiff; unleſs there was no other way to ſave his dog, as that he could not take off the maſtiff, &c. (1 Saund. 84. 3 Salk. 139.) The owner of a dog is bound to muzzle him if miſchievous, but not otherwiſe: and if a man keeps a dog that is uſed to do miſchief, as by worrying ſheep, biting cattle, and the like, the owner muſt anſwer for the conſequences, if he knows of ſuch an evil habit. (Cro. 254. 487. Stra. 1264.) By ſtat. 10 Geo. III. c. 18. ſtealing of dogs incurs a forfeiture from 20 *l.* to 30 *l.* and charges of conviction for the firſt offence, or an impriſonment for any time between ſix and twelve months, at the diſcretion of two juſtices; and for a ſubſequent offence, of not leſs than 30 *l.* nor more than 50 *l.* and charges, or on nonpayment, impriſonment for twelve to eighteen months, and public whipping. Perſons alſo, in whoſe cuſtody dogs, or their ſkins are found, are liable to like penalties.

We ſhall wave ſpeaking at any conſiderable length on the many valuable qualities which ſo eminently characterize this valuable race of animals, in a general point of view: theſe are too obvious to require demonſtration, and have abundant claim to the generous impulſe of our gratitude, as well as panegyric. The dog is our ſervant, but he is alſo our companion and our friend, and who, by his vigilance and attachment, more than amply repays the kindneſs we beſtow on him. But the good qualities of this animal, though uniformly felt, are not invariably acknowledged. In England the dog is cheriſhed and protected, but there are many parts of the world, not even to inſtance the more uncivilized ſtates, where the condition of theſe ill-fated animals may juſtly excite our commiſeration; countries in which the moſt ſolid and beneficial advantages are derived to ſociety from their zeal and induſtry, and in reward for which they receive only the moſt inhuman and ungrateful treatment, deteſtation, and contempt. It is, indeed, but too generally in the cruel diſpoſition of man, to recompenſe the moſt important ſervices of the brute creation with the coldeſt inſenſibility and barbarity.

Notwithſtanding the extraordinary natural faculties of the dog, it muſt be allowed that much depends on his education, and ſuch is his docility as well as ſagacity, that he rarely fails to improve to the utmoſt expectation of his tutor. There are numberleſs inſtances in which he muſt have exceeded every reaſonable idea that could have been entertained of him. Inſtances of this kind muſt be familiar to every reader, but there are two or three anecdotes on record of ſuch an extraordinary nature, that we cannot refrain repeating them; they ſeem to evince a degree of dexterity and talent ſo much beyond the comprehenſion of the brute creation, that they cannot prove irrelevant. It is recorded of a dog, belonging to a nobleman of the Medici family, that he always attended at its maſter's table, changed the plates for him, and carried him his wine in a glaſs placed on a ſalver, without ſpilling a drop! This is ſurely a moſt aſtoniſhing inſtance of canine ſagacity, but its attainments were perhaps outrivalled by the dog who was taught to ſpeak. The dog alluded to is mentioned by the French academicians; it lived in Germany, and could call in an intelligible manner for tea, coffee, chocolate, &c. The account is given by the celebrated Leibnitz, and was briefly this: the dog was of a middling ſize, and was the property of a peaſant in Saxony. A little boy, the peaſant's ſon, imagined that he perceived in the dog's voice an indiſtinct reſemblance to certain words, and was therefore determined to teach him to ſpeak diſtinctly. For this purpoſe he ſpared neither time nor pains with his pupil, who was about three years old, when his learned education commenced; and at length he made ſuch a progreſs in language as to be able to articulate no leſs than thirty words. It appears, however, that he was ſomewhat of a truant, and did not very willingly exert his talents, being rather preſſed into the ſervice of literature, and it was neceſſary that the words ſhould be firſt pronounced to him each time before he ſpoke. The French academicians add, that unleſs they had received the teſtimony of ſo great a man as Leibnitz, they ſhould ſcarcely have dared to report the circumſtance. This wonderful dog was born near Zeitz, in Miſnia in Saxony.

There is not, perhaps, in the univerſe, a country in which the dog enjoys a greater degree of liberty than in Britain, nor any in which the different breeds in general are to be found in a higher ſtate of improvement: particular nations may boaſt of their peculiar or local varieties, but we ſpeak generally.

Dogs in many countries are ſubjected to the ſevereſt labour. In Lapland and Siberia the dogs are compelled to convey travellers over the ice and ſnows of thoſe inhoſpitable regions, in return for a ſolitary daily meal of the filthy offals of fiſh, ſcarcely ſufficient to ſupport life, and which they receive only when the labour of the day is over. Nor is their fate leſs ſevere in Newfoundland, where the dogs of that country are employed as animals of draught for every ſimilar purpoſe. In Holland, according to Mr. Pratt, there is not an idle dog of any material ſize to be ſeen in the whole ſeven provinces. You ſee them in harneſs at all parts of the Hague, as well as in other towns, tugging at barrows and little carts with their tongue nearly ſweeping the ground, and their poor palpitating hearts almoſt beating through their ſides: frequently three, four, five, or ſometimes ſix abreaſt, drawing men and merchandize with the ſpeed of little horſes. On paſſing from the Hague-gate to Scheveling, you perceive, at any hour of the day, an incredible number loaded with fiſh and men, under the burden of which they run off at a long trot, and ſometimes at full gallop, the whole mile and half, which is the preciſe diſtance from gate to gate; nor on their return are they ſuffered to come with their barrows empty, being filled not only with the men and boys before mentioned, but with ſuch commodities as are marketable at the village. This writer further adds, that it is no uncommon thing in the middle of ſummer to ſee theſe poor patient, perſevering animals urged and driven beyond their utmoſt ability, till they drop down on the road. Theſe dogs in the ſummer time are occaſionally brought down to the beach and bathed in the ſea, a practice calculated to prevent the diſorders incidental to the canine breed, and highly conducive to their health and vigour. The cuſtom of employing dogs for the conveyance of little carts of a peculiar conſtruction, has begun, within the laſt three or four years, to be prevalent in the vicinity of our own metropolis, but they are only dogs of the more robuſt kinds that are in uſe for this purpoſe.

In the city of Liſbon an immenſe multitude of dogs are allowed to wander in troops without any ſettled habitation, or owners, and which ſubſiſt entirely on the offals, and offenſive filth of every deſcription, thrown from the windows of the houſes into the ſtreets at a certain hour of the night, appointed by the police. During the day-time theſe poor, diſguſting, and half-famiſhed animals, are ſeen lurking under the door-porches, in alleys, ſtables, or ruined buildings, from whence they iſſue in the evening, and perambulate the ſtreets in troops in queſt of food. At ſuch times it becomes adviſable for paſſengers to avoid as much as poſſible approaching them, as their hunger and conflicts between each other render them extremely ferocious, and, ſhould they attack them, would not fail to puniſh their temerity for not keeping at a diſtance. Theſe canine ſcavengers are not ſanctioned or protected by the law, but, as before intimated, are permitted by the police, for the ſake of cleanlineſs, to infeſt the ſtreets of Liſbon. Throughout Turkey, and other Mahometan countries, dogs are reared in conſiderable numbers, but are in general treated with harſhneſs and indifference. In Kamtſchatka, independently of the ſervices which dogs afford during a ſhort and painful life, already mentioned, their ſkins are worn as cloathing, and their long hair for ornament. In America, and various other parts of the world, the fleſh of the dog is eaten, and is to be found commonly with other kinds of meat and game in the public markets. In the Society iſlands they are fattened with vegetables, crammed down their throats, when they will not voluntarily eat any more, as we cram turkies. They are killed by ſtrangling, and the extravaſated blood is preſerved in cocoa-nut ſhells, and baked for the table. The ancients alſo reckoned a young and fat dog excellent food, eſpecially if it had been caſtrated. Hippocrates claſſed it with mutton or pork. The Romans admired ſucking whelps, and ſacrificed them to their divinities; a practice then obſerved by the Aſiatic and American ſavages, to enſure favour or avert evil; and the Romans thought them alſo a ſupper in which the gods themſelves delighted.

Dogs, *Diſeaſes of.* Theſe animals are ſubject to a great variety of diſeaſes, even in a ſtate of nature, and much more ſo when they are domeſticated with man. In theſe latter circumſtances, we find them attacked with almoſt as great a variety of diſeaſes as man himſelf. As this is the caſe, it will at once appear how very unfit a huntſman, a groom, or even a farrier, muſt be to adminiſter to the ſick wants of an animal, incapable of deſcribing his diſeaſe, and rendered tender by art. Mr. Blaine, who has directed his particular attention to this ſubject, has furniſhed us with the following abſtract, or ſummary of thoſe diſeaſes, that are moſt prevalent, and that commit the greateſt ravages among theſe animals, aſſuring us that the remarks here made are the reſult of actual and attentive obſervation.

Aſthma.—There is a kind of affection of the cheſt to which dogs are ſubject, that in its appearances and effects ſo much reſembles the human diſeaſe of this name, and is ſo little like any other diſeaſe, that it may with great propriety be called aſthma. It has, however, this ſpecific difference from human aſthma, that whereas this latter attacks perſons of all ages, and under every peculiarity of circumſtance, the canine aſthma is hardly ever obſerved to attack any but either old dogs, or thoſe who, by confinement, too full living, and want of exerciſe, may be ſuppoſed to have become diſeaſed by theſe deviations from a ſtate of nature. There are very few dogs that live much within doors, or are accuſtomed to much confinement of any kind, which at 5, 6, or 7 years old are not troubled with a ſhort dry diſtreſſing cough, which firſt ſteals on them by unperceived degrees, with a ſlight huſk and diſpoſition to bring ſomething up, gradually becoming more frequent, till at laſt it is almoſt inceſſant; producing a dry ſonorous cough, accompanied with moiſt eyes and continued efforts to bring up a ſmall quantity of frothy mucus. This gives momentary relief, but the cough ſoon returns. After laſting a longer or ſhorter period (ſometimes for ſeveral years) according to circumſtances, the dog has occaſional fits, and from the united effects of theſe, he is at laſt cut off, either by ſtrangulation or emaciation. In ſome caſes the origin of the complaint may be aſcribed to a cold, but even in theſe inſtances the foundation has been previouſly laid by too much confinement, or by the animal's being too fat, which laſt circumſtance is ſo certain a cauſe of it, that it is hardly poſſible to keep a dog very fat for any great length of time, without bringing it on.

This cough is frequently confounded with the cough that precedes, or accompanies diſtemper, but it may be readily diſtinguiſhed from this by an attention to circumſtances; as the age of the animal, its not affecting the general health, nor producing immediate emaciation, and its leſs readily giving way to medicine.

The Cure.—This is often very difficult, becauſe the diſeaſe has in general been long neglected before it is ſufficiently noticed by the owners. As it is in general brought on by confinement, too much warmth, and over feeding; ſo it is evident the cure muſt be begun by a ſteady perſevering alteration in theſe particulars. The exerciſe ſhould by no means be violent, but gentle and long continued. The food muſt be moderate, and principally vegetable; and without being expoſed the dog ſhould have plenty of free air. As the want of pure air brings the diſeaſe on in moſt inſtances, ſo the acceſs of it muſt tend to remove it. The former is ſo certain, that it almoſt invariably happens to thoſe dogs, who are permitted to ſleep withinſide a bed, even though they ſhould have in other reſpects proper treatment, as moderate feeding and plenty of exerciſe. The medicines moſt uſeful are alteratives, and of theſe occaſional emetics are the beſt. One grain of tartariſed antimony (*i. e.* tartar emetic) with two, three, or four grains of calomel, is a very uſeful and valuable emetic. This doſe is ſufficient for a ſmall dog, and may be repeated twice a week with great ſucceſs, always with palliation.

Blindneſs.—Dogs are ſubject to almoſt as many affections of the eyes as ourſelves, many of which end in blindneſs. In diſtemper it is very common for a ſmall abſceſs to form immediately on the pupil of the eye; ſometimes this becomes ſo large as to let out the whole contents of the globe of the eye, in which caſe blindneſs is the inevitable conſequence; but more frequently it heals and leaves only an opaque ſpot, and even this generally in a few months diſappears. In theſe caſes it is of more conſequence to attend to the diſeaſe than to the eye itſelf, which may be ſimply waſhed with a mild waſh of Goulard.

Blindneſs comes on frequently from cataract, which is an opacity of the inner part of the eye within the pupil; moſt old dogs have partial cataract, that is, the bottom of the eye becomes milky and opaque; but the cryſtalline lens does not harden or become wholely white. No treatment yet diſcovered will remove or prevent this complaint.

Sore Eyes, though not in general ending in blindneſs, are very common among dogs. It is an affection of the eyelids, and is not unlike the ſcrophulous affection of the human eyelids, and is equally benefitted by the ſame treatment: an unguent made of equal parts of nitrated quick-ſilver ointment, prepared tutty and lard, very lightly applied. Dropſy of the eyeball is likewiſe ſometimes met with, but is incurable.

Cancer.—The virulent dreadful ulcer that is ſo fatal in the human ſubject, and is called cancer, is unknown in dogs; yet there is very commonly a large ſchirrous ſwelling of the teats in bitches, and of the teſticles (though leſs frequent) in dogs, that as it ſometimes becomes ulcerated, ſo it may be characterized by this name. When bitches are not permitted to breed, the milk they form, which they do without being pregnant, nine weeks after their heat, coagulates in the teats, and becomes a ſource of irritation, and gradually a ſchirrous ſwelling is formed, which increaſes to a very large ſize; we have ſeen them of ſeveral pounds. Sometimes ulcers break out on the ſurface, which increaſe gradually, but do not appear to diſtreſs the animal, or affect the health in any degree equal to the apparent magnitude of the complaint. In the early ſtate of the diſeaſe diſcutients prove uſeful, as vinegar with ſalt. Camphor and Spaniſh flies, with mercurial ointment, have ſometimes ſucceeded; taking care to avoid irritating the part ſo much as to produce bliſter. But when the ſwelling is detached from the belly, and hangs pendulous in the ſkin, it had better be removed, and as a future preventive ſuffer the bitch to breed.

Schirrous teſticles are likewiſe ſometimes met with; for theſe no treatment yet diſcovered ſucceeds, but the removal of the part, and that before the ſpermatic chord becomes much affected, or it will be uſeleſs.

Colic.—Dogs are ſubject to two kinds of colic; one ariſing from conſtipation of the bowels, the other is of a kind peculiar to dogs, apparently partaking of the nature of rheumatiſm, and alſo of ſpaſm. From a ſudden or violent expoſure to cold, dogs become ſometimes ſuddenly paralytic, particularly in the hinder parts; having great tenderneſs and pain, and every appearance of lumbago. In every inſtance of this kind, there is conſiderable affection of the bowels, generally coſtiveneſs, always great pain. A warm bath, external ſtimulants, but more particularly active aperients, remove the colic. The future treatment will be detailed under the head RHEUMATISM.

Colic, ariſing from coſtiveneſs, is not in general violently acute in the pain it produces; ſometimes, however, it appears accompanied with more ſpaſm than is immediately dependant on the confinement of the bowels. In the former give active aperients, as calomel with pil. cochiæ, *i. e.* aloetic pill and glyſters; in the latter caſtor oil with laudanum and ether.

Cough.—Two kinds of cough are common among dogs, one accompanying diſtemper, the other is an aſthmatic affection of the cheſt. See ASTHMA, and the next article.

Diſtemper.—This is by far the moſt common and moſt fatal among the diſeaſes of dogs. This alone deſtroys by thouſands more than all the other diſeaſes together: hardly any young dog eſcaping it. And of the few who do eſcape it in their youth, three-fourths are attacked with it at ſome period afterwards: it being a miſtake that young dogs only have it. No age is exempt. We have ſeen repeated inſtances of it after ten, twelve, and even fourteen years of age. It however generally attacks before the animal arrives at eighteen months old. When it comes on very early the chances of recovery are very ſmall. It is peculiarly fatal to greyhounds, much more ſo than to any other kind of dog, generally carrying them off by exceſſive ſcouring. It is very contagious; but it is by no means neceſſary that there ſhould be contagion preſent to produce it; on the contrary, the conſtitutional liability to it is ſuch, that any cold taken may bring it on: and hence it is very common to date its commencement from a dog's being thrown into water, or ſhut out in a rainy day, &c. &c. There is no diſeaſe that preſents ſuch varieties as this, either in its mode of attack, or during its continuance. In ſome caſes it commences by purging, in others by fits. Some have cough only, ſome waſte, and others have moiſture from the eyes and noſe, without any other active ſymptom.

Moiſt eyes, dulneſs, waſting, with ſlight cough, and ſickneſs, are the common ſymptoms that betoken its approach. Then purging comes on, and the moiſture from the eyes and noſe become from mere mucus, pus, or matter. There is alſo frequently ſneezing, with a weakneſs in the loins. When the diſeaſe in this latter caſe is not ſpeedily removed, univerſal palſy comes on. During the progreſs of the complaint, dogs have ſome of them fits. When one fit ſucceeds another quickly, the recovery is extremely doubtful. Many dogs are carried off rapidly by the fits, or by purging; others waſte gradually from the running from the noſe and eyes, and theſe caſes are always accompanied with great marks of putridity.

The remote cauſe of the diſtemper it is difficult to explain, nor do the moſt careful diſſections in every ſtage of the complaint aſcertain more than that there is a general inflammation of the mucous membrane: but whether the true ſeat of the diſeaſe is confined to *that* membrane, and all the other ſymptoms are the conſequences of it, or are real affections of the other parts, is an undecided point; although it is certain, that its firſt appearance is an inflammation of the pituitary membrane, and that this is one of the moſt laſting as well as conſtant ſymptoms. That this inflammation is communicated from the membrane of the noſe to the upper part of the gullet and windpipe, is evident by the ſwelling of the glands of the throat, the tenderneſs and dry cough; and that this inflammation extends from thence to the ſame membrane of the ſtomach and inteſtines is equally ſo, producing vomiting, coſtiveneſs, or purging. The diſtemper in dogs is thought to have one characteriſtic in common with the putrid ſore throat in human beings, that it generally attacks the weakeſt; children being the moſt and women more liable to it than men, and ſo young hounds more readily catch the diſtemper than old ones. When at their walks, or firſt taken up from them, the diſorder is conſidered as moſt dangerous, and if one has the diſeaſe, they will all take it. Mr. Beckford alſo coincides in the opinion that madneſs, the dog's inflammatory fever, is leſs frequent than it was before the diſtemper was known.

The Cure.—In the early ſtages of the complaint give emetics, they are peculiarly uſeful. A large ſpoonful of common ſalt, diſſolved in three ſpoonfuls of warm water, has been recommended; the quantity of ſalt being increaſed according to the ſize of the dog, and the difficulty of making him to vomit. While a dog remains ſtrong, one every other day is not too much: the bowels ſhould be kept open, but active purging ſhould be avoided. In caſe the complaint ſhould be accompanied with exceſſive looſeneſs, it ſhould be immediately ſtopped by balls made with equal parts of gum arabic, prepared chalk, and conſerve of roſes, with rice milk as food. Two or three grains of James's powder may be advantageouſly given at night, in caſes where the bowels are not affected, and in the caſes where the matter from the noſe and eyes betokens much putridity, we have witneſſed great benefit from balls made of what is termed Friar's balſam, gum guaicum, and chamomile flowers in powder: but the moſt popular remedy is a powder prepared and vended under the name of Diſtemper Powder, with inſtructions for the uſe of it. Dogs, in every ſtage of the diſeaſe, ſhould be particularly well fed. A ſitton we have not found ſo uſeful as is generally ſuppoſed; where the noſe is much ſtopped, rubbing tar on the upper part is uſeful, and when there is much ſtupidity, and the head ſeems much affected, a bliſter on the top is often ſerviceable.

Mr. Beckford mentions a remedy for the diſtemper, communicated to him by a friend, whoſe hounds had found great benefit from it; this was an ounce of Peruvian bark in a glaſs of port wine, taken twice a day. Norris's drops have alſo been given with ſucceſs in the quantity of a large table-ſpoonful in an equal quantity of port-wine, three times a day, leſſening the quantity as the dog grew better.

Mr. Daniel (Rural Sports, vol. i.) informs us, that he has witneſſed extraordinary ſucceſs from Dr. James's powders, applied in the following manner: when the ſymptoms of the diſtemper are apparent, a *third* of one of the parcels incloſed in the half-crown packets ſhould be given, well mixed up with butter; the dog to have plenty of warm broth or milk and water, and if poſſible, to be near a fire, or be kept very warm; two hours afterwards another third part is to be adminiſtered. If neither of theſe ſhould operate by vomiting or purging, at the end of four hours give the remaining third. Should the two firſt portions have effect, the remaining third ſhould not be given until four or ſix hours (according to the quantity of the evacuations) after the expiration of the four hours; in the mean while the dog is to be encouraged to lap, and if he refuſes, be forced to take plentifully of the warm broth or milk and water. Warmth and warm liquids will perfect the recovery: and as ſoon as the dog's appetite returns, he ſhould be fed (at firſt ſparingly) with animal food. The following remedies have been recommended, and in ſome caſes of the diſorder, have been effectual in its cure; *viz.* 1½ gr. of calomel, and 5 gr. of rhubarb, to be repeated every other day;—4 gr. of turbith mineral, and 1 gr. of emetic tartar, the dog having been firſt bled;—a tea-ſpoonful of jalap, half the quantity of grated ginger, a table ſpoonful of ſyrup of buckthorn, made into a ball, or given liquid in warm water, no milk but water-gruel being given to drink, and the dog kept very warm:—gamboge, dragon's blood, and Jeſuit's bark, of each half an ounce, made into pills the ſize of a hazle nut; one pill to be given every morning to a full grown dog, till cured; and to a whelp, three times a week; the dogs having full liberty to run out. Dr. Darwin has given the following account of this diſorder, and of the method of counteracting its malignity. In dogs, he ſays, the catarrh is generally joined with ſymptoms of debility early in the diſeaſe; the animals ſhould be allowed to go about in the open air, becauſe the air which they breathe paſſes twice, in inſpiration and expiration, over the putrid ſloughs of the mortified parts of the membrane, which lines the noſtrils, and the maxillary and frontal cavities, and muſt, therefore, be loaded with contagious particles. Freſh new milk, and freſh broth ſhould be given them very frequently, and they ſhould be ſuffered to go amongſt the graſs, which they ſometimes eat for the purpoſe of an emetic; and if poſſible, they ſhould have acceſs to a running ſtream of water, as the contagious mucus of the noſtrils generally drops into the water, which they attempt to drink. Bits of raw fleſh, if the dog will eat them, are preferable to cooked meat, and from five to ten drops of tincture of opium, according to the ſize of the dog, may be given with advantage when ſymptoms of debility are evident, every ſix hours. If ſloughs can be ſeen on the noſtrils, they ſhould be moiſtened twice a day with a ſolution of ſugar of lead or of alum, by means of a ſponge fixed on a bit of whalebone, or by a ſyringe. The lotion may be made by diſſolving half an ounce of ſugar of lead, or of alum, in a pint of water.

Fits.—Dogs are peculiarly ſubject to fits. Theſe are of various kinds, and ariſe from various cauſes. In diſtemper, dogs are frequently attacked with convulſive fits, which begin with a champing of the mouth and ſhaking of the head, gradually extending over the whole body. Sometimes an active emetic will ſtop their progreſs, but more generally they prove fatal.

Worms are often the cauſe of fits in dogs. Theſe deprive the animal wholly of ſenſe; he runs wild till he becomes exhauſted, when he gradually recovers, and perhaps does not have one again for ſome weeks. Confinement produces fits likewiſe. Whenever a dog has been long confined, on coming into active exerciſe he frequently falls into an epileptic fit. Thus, after long ſea voyages, they are very common, and the ſame with pointers and ſpaniels, particularly the latter on their firſt beginning to hunt.

Coſtiveneſs will produce fits ſometimes.

Cold water thrown over a dog will generally remove the preſent attack of a fit; and for the prevention of their future recurrence it is evident, that the foregoing account of cauſes muſt be attended to.

Inflamed Bowels.—Dogs are very ſubject to inflammation of their bowels, from coſtiveneſs, from cold, or from poiſon. When inflammation ariſes from coſtiveneſs, it is in general very ſlow in its progreſs, and is not attended with very acute pain, but it is characteriſed by the want of evacuation, and the vomiting up of the food taken, though it may be eaten with apparent appetite. In theſe caſes the principal means to be made uſe of, are the removal of the conſtipation by active purging, clyſters and the warm bath. Calomel with aloes forms the beſt purge. But when the inflammation may be ſuppoſed to ariſe from cold, then the removing of any coſtiveneſs that may be preſent is but a ſecondary conſideration. This active kind of inflammation is characteriſed by violent panting, total rejection of food, and conſtant ſickneſs. There is great heat in the belly and great pain; it is alſo accompanied with great weakneſs, and the eyes are very red. The bowels ſhould be gently opened with clyſters, but no aloes or calomel ſhould be made uſe of. The belly ſhould be bliſtered, having firſt uſed the warm bath.

When the inflammation ariſes from poiſon, there is then conſtant ſickneſs, the noſe, paws, and ears are cold, and there is a frequent evacuation of brown or bloody ſtools. Caſtor oil ſhould be given, and clyſters of mutton broth thrown up, but it is ſeldom any treatment ſucceeds.

Inflamed Lungs.—Pleuriſy is not an uncommon diſeaſe among dogs. It is ſometimes epidemic, carrying off great numbers. Its attack is rapid, and it generally terminates in death on the third day, by a very great effuſion of water in the cheſt. It is a complaint that exhibits but few varieties in dogs, attacking almoſt all alike, and terminating in a ſimilar manner in all. It is ſeldom that it is taken in time, when it is, bleeding is uſeful; but it muſt be liberally employed. A dog will bear to loſe in this inſtance from three ounces to ſixteen, according to his ſize. If the diſeaſe has proceeded beyond the ſecond day, and bleeding is employed, it produces generally immediate death. Bliſters may be applied to the cheſt alſo.

Madneſs.—The late alarming prevalence of this complaint among dogs, renders the conſideration and deſcription of it intereſting and important. Except the occaſional obſervations of ſportſmen, or the curſory notices of the ſymptoms attendant on it by thoſe who write on human hydrophobia, nothing has ever been written on this head that could give any clear idea of the diſeaſe. The writer of this article has attentively obſerved, during its whole progreſs, more than two hundred caſes; and has diſſected near an hundred bodies of dogs who have died of the malady; he preſumes, therefore, that he muſt be tolerably converſant with the ſubject. There certainly is no diſeaſe more frequently mentioned, none on which every one ſuppoſes that he has clear notions, and yet on which ſuch total ignorance prevails. Several cauſes conſpire to render this the caſe: one is, that except at particular periods, perhaps once in 20 years, to ſee a mad dog is a very rare occurrence: another is, that the peculiar ſymptom which characteriſes the complaint, brought on by the bite of the mad dog, in the human ſubject, has been applied to the diſeaſe in the dog, and has occaſioned it to be called by the ſame name, hydrophobia. This, in the firſt place, is a palpable miſnomer; for in no inſtance does there ever exiſt any dread of water; on the contrary, dogs are in general very greedy after it. This, therefore, has led perſons into a very fatal error; for it being the received opinion that no dog was mad who would drink water, many perſons have been lulled into a dangrous ſecurity. Another equally fatal prejudice has exiſted in the minds of perſons relative to this complaint, which is, that every mad dog muſt neceſſarily be wild and furious; and in every deſcription I have ever read of the complaint it has been ſo deſcribed; but ſo erroneous is this, that in by far the greater number of inſtances there is very little of that wild ſavage fury that is expected by the generality of perſons, or that it is deſcribed by the majority of thoſe who have attempted any delineation of the diſeaſe. Hence, as it is evident that the term hydrophobia, characteriſing the affection in the dog, is a miſnomer, ſo it is evident that the term madneſs is equally ſo. In no inſtance have I ever obſerved a total alienation of the mind; in very few have the mental faculties been diſturbed. The diſpoſition to do miſchief is rather an increaſed irritability than abſence of ſenſe, for in moſt inſtances, even in thoſe that are furious, they acknowledge the maſter's voice, and are obedient. Sportſmen diſtinguiſh two kinds of madneſs, a dumb and a raging; but the diſtinction is not always very clear. The varieties in the diſeaſe are immenſe; it is hard to ſay what is the firſt ſymptom that appears. Mr. Meynell, of ſporting celebrity, drew up ſome remarks, which appeared in the 19th vol. of the Medical Commentaries, and were at the time conſidered as the beſt account that had appeared. In this paper, he ſays, that loſs of appetite is the firſt ſymptom; but this we by no means conſider to appear in many inſtances the firſt; but a certain peculiarity in the manner of the dog; ſome ſtrange departure from his uſual habits; and this peculiarity cannot be laid too much ſtreſs on, for it is almoſt invariable, and a never failing criterion of the complaint. In a very great number of inſtances the peculiarity conſiſts in a diſpoſition to pick up ſtraws, bits of paper, rag, threads, or the ſmalleſt objects that may lie on a floor; and this is induſtriouſly perſiſted in till the floor or carpet is actually cleared of every ſmall object; this peculiar characteriſtic is very common in ſmaller dogs; others again ſhew an early peculiarity by licking the parts of another dog; in one inſtance the approach of the diſeaſe was foretold, by our obſerving a very uncommon attachment in a pug puppy, towards a kitten, which he was conſtantly licking; and likewiſe the cold noſe of a healthy pug that was with him; an attachment to the ſenſation of cold appears in many caſes, it being very common to obſerve them licking the cold iron, cold ſtones, &c. Some dogs, early in the diſeaſe, will eat their own excrement, and lap their own urine; this is by no means uncommon, and is a very ſtrong ſign of madneſs: an early antipathy to dogs and cats is very commonly obſerved; but particularly to cats. This is almoſt invariable; the progreſs of their irritability is often very clear, the cats are the firſt objects of their anger, next ſtrange dogs; as the diſeaſe advances they do not ſpare the dogs they are domeſticated with, and laſtly the perſons around; but, except in a moment of irritability, they ſeldom abſolutely attack any human perſon. The irritability that induces them to bite is very ſtrong; but is devoid of wildneſs, and is rather at leaſt early in the diſeaſe. It is more like the peeviſhneſs of a child than any fury. We ſpeak of domeſticated dogs. In them, in the majority of inſtances, the ſame gentleneſs, attachment, and obedience, are obſerved during the firſt days of the diſeaſe; by degrees, however, he gently ſnaps at them, or runs at their feet, as though in play, and will not bite, but will take their hand or foot in his mouth; but a ſtick held even in this ſtage is ſure to excite his anger to a violent degree, even againſt thoſe he is moſt fond of. This is a very ſtrong ſymptom, and almoſt a certain criterion; throughout the diſeaſe here is, nevertheleſs, a wonderful impatience of controul, and the animal is with great difficulty frightened, though in ſome inſtances we have obſerved the meekneſs of the temper laſt wholly through the diſeaſe.

In moſt caſes there is a very treacherous diſpoſition obſerved. A dog labouring under rabies, if called, comes, wags his tail, ſhews every mark of fondneſs, permits himſelf to be noticed, and ſeems pleaſed with attention; but on a ſudden he turns and ſnaps. It is not every dog that makes any noiſe under rabies. Some have a violent inflammation of the mouth and throat, producing a total inability to bark; this by ſportſmen is termed dumb madneſs: but where any noiſe is made, which occurs in two-thirds of the caſes that happen, this very noiſe forms the trueſt character of the diſeaſe, and affords a mark ſubject to the feweſt varieties. It conſiſts in a very remarkable ſhort howl, or lengthened bark, for it partakes of both; and is ſo totally unlike any thing beſides, that when once heard, it can never be forgotten or miſtaken. It more nearly reſembles the giving tongue of a heavy ſlow hound, and is commonly made with the head held up in the air. There is great diſtreſs apparent in the countenance, with a quick anxious look; the eyes are always red, frequently ſo inflamed as to produce matter, and the ſight, in ſome inſtances, becomes deceptive, and they ſnap at objects they fancy they perceive. In moſt there is a remarkable tendency to carry ſtraw about in their mouths, and to ſcratch it up under their bellies into heaps. Whenever this is done, the bowels have been found very highly inflamed after death. Gnawing is almoſt invariable with them; boards, chains, the veſſel that holds their food or water, is gnawed, or taken up and ſhook to pieces. In many the attempt to eſcape is very great. This anxiety to eſcape is a very remarkable trait in the diſeaſe. It is not the effect of delirium, as is ſuppoſed, nor of pain; on the contrary, when a dog has eſcaped, he commonly returns home again, unleſs worried and hunted. But it is, as it were, a peculiar anxiety to propagate the diſeaſe, for he travels induſtriouſly ſeeking objects to bite. Horſes, cows, ſheep, but peculiarly dogs, he anxiouſly ſeeks: much leſs frequently does he attack human perſons. Having tired himſelf, unleſs he is moleſted, he returns home. It is ſaid that a rabid dog will not turn out of his road to bite, but this can only apply to the laſt ſtages of the diſeaſe; for in the middle ſtage, which is when the miſchievous propenſity is the ſtrongeſt, and when the dog is ſtrong and active, he is induſtrious in ſeeking objects, in fact, it is his ſole purſuit. In no inſtance is there any averſion to water, but on the contrary, the fever accompanying the diſeaſe makes the dogs very dry, and they are continually lapping, though in ſome inſtances unable to ſwallow. The complaint is generally accompanied with coſtiveneſs, and there is evident mark of pain and uneaſineſs in the bowels in almoſt every inſtance. It is this inflammatory affection of the bowels that makes many of them paralytic, and faulter behind. We have ſeen ſome, from this ſame cauſe, have a conſtant tendency to ſit upright on the rump. We have diſſected carefully nearly one hundred caſes, in every ſtage of the complaint, and under every variety of the diſeaſe, and ſome appearances have been found common to all. More or leſs, every inſtance ſhews inflammation of the ſtomach and bowels, together with the lungs. But theſe are by no means in equal degrees. In thoſe caſes where there are much reſtleſſneſs, quickneſs, violent panting, and much miſchievous tendency, with almoſt inceſſant barking, the inflammation of the lungs is found to be exceſſive; and the bowels, though never without ſome inflammation, are found leſs ſo. But when there is more mildneſs, when the dog appears affected in his loins, when he eats much ſtraw, dirt, or unuſual ſubſtances, and frequently brings up what he has taken down, then, on diſſection, it will be found that the ſtomach and bowels are principally inflamed. In what is termed dumb madneſs, the ſtomach and bowels are ſtill the organs that ſuffer moſt, but to this is ſuperadded a peculiar affection of the throat and mouth. In ſome the throat alone is affected, producing a difficulty of ſwallowing, and a very odd deep choaking noiſe; in others the whole mouth is affected; the tongue is inflamed to the end, nearly black. The jaw drops, and ſlaver runs faſt from the mouth, and there ſeems almoſt a total paralyſis of the parts. There is ſeldom much miſchievous tendency in this variety of the diſeaſe; on the contrary, ſome are to the full as mild and as tractable as at any other time, and ſhew not the ſmalleſt diſpoſition to bite throughout. We have ſeen the moſt tender offices performed in many inſtances of this kind, not only with impunity, but with great expreſſions of gratitude from the manner of the ſuffering animal. In theſe caſes the parts of the mouth and throat do not ſhew any alteration of appearance after death, further than a ſlight increaſe of vaſcularity.

In the wild kind there is a very ſlight redneſs in the veſſels of the brain. In almoſt every inſtance the ſtomach is filled with the moſt unuſual ſubſtances, ſtones, ſtraw, coals, wood, and whatever can be got at. It is a remarkable fact, but it has occurred to us ſo often, that we are poſitive as to its exiſtence; that if, in the progreſs of the complaint, any very great violence is offered to the animal, the diſeaſe ſeems arreſted, and he lives many more days than he otherwiſe would have done, judging from analogy. The duration of the complaint is various: it ſeldom deſtroys before the third day, and few ſurvive beyond the ſeventh. The average number die on the fourth or fifth day from the firſt appearance of the diſeaſe.

We know of no inſtance of the complaint being cured, nor have we in any inſtance ever attempted any thing of this kind, but we flatter ourſelves that we have been ſucceſsful in bringing forward a preventive. We claim not the diſcovery of this moſt valuable and truly important remedy; we only, by exertion, reſcued it from oblivion, and by a long courſe of well-conducted experiments, have eſtabliſhed the certainty of its efficacy. Out of more than 90 animals, as horſes, ſheep, ſwine, and dogs, one only has gone mad to whom this remedy was adminiſtered; and this failure did not occur under our own immediate inſpection; ſo that it might have been waſted or brought up. This remedy was detailed by us as early as laſt December, 1807, in the Medical Review of that month, where every circumſtance relative to the original recipe is communicated. This remedy, as by us prepared, is as follows:

Take of the freſh leaves of the tree-box	2 ounces
of the freſh leaves of rue -	2 ounces
of ſage - - - -	½ ounce.

Chop theſe fine, and boil in a pint of water to half a pint; ſtrain carefully, and preſs out the liquor very firmly: put back the ingredients into a pint of milk, and boil again to half a pint; ſtrain as before; mix both liquors, which forms three doſes for a human ſubject. Double this quantity is proper for a horſe or cow. Two-thirds of the quantity is ſufficient for a large dog; half for a middling ſized, and one-third for a ſmall dog. Three doſes are ſufficient, given each ſubſequent morning faſting; the quantity directed being that which forms theſe three doſes. As it ſometimes produces ſtrong effects on dogs, it may be proper to begin with a ſmall doſe, but we hold it always prudent to increaſe the doſe till effects are evident, by the ſickneſs, panting, and uneaſineſs of the dog. In the human ſubject, where this remedy appears equally efficacious, we have never witneſſed any unpleaſant or active effects. About 40 human perſons have taken this remedy, and in every inſtance it has ſucceeded equally as with animals: but candour obliges us to notice that in a conſiderable proportion of them, other means were uſed, as the actual or potential cautery: but in all the animals other means were purpoſely omitted. That this remedy, therefore, has a preventive quality, is unqueſtionable, and now perfectly eſtabliſhed; for there was not the ſmalleſt doubt of the animals mentioned either having been bitten, or of the dog being mad who bit them, as great pains were in every inſtance taken to aſcertain theſe points.

The ſymptoms of madneſs are conciſely ſummed up by Mr. Daniel in the following words: "At firſt the dog looks dull, ſhews an averſion to his food and company, does not bark as uſual, but ſeems to murmur; is peeviſh and apt to bite ſtrangers; his ears and tail drop more than uſual, and he appears drowſy; afterwards he begins to loll out his tongue and froth at the mouth, his eyes ſeeming heavy and watery: if not confined he ſoon goes off, runs panting along with a dejected air, and endeavours to bite any one he meets. If the mad dog eſcapes being killed, he ſeldom runs above two or three days, when he dies exhauſted with heat, hunger, and diſeaſe." In Mr. Meynell's account, already referred to, a diſtinction is made between dumb madneſs and raging madneſs: in the former, the nether jaw drops and is fixed, the tongue hangs out of the mouth, and ſlaver drops from it. In the latter, the mouth is ſhut, except when the dog ſnaps or howls, and no moiſture drops from it. It has been ſaid that this diſorder is occaſioned by heat or bad food; but in Mr. Meynell's account, communicated to him by a phyſician, it is aſſerted, that the complaint never ariſes from hot weather or putrid proviſions, or from any other cauſe but the bite; for however dogs have been confined, however fed, or whatever may have been the heat of the ſeaſon, the diſorder never commenced without being able to trace it to that cauſe, nor was it ever introduced into the kennel, but by the bite of a mad dog. Accordingly, this malady is rare in the northern parts of Turkey, more rare in the ſouthern provinces of that empire, and totally unknown under the burning ſky of Egypt. At Aleppo, where theſe animals periſh in great numbers, for want of water and food, and by the heat of the climate, this diſorder was never known. In other parts of Africa, and in the hotteſt zone of America, dogs are never attacked with madneſs.

It appears that the prevention of canine madneſs has been attempted, even in the early ages. For this purpoſe Pliny recommends *worming* of dogs, and from his time to the preſent it has had, moſt deſervedly, ſays Mr. Daniel, (ubi ſupra) its advocates. He tells us, that he has had various opportunities of proving the uſefulneſs of this practice, and recommends its general introduction.

Mange.—This is a very frequent diſeaſe in dogs, and is an affection of the ſkin, either caught by contagion, or generated by the animal. It is, however, not ſo contagious as is ſuppoſed. It becomes hereditary alſo. White dogs, and thoſe with ſtrong wired hair, are peculiarly liable to it. It has ſome varieties, as red mange, which conſiſts in an univerſal red ſcabby eruption over the whole body, having great acrimony, and great ſtubbornneſs. This mange is frequent in ſetters, pointers, and the larger kind of terriers.

The ſcabby mange breaks out in blotches along the back and neck, and is common to Newfoundland dogs, terriers, pointers, and ſpaniels, and is the moſt contagious. White terriers, white ſpaniels, the white ſhock, and, in fact, almoſt all white dogs, are ſubject to a variety that ſhews itſelf by a ſimple redneſs and intolerable itching in the ſkin. There is a kind alſo that attacks the claws and toes of dogs. Canker in the ear, and on the flap of the ear, is to be conſidered as an appendage to mange.

The cure ſhould be begun by removing the firſt exciting cauſe, if removeable, ſuch as filth or poverty, or, as is more general, the contrary, (for both will equally produce it,) too full living. Then an application ſhould be made to the parts, conſiſting of ſulphur, ſal ammoniac, and tar-lime-water will alſo aſſiſt. When there is much heat and itching, bleed and purge. Mercurials ſometimes aſſiſt, but they ſhould be uſed with caution; dogs do not bear them well.

The following mixture has been recommended for rubbing on any ſpot as ſoon as it is perceived, *viz.* a pint of train oil, $\frac{1}{2}$ a pint of oil of turpentine, $\frac{1}{4}$ of a pound of ginger, in powder, and $\frac{1}{2}$ an ounce of gunpowder, finely powdered; to be mixed up cold. Previouſly to the anointing with this preparation, ſulphur made into a ball, with butter or hog's lard, may be given for two or three following mornings. There are many other remedies preſcribed for this diſorder. When it is very bad, the affected places ſhould be anointed with an unguent formed by mixing a pound of ſulphur vivum, $\frac{1}{2}$ a pound of white hellebore, powdered, a quart of train oil, and one pint of ſpirits of turpentine: or, half a pint of white wine, half a pint of ſpirits of turpentine, 2 ozs. of nitre in powder, and one quart of very ſtrong beer, may be mixed and made milk warm, and then rubbed in with the hand all over, taking care of the eyes, and dried in by a fire; after which the dog ſhould be put into clean ſtraw. Three times' dreſſing, it is ſaid, will cure, ſhould the dog be naked and in the worſt ſtate; or, a table ſpoonful of ſoot, two ditto of ſulphur vivum, half a ſpoonful of oil of turpentine, and four ounces of hog's-lard, mixed well, may be uſed for anointing the part. When the mange is very inveterate, white hellebore root, powdered, 6 ozs., ſulphur vivum, $\frac{1}{2}$lb., black pepper, powdered, 2 ozs., oil of tartar per deliquium, 2 ozs., ſal ammoniac, finely powdered, 1 oz. hog's-lard, 1lb., and olive oil, $\frac{1}{2}$ a pint, ſhould be mixed well; and a moderate portion of the ointment rubbed on the diſeaſed parts every night and morning for *ſeven*, and if the mange be of long ſtanding, for *nine* days: and the firſt morning when the recipe is uſed, the dog ſhould take the following purging ball, to be repeated twice, at the diſtance of three days; *viz.* jalap in powder, 30 grs., calomel, 6 grs., ginger in powder, 3 grs., conſerve of roſes or hips, $\frac{1}{2}$ dram, and a few drops of ſyrup of buckthorn, for aſſiſting to form the ingredients into a ball, which is to be rolled up in a piece of freſh butter. Two days after the laſt uſe of the ointment, the dog ſhould be well waſhed with ſoap and warm water. The ingredients above ſpecified are adapted for a fox-hound, pointer, or grey-hound; and for larger or ſmaller dogs, they may be increaſed or diminiſhed. Another mixture conſiſts of half a pint of train oil, one ounce of ſaltpetre, well powdered, four ounces of ſulphur vivum, powdered, ſpirit of turpentine a table ſpoonful, and the like quantity of honey, which ſhould be rubbed in by the hand morning and evening.

Two ounces of the beſt gun-powder mixed with ſtrong white wine vinegar, until it becomes a thick ſalve, may be uſed for anointing the affected places, until the blood appears, and inwardly may be given as much ſtone-brimſtone, powdered fine, as will lie upon a ſhilling, daily, for ten days: the brimſtone to be mixed with butter or hog's lard.

For the red mange, the following remedies are recommended; *viz.* 4 ozs. of quickſilver, 2 ozs. of Venice turpentine, and 1lb. of hog's-lard, the quickſilver and turpentine are to be rubbed together until all the globules diſappear; and an ounce may be rubbed daily, for three ſucceſſive days, on the parts affected, and uſed when the hair comes off, or any redneſs appears. Alſo, $1\frac{1}{2}$ oz. of caſſia fiſtularis, well cleanſed, $2\frac{1}{2}$ drams of ſtaveſacre, powdered, $2\frac{1}{2}$ drams of ſcammony, prepared in white wine vinegar, and four ounces of oil of olive, ſhould be tempered together and warmed a little, and given to the dog in the evening, keeping him from food until morning: he is then to be bled, and within two days after anointed with the following ointment, *viz.* 3lbs. of nut-oil, $1\frac{1}{2}$lb. of oil of cade, 2lbs. of oil of worms, and 3lbs. of honey; boil theſe together till half is conſumed; then add of reſin and pitch or tar, of each $2\frac{1}{2}$lbs., and half a pound of new wax unwrought; melt them, and then add $1\frac{1}{2}$lb. of brimſtone, 2 lbs. of copperas well dried, and 12 ozs. of verdigreaſe, which ſtir together till they are cold; waſh the dog well, before he is anointed, with ſalt and water, and dry him before a fire; his diet ſhould be warm broth, in which ſhould be put a little brimſtone. This proceſs followed for a week will certainly cure.

Worms.—Dogs ſuffer very much from worms, which, as in moſt animals, ſo in them, are of ſeveral kinds; but the effects produced are nearly ſimilar. In dogs having worms the coat generally ſtares; the appetite is ravenous, though the animal frequently does not thrive; the breath ſmells, and the ſtools are irregular, ſometimes looſe and ſlimy, at others hard and dry; but the worſt evil they produce, is occaſional fits, or ſometimes a continued ſtate of convulſion, in which the animal lingers ſome time, and then dies; the fits they produce are ſometimes of the violent kind, at others they exhibit a more ſtupid character, the dog being ſenſeleſs, and going round continually. The cure conſiſts, while in this ſtate, in active purgatives joined with opium, and the warm bath; any rough ſubſtance given internally, acts as a vermifuge to prevent the recurrence.

Aloes, hartſhorn, the juice of wormwood, with ſome flour of brimſtone being mixed together; a piece of the ſize of a hazle nut, wrapped up in ſweet butter, may be given three or four times in a week and the dog ſhould faſt a few hours afterwards. Thus, it is ſaid, the worm will be deſtroyed. The method of giving any bolus or pill to a dog is to pull out his tongue, then put the bolus down his throat as low as poſſible, and when the dog draws in his tongue, the medicine will ſlip down in ſpite of his efforts to hinder it. Pulveriſed pewter, 1 dr. 10 grs., and æthiops mineral, 16 grs. may be taken three times a day, with the interval of a day between each doſe; the dog being kept warm and from cold water. Whey or pot-liquor may be given him two or three hours after, and ſhould be continued inſtead of meat, whilſt he is taking the medicine. It is beſt given by mixing it in butter, and making it into balls with a little flour.

To make hounds fine in their coats, uſe the following dreſſing, *viz.* 1lb. of native ſulphur, one quart of train oil, one pint of oil of turpentine, and 2lbs. of ſoap. This uſed three times in a year will keep them clean in their ſkins. In ſome kennels this is applied once in two months; and, of courſe, the oftner it is renewed, the cleaner will the hounds look.

The *worming* of whelps is performed with a lancet, to ſlit the thin ſkin which immediately covers the worm; a ſmall awl is then to be introduced under the centre of the worm to raiſe it up; the farther end of the worm will, with very little force, make its appearance, and with a cloth taking hold of that end, the other will be drawn out eaſily; care ſhould be taken that the whole of the worm comes away without breaking, and it rarely breaks unleſs cut into by the lancet, or wounded by the awl.

Dog, *Allegorical*, the emblem of fidelity, on which account it is generally repreſented at the feet of female ſtatues on the ſepulchral monuments of the middle ages; as a lion, the type of courage, is placed at the feet of the ſtatues of men.

Dog-*draw*, in the *Foreſt Law*, a manifeſt deprehenſion of an offender againſt veniſon in a foreſt; when he is found drawing after a deer by the ſcent of a hound led in his hand; or, where a perſon hath wounded a deer, or wild beaſt, by ſhooting at him, or otherwiſe, and is caught with a dog-drawing after him to receive the ſame.

There are four offences in the foreſt, noted by Manwood; *viz.* ſtable-ſtand, dog-draw, back-bear or back-berond, and bloody-hand. See Stable *ſtand*, &c.

Dog's-*bane*, in *Botany*. See Apocynum and Asclepias.

Dog-*Berry*. See Cornus.

Dog's *Cabbage*. See Theligonum.

Dog-*days*. See Canicular *days*.

Dog-*fiſh*, *Canis Galeus*, in *Ichthyology*. See Squalus *Galeus*.

Dog *fiſh, greater*. See Squalus *Canicula*.

Dog *fiſh, leſſer*. See Squalus *Catulus*.

Dog *fiſh, picked*. See Squalus *Acanthias*.

Dog *fly*, *Cynomyia*, in *Natural Hiſtory*, the name of a ſpecies of fly common in woods and among buſhes, and particularly troubleſome to dogs. It uſually ſeizes upon the ears, and it is in vain to beat it off; for it returns in a moment, and cannot be prevented but by being killed. It ſtings very ſeverely, and always raiſes a bliſter in the part. It ſomewhat reſembles the flat black fly, ſo troubleſome to cattle. It has no trunk, but has two teeth, much reſembling thoſe of the waſp. Its wings are always placed ſo cloſe upon its body, that they are not ſeen. There are two kinds of it, one larger, and found in woods, and the other common in hedges.

Dog's *head*, in *Geography*, a cape of Ireland, on the weſt coaſt of the county of Galway, oppoſite to the iſland of Iniſboſin. N. lat. 53° 33′. W. long. 10° 7′. Beaufort.

Dog *iſland*, one of the ſmaller Virgin iſlands, near the N.W. coaſt of Virgin Gorda and E. of Tortola. N. lat. 18° 20′. W. long. 62° 55′.

Dogs, *iſle of*, a ſmall tract of low land in the county of Middleſex, oppoſite to Greenwich; where Togodumnus, brother of Caractacus, is ſaid to have been killed in a battle with the Romans, A. D. 46.

Although it is now converted to commercial purpoſes, the Iſle of Dogs derived its name from being the depôt of the ſpaniels and grey-hounds of Edward III.; and this ſpot was choſen, becauſe it lay contiguous to his ſports of woodcock ſhooting, and courſing the red deer, in Waltham and the other royal foreſts in Eſſex, for the more convenient enjoyment of which he generally reſided, in the ſporting ſeaſon, at Greenwich.

Dog-*ribbed Indians*, a tribe of Indians, who inhabit the environs of lake Edlande in the N. W. part of N. America, and who are often at war with the Athapuſcow Indians. Both theſe tribes are reckoned among the moſt ſavage of the human race. They trade with the Hudſon-bay company's ſettlements. Edlande lake lies N. of the Athapuſcow ſea or lake, and near the Arctic circle.

Dog *river*, a river in the N. W. part of N. America, which diſcharges itſelf into the Slave river in N. lat. 59° 45′. W. long. 111° 20′. At this ſtation the latter river is nearly two leagues in breadth.

Dog-*roſe*, in *Botany*, a name for the common briar, or hip tree. It is obſervable of ſome kinds of this ſhrub, that the flowers ſmell extremely ſweet in the night, or very early in the morning, but not at all in the day-time. The reaſon of which ſeems to be the ſame as in all the noctuolent plants, of which there are ſeveral kinds, as ſome of the geraniums, and of the jaſmines, &c. that is, that the ſun exhales and diſſipates their odorous effluvia in the day-time, as ſoon as they are expanded from the flower, but that in theſe cold times the vapours are condenſed, and reach our noſtrils in an agreeable manner. Phil. Tranſ. N° 114.

Dog's *Rue*. See Scrophularia.

Dog's *ſtones*. See Orchis.

Dog's-*tail graſs*. See Cynosurus.

Dog's-*tail graſs*, in *Agriculture*, a name commonly applied by farmers to a well known ſpecies of natural graſs, the *cynoſurus criſtatus*, which is uſeful in ſheep paſtures.

It is a ſort of graſs that grows in the moſt perfect manner in dry ſituations, but which will not thrive in very moiſt meadows. It is frequently found in dry, ſound, feeding paſtures. It flowers nearly at the ſame period with the meadow feſcue-graſs, but it is not very productive of foliage. It has been ſuppoſed that its benty appearance in high poor moiſt paſtures, has led to the notion of its being but an indifferent graſs plant. But from its being particularly abundant in moſt of the richeſt grazing paſtures in different parts of the kingdom, and conſtituting in ſome the chief herbage, it would ſeem to be an uſeful graſs. As its flowering ſtems and heads are rarely conſumed by cattle, its ſeeds may be readily collected in caſes where the paſtures are fed; and as they are in great plenty this may be done by children at the ſmall expence of about one ſhilling the pound. It is contended that land may be laid down with this graſs with ſucceſs, provided proper attention be beſtowed in having the ſeed gathered when perfectly ripe, as it has been known to fail on this ground. It is in high eſtimation on the continent as a paſture graſs. But from the fibrous nature of its roots not permitting their running down much into the ſoil, there may be danger of its being deſtroyed in dry ſummer-ſeaſons; however, as it abounds ſo greatly in the beſt paſtures, and is a blade graſs which ſhoots up the firſt after the land has been mown, its thick tufts may afford much food for ſheep in the time of ſnow and ſevere weather, during the winter ſeaſon. It is obſerved, that thoſe who are not accuſtomed to diſtinguiſh the difference of graſſes with any great accuracy, may deſpiſe it as being of an improper and uſeleſs kind; but the ſheep and the ox, who muſt be allowed to be better judges, will ſoon convince them of its importance. From the great rapidity of its growth, it may be apt to get coarſe, if not cut down more quickly than is often the caſe. The ſeed is ſmall and fine, but may be obtained with much facility by paſſing the ſtem through the hand, in a rather tight manner. It has, in particular ſituations, been provided at the low expence of ſixpence the quart. See Grass.

Dog's *teeth*, in *Anatomy*. See Cranium and Teeth.

Dog's *tongue*, in *Botany*. See Cynoglossum.

Dog's *tooth*, or *Dog's tooth violet*. See Erythronium.

Dog's *tooth ſhell*. See Dentalis.

Dog-*wood*. This wood, when put into water, is ſaid to ſtupefy fiſh there, ſo that they are eaſily taken with the hand. It is uſed in America for this purpoſe; and the method is to tie it to the ſtem of the fiſhing boat. It is the wood of a ſpecies of *cornus*, which ſee.

Dog-*wood of Jamaica*. See Erythrina.

DOGA, in *Antiquity*, a large veſſel into which the wine was put when newly brought from the vintage.

DOGADO, in *Geography*, a part of the Venetian ſtates, in which is the capital extending from the mouth of the Liſonzo to that of the Adige, between the country of the Friuli, the Paduan, and the Poleſin-de-Rovigno, including the canals of Venice and the canals of Marano.

DOGE, the chief magiſtrate in the republics of Venice and Genoa. For the preſent ſtate of theſe countries, ſee Venice and Genoa.

The word properly ſignifies *duke*, being formed from the Latin *dux*; as *dogate* and *dogado*, from *ducatus*, duchy.

The dogate, or office and dignity of doge, is elective: at Venice, the doge is elected for life; at Genoa, only for two years; he is addreſſed under the title of *Serenity*, which among the Venetians is ſuperior to that of highneſs.

The doge is the chief of the council, and the mouth of the republic: yet the Venetians do not go into mourning at his death, as not being their ſovereign, but only their firſt miniſter. In effect, the doge of Venice is no more than the phantom or ſhadow of the majeſty of a prince, all the authority being reſerved to the republic. He only lends his name to the ſenate; the power is diffuſed throughout the whole body, though the anſwers be all made in the name of the doge. If he gives any anſwers on his own account they muſt be very cautiouſly expreſſed, and in general terms, otherwiſe he is ſure to meet with a reprimand. So that it is abſolutely neceſſary he be of an eaſy and pliable diſpoſition.

Anciently, the doges were ſovereigns; but things are much altered; and at preſent, all the prerogatives reſerved to the quality of doge, are thoſe which follow:, he gives audience to ambaſſadors; but does not give them any anſwer from himſelf, in matters of any importance; only he is allowed to anſwer according to his own pleaſure to the compliments they make to the ſignory; ſuch anſwers being of no conſequence. The doge, as being firſt magiſtrate, is head of all the councils; and the credentials which the ſenate furniſhes its miniſters in foreign courts, are written in his name; and yet he does not ſign them, but a ſecretary of ſtate ſigns them, and ſeals them with the arms of the republic. The ambaſſadors direct their diſpatches to the doge; and yet he may not open them, but in preſence of the counſellors. The money is ſtruck in the doge's name, but not with his ſtamp, or arms. All the magiſtrates riſe, and ſalute the doge, when he comes into council; and the doge riſes to none but foreign ambaſſadors.

The doge nominates to all the benefices in the church of St. Mark; he is protector of the monaſtery delle Vergine; and beſtows certain petty offices of uſhers of the houſehold, called "Commanders of the Palace." His family is not under the juriſdiction of the maſter of the ceremonies; and his children may have ſtaff officers, and gondoliers in livery.

His grandeur, at the ſame time, is tempered with a variety of circumſtances which render it burdenſome. He may not go out of Venice, without leave of the council; and if he does go out, he is liable to receive affronts, without being entitled to demand ſatisfaction; and, if any diſorder ſhould happen where he was, it belongs not to him, but to the podeſta, as being inveſted with the public authority, to compoſe it.

The children and brothers of the doge are excluded from all the chief offices of ſtate. They may not receive any benefice from the court of Rome; but are allowed to accept of the cardinalate, as being no benefice, nor including any juriſdiction. The doge may not diveſt himſelf of his dignity, for his caſe; and after his death, his conduct is examined by three inquiſitors, and five correctors, who ſift it with great ſeverity.

The ceremony of the reigning doge's marriage with the Adriatic ſea by throwing a gold ring into it, which is practiſed yearly at Venice on Aſcenſion-day, is ſaid to have taken its riſe in the year 1173 from the following circumſtance. The ſtate of Venice, having taken part with pope Alexander III. againſt the emperor Frederic Barbaroſſa, who had obliged that pope to fly to Venice for protection, made the emperor's ſon, Otho, a priſoner in a ſea-fight on the coaſt of Iſtria, and took the Admiral gally, with 48 other ſhips. Upon which the pope, coming to meet the doge Sebaſtian Zani, at Venice, preſented him with a gold ring, in teſtimony of his gratitude, ſaying, "Take this ring, and bind the Adriatic ſea therewith to thee in wedlock; which ceremony you and your ſucceſſors ſhall annually perform, that lateſt poſterity may know you have acquired a dominion of this ſea by right of conqueſt, and that as the wife is ſubject to her huſband, ſo is this ſea to your republic." Such are the grounds of the mighty pretenſions of this republic to the dominion of the Adriatic ſea. Yet ſo wiſe a ſtate as Venice for a long time availed themſelves of this trivial circumſtance to their ſubſtantial advantage; for in conſequence of it they aſſumed the title of ſovereigns of the Adriatic, and to be its guard from pirates, and other invaders; and even to prohibit the navigation of it to ſuch nations as they diſliked, and to demand a tribute of all foreign ſhips ſailing upon it. Nevertheleſs, ſo early as the 13th century, Ancona diſputed Venice's right to this excluſive privilege, which is quite obſolete in our days.

Keyſler (Travels, vol. iv.) has given the following account of this ſplendid ceremony. On Aſcenſion-day, about 10 o'clock in the morning, the ſignal being given by a diſcharge of great guns and ringing of bells, the doge, or in caſe of his illneſs, the vice-doge, goes on board the bucentoro or bucentaur, (ſee Bucentaur,) and accompanied by ſeveral thouſand barques and gondolas, a great number of gallies finely onamented on this occaſion, and the ſplendid yachts of foreign ambaſſadors, is rowed out to ſea, about 200 paces, between the iſlands of St. Eraſmo and Il Lido di Malamocco. The patriarch, (who, on this day, according to ancient cuſtom, in commemoration of the ſimple diet of the primitive clergy, is entertained in the Olivetan convent, in the iſland of St. Helena, with cheſnuts and water,) and ſeveral of the dignified clergy, come on board the Bucentaur, and preſent the doge and ſignoria, as they paſs, with artificial flowers or noſegays, which, at their return, they make preſents of to their acquaintance. The doge, at his ſetting off, and again on his return, is ſaluted by the cannon of a fort on the Lido, of the caſtle on the iſland of Eraſmo, and with the ſmall arms of the ſoldiers, who are drawn up along the ſhore of Lido. An eminence on this iſland affords a diſtinct view of this pompous proceſſion, and of the vaſt number of boats, &c. which cover the ſurface of the water and make a brilliant appearance. In the mean time ſeveral hymns are performed on board the Bucentaur, by the band of muſic belonging to St. Mark's church, and ſeveral prayers appointed for the occaſion are read or ſung, till the doge has paſſed the two forts of Lido and St. Eraſmo; and then he proceeds a little further towards the Lido ſhore, the ſtern of his barge being turned towards the main ſea. Here the patriarch pours into the ſea ſome water which has been conſecrated with ſome particular prayers, and is ſaid to have the virtue of allaying ſtorms, and the fury of the waves. After this the doge drops a gold ring into the ſea through a hole near his ſeat, at the ſame time repeating theſe words, "Deſponſamus te mare, in ſignum veri perpetuique dominium;" *i. e.* "We eſpouſe thee, O ſea, in token of our perpetual dominion over thee." The doge on his return goes aſhore at the iſland of Lido, where he hears maſs performed by the patriarch in St. Nicholas's church. In the evening the principal members of the council, and all who attended the doge in the Bucentaur, are entertained at the doge's palace, where the deſert, which repreſents gondolas, forts, &c. is expoſed the whole day to the admiration of the populace.

DOGGER, in *Sea Language*, a ſtrong veſſel with two maſts, uſed by the Dutch, &c. for fiſhing in the German ſea, and on the Dogger-bank. On the main-maſt are ſet two ſquare-ſails; on the mizen-maſt a gaff ſail; and above that a top-ſail.—Alſo, a bow-ſprit with a ſprit-ſail, and two or three jibs.

Dogger-*bank*, in *Geography*, a very extenſive ſand-bank in the German ocean, between the coaſt of England and Germany. It ſtretches S. E. and N. W. beginning about 12 leagues from Flamborough-head, and extending near 72 leagues towards the coaſt of Jutland. Between the Dogger and the Well-bank, to the S., are the ſilver pits of the Marinus, which ſupply London with cod; a fiſh, which loves the deep water near the banks, while the flat fiſh delight in the ſhallows.

Dogger-*fiſh*, in our *Statutes*, ſeems to be fiſh brought in the fiſhing-veſſels called doggers to Blackneſs-haven, &c. anno 31 Edw. III. ſtat. 3. cap. 2.

Dogger-*men*, fiſhermen, belonging to dogger-ſhips, 25 Hen. VIII. cap. 4.

DOGGERS, in the Engliſh *Alum Works*, a name given by the workmen to a ſort of ſtone found in the ſame mines with the true alum-rock, and containing ſome alum, though not nearly ſo much as the right kind. The county of York, which abounds greatly with the true alum rock, affords alſo a very conſiderable quantity of theſe doggers; and in ſome places they approach ſo nearly to the nature of the true rock, that they are wrought to advantage. See Alum.

DOGGS, machines of iron for burning wood on.—Alſo, hooks fixed in large timbers, for drawing them with horſes.

DOGGET. See Docket.

DOGLIANI, in *Geography*, a mountain of Boſnia; 12 miles N. of Verajo.

DOGMA, Δογμα, a maxim, tenet, ſettled propoſition, or principle; particularly in matters of religion or philoſophy.

DOGMATICAL, ſomething relating to a doctrine, or opinion.

In common uſe, a dogmatical philoſopher is one who aſſerts every thing poſitively; in oppoſition to a ſceptic, who doubts of every thing. See Dogmatism.

A dogmatical phyſician is he, who, on the principles of the ſchool philoſophy, rejects all medicinal virtues not reducible to manifeſt qualities.

DOGMATICI, Dogmatists, a ſect of ancient phyſicians, called alſo logici, logicians, from their uſing the rules of logic and reaſon in ſubjects of their profeſſion.

They laid down definitions and diviſions, reducing diſeaſes to certain genera, thoſe genera to ſpecies, and furniſhing remedies for them all; ſuppoſing principles, drawing conſequences, and applying thoſe principles and conſequences to the particular diſeaſes under conſideration; in which ſenſe the dogmatiſts ſtand contradiſtinguiſhed to empirics and methodiſts.

The dogmatiſts were thoſe who brought phyſic into a form and arrangement, like thoſe of other ſpeculative ſciences; defining, dividing, laying down principles, and drawing concluſions; and hence they had alſo the appellation of logici; *q. d.* reaſoners. They alſo applied themſelves to ſeek the cauſes of diſeaſes, the nature of remedies, &c.

Eraſiſtratus, a famous dogmatiſt, went ſo far, that, not content to diſſect dogs, and other brute animals, he begged condemned criminals of the magiſtrates, and opened them while alive, and ſearched in their entrails

DOGMATISM, in its primitive ſenſe, meant no more than the holding of ſome particular tenet or ſyſtem of opinions; and thus it was anciently applied to every ſect of philoſophers, except the *Middle* ACADEMY, and the SCEPTICS. Thus far dogmatiſm is not only free from blame, but even unavoidable; becauſe, when a ſubject is extenſive or complicated, it becomes neceſſary to make certain combinations of ideas, or to adopt thoſe which have been made, with regard to it, by others; that is, in other words, a ſyſtem. But from the abuſe of dogmatiſm, eſpecially in religion, the term has acquired a ſignification very different from its original import. At preſent it ſeems to have three principal ſenſes. It ſometimes ſignifies the adopting of opinions without any adequate evidence, or the maintaining of them with ſuch inflexible rigidity, as excludes further information and enquiry: ſometimes it denotes that fond attachment to our own ſentiments, which induces us to conſider them as the infallible ſtandard of right and wrong, and reject thoſe of others as criminal and abominable: at other times, it is uſed to ſignify that intolerant ſpirit, which *violently* wreſts from others the rights of conſcience, and impoſes upon them our own ſentiments, in an arbitrary, and, as it is called, *dogmatical* manner. In whichever of theſe ſenſes dogmatiſm be conſidered, it is equally abſurd, as it is founded in preſumption. No man can be without his opinions, and his ſyſtem; but theſe opinions, and this ſyſtem, may be profeſſed with modeſty, and maintained with candour. They ſhould be held as the reſult of our beſt inquiries, not as the dictates of infallibility. They may be maintained as recommended by their ſuperior evidence; but others muſt be allowed the ſame liberty we take to ourſelves, that of adopting ſuch opinions as we like beſt. Nothing but infallibility can juſtify dogmatiſm; and as dogmatiſm reſts on ſelf-conceit, whatever be the ſubject, this foundation of it is doubly conſpicuous in religion, becauſe the nature and ſublimity of the object may the more eaſily expoſe us to miſtake; at the ſame time that its importance renders it more incumbent upon us to guard againſt being deceived. Dogmatiſm alſo leads to injuſtice, as it violates the rights of conſcience and of private judgment. What Tacitus (when he ſays, "Rara temporum felicitas, ubi ſentire quæ velis, et quæ ſentias, dicere licet") deems the characteriſtic of times uncommonly happy, ſhould belong to every period, and to every ſociety. To reſtore this liberty was one main end of the Chriſtian revelation; but, ſuch is the perverſity of human nature, ſuch its propenſity to dogmatiſm and ſpiritual tyranny, that the inſtrument of deliverance was again converted into an inſtrument of ſlavery; inſomuch, that ſpiritual uſurpation, and the oppreſſion of conſcience, have been carried to greater lengths among Chriſtians than perhaps they ever were in the Heathen world.

Dogmatiſm, with regard to its effects, obſtructs religious improvement, and thus deſtroys the very eſſence of religion; and it has, directly or indirectly, produced all the corruptions which have diſgraced Chriſtianity. Should it be aſked, what is the proper medium between dogmatiſm and ſcepticiſm? This part of the queſtion refers either to the beſt way of avoiding theſe ourſelves, or to the moſt effectual method of diſcouraging their prevalence in the world. With reſpect to the former we may obſerve, that the only ſure preſervative againſt both a dogmatical and a ſceptical ſpirit, is the knowledge of the principles of pure religion, unſophiſticated by the comments and inventions of men. With regard to the latter, great attention ſhould be paid to the ſtudy of natural religion, and of the ſcriptures; in explaining which, a diſtinction ought always to be made between fundamental doctrines, and others which are either indifferent, or of ſmall conſequence. Let thoſe doctrines, which ſcripture unequivocally reveals, be laid down as fundamentals:—let every other be propoſed with thoſe marks of doubt with which the word of God has characteriſed them, by leaving them in a certain degree of ſhade and obſcurity, and inſiſting upon them as little as poſſible. The very words of ſcripture, tranſlated as nearly as the genius of each language will admit, ſhould be uſed. Even with regard to fundamental truths, great care ſhould be taken not to think of impoſing them violently upon others, or even to load thoſe who reject them with opprobrious epithets. An excellent writer obſerves, in reference to this ſubject, "that Chriſtianity will never appear in its native luſtre, till the moſt perfect unequivocal toleration be every where eſtabliſhed; becauſe this alone will allow religion to exert its natural energy, and enjoy the ſame advantage with every other ſcience, and, by means of free enquiry, extracting freſh light and evidence, bring it nearer and nearer to the ſtandard of divine truth." See on this ſubject a diſſertation, which obtained the gold medal, by Dr. Brown, miniſter of the Engliſh church at Utrecht, afterwards profeſſor of moral philoſophy and eccleſiaſtical hiſtory in the univerſity of that city, and now principal of the Mariſchal college of Aberdeen, in "Taylor's Prize Diſſertations," vol. vii. 4to. Haerlem, 1787.

DOGOROBUSH, in *Geography*, a village, or as the people of the country call it, a city, together with a diſtrict, in the government of Smolenſko, in Ruſſia, ſeated on the Dnieper. This is built upon a riſing hill, and exhibits, like Smolenſko, though on a ſmaller ſcale, an intermixture of churches, houſes, cottages, corn-fields, and meadows. Some of the houſes, conſtructed at the expence of the empreſs Catherine, are of brick covered with ſtucco, and appear like palaces when contraſted with the meanneſs of the ſurrounding hovels. This place was formerly a ſtrong fortreſs, and frequently beſieged during the wars between Ruſſia and Poland. The remains of an old citadel are ſtill to be ſeen, and the ramparts command an extenſive proſpect of a champaign country, marked by meanders of the Dnieper, and bounded by diſtant little hills.

DOHALIZ, a town of Bohemia, in the circle of Konigingratz; four miles N.W. of Konigingratz.

DOHNA, anciently DONYN, a ſmall town of Saxony, in the circle of Miſnia, on the river Muglitz, eight miles of Dreſden, remarkable for having been, during ſix centuries, the reſidence of the earls or bourgraves of Dohna, who were driven from it, in 1402, by the margraves of Miſnia. It contains about 800 inhabitants, many of whom are butchers, who, ever ſince the year 1462, enjoy the privilege of ſelling their meat on Wedneſdays, Thurſdays, and Saturdays, at Dreſden; but they muſt diſpoſe of it one farthing cheaper *per* pound than the Dreſden butchers.

DOIAGOI, an iſland of Ruſſia, in the Frozen ſea, at the entrance of the ſtraits of Vagatſkoi. N. lat. 70° 5′. E. long. 57° 14′.

DOJAR, a town of Arabia, in the country of Yemen; 44 miles E. of Chamir.

DOIGTER, *Fr.* the art of fingering upon keyed-inſtruments. M. Rameau has condeſcended, in his laſt work, "Code de Muſique," to place the young muſician's hand on the keys, and to regulate the fingers; but the buſineſs ſeems to have been better done by Couperin. Rouſſeau excludes the uſe of the right hand, which is an erroneous precept: but the rules with which Duphlip has furniſhed him are in general good. Rameau's fingering is the old French method, which has been long abandoned. Couperin's fingering, in the minority of Louis XV., 1717, was new and admirable, and has been often adopted by the beſt maſters, among the reſt, Emanuel Bach. See FINGERING.

DOIRE, in *Geography*. There are two rivers of that name, in that part of France which formerly was called Piémont, and belonged to the king of Sardinia. The Roman name of both rivers was Duria. The grande Doire was ſtyled Duria major, or Doria Baltea; the petite Doire, Duria minor, or Doria Riparia. The French name is derived from Doria.

The grande Doire, or Doria Baltea, is the moſt conſiderable of the two rivers, and has given its name to a department. It has its ſource in the Alps, near the Little St. Bernard, runs from N.W. to S.E., paſſes by Aoſta, the caſtle of Bard, Yvrée, and falls into the Po, above Caſal. A canal of communication between the Doire and the river Seſia, likewiſe in Piémont, has been lately opened; it begins at Yvrée, and ends at Verceil.

The petite Doire, Doria Riparia, has its ſource at the foot of mount Genevre, flows from weſt to eaſt, paſſes by Exilles, Chaumont, Suze, where it receives the Ceniſelle, and takes afterwards a ſouth-eaſt direction towards Turin, below which city it likewiſe falls into the Po.

Doire, *the Department of the,* is the firſt of the ſix departments into which the whole principality of Piémont, in Italy, which formerly belonged to the king of Sardinia, has been divided by the French, when it was annexed to France, by a ſenatus conſultum of the 8th fructidor, in the tenth year of the republic, or the 26th of Auguſt, 1802. It comprizes the ancient duchy of Aoſta, and what was called the Canaveſe. Its name is derived from the grande Doire, Doria Baltea, (ſee the preceding article,) and is irrigated by that river, which divides it into two almoſt equal parts, and by the Orco, which has its ſource on the borders of the department of Mont Blanc, paſſes by Locana, Cuorgne, Rivarol, and falls into the Po, not far from Chivas.

The department of the Doire is bounded to the north by the new republic of Vallais; to the north-eaſt by the kingdom of Italy; to the eaſt by the department of the Seſia; to the ſouth-eaſt by the departments of Marengo and Tanaro; to the ſouth by that of the Po; to the weſt by that of the Mont Blanc; and to the north-weſt by that of the Leman. Its extent is of 4772½ ſquare kiliometres, about 200 ſquare leagues, or 935.060 arpens. The ſoil, even in the vicinity of the Po, is mountainous; but it is particularly northwards of the valley of Aoſta that mountains have been heaped, as it were, one upon the other. Yet they ſeem only ſecondary mountains, formed by fragments detached from the higher ſummits of the Alps, as Mont Blanc, and the great St. Bernard. Theſe mountains are covered with foreſts, peopled with bears, wolves, foxes, and white hares. Cheſnut and wallnut trees thrive at the foot of the hills. On the higheſt Alps there are no trees. Marmots are found among the rocks, covered with a ſcanty graſs.

One of the higheſt ſummits of the Alps, the Mont Joux, or Great St. Bernard, forms the boundary between the department of the Doire and the republic of Vallais. It has at its top a celebrated convent of monks, founded by Bernard of Menthon, for the benefit of travellers who have loſt their way. There is alſo an hoſpital at the ſummit of the Little St. Bernard, over which paſſes the road from the department of the Doire into that of the Mont Blanc.

The valley of Aoſta, formed by an opening of the mountains from eaſt to weſt, begins at the caſtle of Bard, a little above Ivrée, and ends in the eaſt by Mont Jouet, at ſome diſtance from Aoſta. There is much hemp grown in this department, which abounds beſides in excellent paſtures and all ſorts of fruit trees, but chiefly cheſnut and mulberry trees, which are of great uſe for the rearing of ſilk-worms. There is alſo ſome corn and ſome wine. The northern part of the department is rich in mines of iron and other metals, and mineral ſprings. It is even reported to poſſeſs ſome mines of gold, which are not worked, becauſe it is ſuppoſed that their produce would be inconſiderable.

The department of the Doire has ſome manufactures of linen cloth, but its principal trade is with hemp and cattle. It is divided into three diſtricts, Aoſte, Ivrée, and Chivas; 27 cantons, and 227 communes. The chief place of the department is Ivrée; the other principal towns are Aoſte, Chivas, Caſtellamont, Locana, Strambino. The whole population amounts to 224,127 individuals, or about 1121 inhabitants *per* ſquare league. The annual contributions to the ſtate are 951,159 livres, or about 4*s.* 4*d.* ſterling for each individual.

There are ſeveral remains of Roman architecture at Suze and Aoſte. Herbin. Statiſtique de la France.

DOIT, in *Commerce,* the fourth part of a ſtiver in Holland.

DOITKIN, a kind of baſe coin of ſmall value, prohibited by the ſtatute 3 Hen. V. cap. 1. Hence came the phraſe, "Not worth a doitkin."

DOKE, in *Agriculture,* a term ſometimes applied to a deep furrow.

DOKOWICHE, in *Geography,* a town of Poland, in the palatinate of Belcz; 28 miles N. W. of Belcz.

DOL, a ſmall town of France, in the department of Ille and Vilaine, chief place of a canton in the diſtrict of St. Malo, with a population of 2787 individuals. It is ſituated in a marſhy country, but fertile in hemp, corn, and apples, of which they make cyder; ſix miles from the ſea, 18 miles S. E. of St. Malo, 36 N.W. of Rennes, and 249 W. of Paris. Lat. 48° 33′ 9″. The canton has an extent of 200 kiliometres, 8 communes, and 12,600 inhabitants.

DOLA, an appellation applied in Arabia, in the country of Yemen, much in the ſame manner as pacha in Turkey, excepting its being reſtricted to a more narrow ſtage. He commands the forces ſtationed in his province, regulates the police, and collects the taxes. From lucrative governments the dolas are recalled every two or three years, to prevent their accumulating too much wealth. When the Imam continues a dola in office, he ſends him a horſe, a ſabre, and robes. All are obliged to render an account, from time to time, of their adminiſtration; and when guilty of high miſdemeanours, or convicted of malverſations in office, they are puniſhed by impriſonment, or by confiſcation of their property, but ſeldom capitally. Sometimes a dola, who has been thus diſgraced, is raiſed from priſon to an office of greater conſequence than that of which he was diveſted. In every little town a ſub-dola, with a ſmall garriſon, conſiſting ſometimes of only five or ſix ſoldiers, reſide, to maintain order. The dolas of conſiderable governments are attended by a "baſkatib," or controller, whoſe buſineſs is to keep a ſtrict eye upon their conduct, and to inform the Imam of what is going forward. Every city in which a dola reſides has alſo a Kadi, dependent on the chief Kadi of Sana.

DOLABRIFORM Leaf, in *Botany.* See Leaf.

DOLABRUM, among the Romans, a kind of knife uſed in ſacrifices among the people. Vide Hiſt. Acad. Inſcript. tom. ii. p. 345.

DOLALYCZE, in *Geography,* a town of Lithuania, in the province of Novogrodek; 12 miles N. N. E. of Novogrodek.

DOLAN, a town of Bohemia, in the circle of Konigingratz; 4 miles W. of Gitſchin.

DOLANOVA, a river of Ruſſian Siberia, which runs into the Oka; 12 miles S. of Bratſkoi.

DOLBA, in *Ancient Geography*, a town of Aſia, in Adiabene, according to Arrian.

DOLBEN, John, in *Biography*, an Engliſh prelate of conſiderable reputation, was born in the year 1625, at Stonewick in Northamptonſhire, of which place his father was rector. In 1636, he was admitted a king's ſcholar at Weſtminſter, whence he was elected to Chriſt-church college, Oxford, in 1640, and admitted a ſtudent on queen Elizabeth's foundation. He ſeems to have been adapted to the troubleſome times in which he lived; for during the civil wars, his attachment to the cauſe of his ſovereign was ſo great, that he took up arms in his defence, and ſerved ſucceſſively, as enſign, captain, and major. Frequently he was expoſed to all the dangers of warfare, and at the battle of Marſton Moor he was dangerouſly wounded: and again in the defence of York, his thigh was broken by a muſket-ball, which occaſioned him to be confined to his bed for twelve months. When he ſaw the cauſe of the king was abſolutely indefenſible and hopeleſs, he returned to his college, where he purſued his ſtudies with ſo much ardour as if determined to make up for the time which he had ſpent, in a ſervice, though equally honourable, as he thought, yet totally inappropriate to his intended profeſſion. In 1647, he took the degree of M. A., and continued at college till he was ejected by the parliamentary viſitors. He now became the champion of the church as he had been the vindicator of the king. He accordingly took orders in 1656, and in the following year he married a niece of Dr., afterwards archbiſhop, Sheldon, and from that period till the reſtoration of Charles II., he reſided at Oxford, and in conjunction with Dr. Fell, and Dr. Alleſtry, conſtantly performed divine ſervice, and adminiſtered the ſacraments according to the liturgy of the church of England, at a private houſe, whither many of the royaliſts and ejected ſtudents reſorted and formed a regular and numerous congregation. Upon the reſtoration of Charles, his zeal and ſufferings were not forgotten: he was firſt made canon of Chriſt-church, Oxford, and took his degree of doctor in divinity. He now roſe in the church by rapid ſtrides, and was ſoon inſtalled dean of Weſtminſter. In 1664, he was choſen prolocutor of the lower houſe of convocation, and in a ſhort time was appointed clerk of the cloſet to the king, and, in 1666, he was nominated to the biſhopric of Rocheſter, which he was enabled to hold with the deanery of Weſtminſter. In a few years after he undertook the office of lord high almoner, the duties of which he performed with much benefit to the poor. In 1683, he was tranſlated to the archiepiſcopal ſee of York; this was the laſt inſtance of his preferment; in them all, and in every ſtation of life, he conducted himſelf with prudence, with integrity, and great zeal. He died of the ſmall-pox in 1683, in the ſixty-ſecond year of his age. He is deſcribed by Anthony Wood "as a man of a free, generous, and noble diſpoſition, and of a natural, bold, and happy eloquence." His powerful talents gave him great weight and aſcendancy in the houſe of lords. He had ſtudied much of our laws, eſpecially thoſe relating to parliament, and was not to be daunted by the arrogance of courtiers and favourites. In him, ſays his biographer, we loſt the greateſt abilities, the moſt uſeful converſation, the moſt faithful friendſhip, and one who had a mind that practiſed the beſt virtues, and a wit that was beſt able to recommend them to others. Biog. Brit.

DOLCE, Ludovico, an Italian writer, was born at Venice in 1508, and paſſed his life in purſuits of literature, which afforded him a ſcanty maintenance. He publiſhed many works in hiſtory, grammar, philoſophy, &c. and the belles lettres. By ſome of theſe he acquired a conſiderable ſhare of celebrity, though his writings were not of the firſt or even of the ſecond rate. His ſtyle was eaſy and clear, and he was equally ready at verſe as at proſe. He tranſlated many of the ancient Roman poets, and ſome of Cicero's pieces: his dialogue on painting, and his life of Charles V. are his moſt eſteemed works. He died about the year 1568.

Dolce *Aqua*, in *Geography*, a ſmall town of France, in the department of the maritime Alps, which formerly conſtituted the county of Nice, bordering upon the Mediterranean ſea, and belonging to the kings of Sardinia. It is ſituated in a fertile country, abundant, particularly, in excellent wine and olive oil; 6 miles N. of Vintimille.

Dolce, in *Muſic*. See Doux.

DOLCI, Carlo, or Carlino, in *Biography*, an eminent painter of hiſtory and portrait, was born at Florence in the year 1616, and was a diſciple of Jacopo Vignali. His firſt attempt in a whole figure of St. John, when he was only eleven years of age, was much approved; and this was ſucceeded by the portrait of his mother, which placed him in the higheſt rank of merit. His ſtyle, which was new and delicate, procured him ample employment at Florence, and in other cities of Italy. His works are diſtinguiſhed by the peculiar delicacy of his compoſitions; by a pleaſing tint of colour, improved by a judicious management of the chiaro-ſcuro, which gave a ſurpriſing relief to his figures, by the graceful air of his heads, and by a placid repoſe diffuſed over the whole. He took great pains in the execution of his pictures, and he was ſo ſlow, that his brain is ſaid to have been affected by obſerving Luca Giordano diſpatch more buſineſs in four or five hours, than he would have done in as many months. Some of his pictures, particularly that of St. Sebaſtian, and another repreſenting the four evangeliſts, are repoſited in the Palazzo Corſini, and the Palazzo Ricardi at Florence: and in the Pembroke collection at Wilton, there is a fine picture of the Virgin, ornamented with flowers by Mario da Fiori. This artiſt died at the age of 70, in 1686. He left a daughter, Agneſe Dolci, who imitated, without equalling her father, and furniſhed many of the copies made from his numerous pictures. Pilkington by Fuſeli.

DOLCIGNO, or Dulcigno, *Ulcinium*, *Olchinium*, in *Geography*, a town of Turkey, in Europe, in Upper Albania, or Arnaut, with a ſtrong caſtle, and a good ſea port. It is the ſee of a Greek biſhop, and is ſituated on the river Drin, or Drino Nigro, not far from the ancient town of Dulcigno, 12 miles S. of Antivari, and 24 S. W. of Scutari. Long. 19° 2′. Lat. 41° 54′. Its inhabitants, called Dulcignots, are noted for their maritime depredations.

DOLE, in *Agriculture*, a word frequently applied provincially to a long narrow ſlip of green land, left in arable fields untouched by the plough: alſo, a piece of land on a common or heath, of which only one particular perſon has a right to cut fuel. It is often written *dool*.

Dole, John, Dolæus, in *Biography*, phyſician to the landgrave of Heſſe-Caſſel, and member of the Imperial Academy, was born at Geiſmar in 1651. He ſtudied medicine firſt at Heidelburg, and then viſited the univerſity at Paris, then in Holland, and then in England, and, at length, returning to his native country, he took the degree of doctor in medicine, where he ſoon acquired a degree of popularity in his profeſſion, which continued to him to the time of his death, which happened in 1712. His publications are, "Encyclopædia Medicinæ Theoretico-practicæ," 4to. an uſeful compilation. It has been ſeveral times reprinted, and was, for a long time, a ſtandard work, as containing numerous uſeful practical obſervations. "Encyclopædia Chirurgica

gica rationalis," Francof. 1689, 4to. He had ſeen inveterate head-achs cured by opening the temporal artery, a liver weighing eight pounds, a very large calculus in the gall-bladder, two bones, and a tuft of hair, found in the ovarium of a woman, aphonia, or loſs of voice, ſupervening the ſmall-pox, and at the end of ſome weeks, ſpontaneouſly cured, &c. "De furia podagræ lacte victa et mitigata." Amſt. 1707. 12mo. This was tranſlated into Engliſh by Stevens, and publiſhed in 1731. The works of Dolæus were collected, and publiſhed together, "Opera omnia," in two vols in folio, at Francfort, 1693, and republiſhed in 1703. Haller, Bib. Med. Pract.

Dole, *Dola Sequanorum*, in *Geography*, a handſome town of France, in the department of the Jura, chief place of a diſtrict, ſituated in an agreeable and fertile plain on the river Doubs, 30 miles S. W. of Beſançon, 33 S. E. of Dijon, 84 N. W. of Geneve, and 270 S. E. of Paris. Lat. 47° 5′ 42″. It has a population of 8235 individuals. Its canton contains 17 communes, and 14,257 inhabitants, on a territorial extent of 150 kiliometres.

Dôle has ſome manufactures of hoſiery and of hats. As chief place of a diſtrict it has a ſub-prefect, a court of juſtice, a regiſter office, and a ranger. The ſoil of the diſtrict is uncommonly fertile; it produces abundance of corn and fruits. There are iron and copper mines, and quarries of beautiful marble. Thoſe of the village of Sampans yield fine marble of a cherry colour with white ſpots; that of the village of Damparis is of a reddiſh hue. Menſley has a quarry of good mill-ſtones.

The whole diſtrict of Dôle comprizes 9 cantons, 155 communes, 63,581 inhabitants, and a territorial extent of 1195 kiliometres.

Dole, one of the higheſt ſummits of the Mont Jura in France, which ſtretches from the Helvetian Alps to the Voſges. It is 1650 metres, or 846 fathoms, above the level of the ſea.

Dole, in the Saxon and Britiſh tongue, ſignifies a part or portion, moſt commonly of a meadow.

Hence alſo dole meadow; a meadow wherein ſeveral perſons have ſhares. See Dalus.

The word ſtill ſignifies a ſhare; a diſtributing, or dealing of alms; or a liberal gift made by a great man to the people.

Dole, in the *Law of Scotland*, is uſed for a malevolent intention; or, that malicious and wilful purpoſe of the mind, which in conformity with the dictates of nature and reaſon, and agreeably to the uniform current of authorities, is neceſſary to the guilt of every tranſgreſſion. The word is taken from the civil law term dolus.

Dole, in the law of Scotland, as well as in the civil law, is an eſſential ingredient to conſtitute an action criminal. In crimes wherein the will, not the event, muſt be regarded, no negligence can equal dole; unleſs the negligence be ſo extremely ſupine, as not to be conceivable without implying dole.

Under dole are comprehended the vices and errors of the will, which are immediately productive of the criminal fact, though not premeditated, but the effect of ſudden paſſion. In this reſpect dole differs from what the Engliſh law calls malice. However both laws agree in this, that the bare intention never brought forth into act, is no crime; yet giving counſel to perpetrate is criminal, if the fact is done purſuant thereto.

Dole-*fiſh*, in our *Statutes*, ſeems to be that fiſh which the fiſhermen, yearly employed in the North ſeas, do of cuſtom receive for their allowance or ſhares. Vide ſtat. 35 Hen. VIII. cap. 7.

Dole-*ſtone*, in *Agriculture*, a term often provincially applied to a land mark, or boundary ſtone.

DOLET, Stephen, in *Biography*, was born at Orleans about the year 1509, and ſuſpected by ſome of being the natural ſon of Francis I., but there ſeems little foundation for the ſurmiſe. He received the early parts of his education at Paris, and went from that city to Padua for farther improvement. Here he ſtudied under, and became a favourite pupil of Simon de Villeneuve, after whoſe death he engaged as private ſecretary to John de Langeac, ambaſſador from France to the republic of Venice. At Venice he purſued the ſtudy of the claſſics under the inſtructions of the celebrated Baptiſta Egnatius. The learned languages ſeemed to be his favourite purſuit, and in early life he made large collections with a view of publiſhing on the ſubject. He next turned his attention to juriſprudence, and ſtudied the law in conjunction with the belles lettres at Toulouſe. Here he preſided at the head of a literary ſociety, and in that ſituation delivered a diſcourſe, which involved him in an unfortunate diſpute. This was carried to ſuch lengths, that he was diſgraced, and baniſhed the city. From this period, rankling, perhaps, for revenge, he was ſeldom free from conteſts; and he provoked ſo many enemies, that his life was frequently in danger. At Lyons, in defending himſelf, he had the misfortune to kill his antagoniſt; to avoid the penal conſequences he fled to Paris, and threw himſelf on the clemency of Francis I., who was the patron of learned men, and from whom he received his free pardon. He then returned to Lyons, and became a printer and bookſeller, where he was active, induſtrious, and ſucceſsful. His enemies were, however, ever watchful of his conduct; their animoſity, and probably their jealouſy of his ſuperior talents, magnified all his failings, and when he avowed lax opinions reſpecting religion, he was purſued by the clergy, arreſted, and thrown into priſon, from which he eſcaped, through the intereſt of ſome perſons of learning and rank, and in the ſtate. But he was ſtill imprudent, and at length wearied out his friends, ſo that when he was arreſted in the year 1545, they did not appear in his behalf; but abandoned him to the fury of the inquiſitors. By them, who never wanted evidence of crimes, which they wiſhed to impute to an enemy, he was convicted of atheiſm, and condemned to be burnt, which ſentence was carried into execution in 1546, when he was ſcarcely 37 years of age. Conſidering his youth, he was author of numerous works, the titles of which would occupy too large a ſpace to admit of their being enumerated; many of them were curious, and on important topics. Moreri.

Dolet, in *Natural Hiſtory*, a word uſed by ſome writers, in *Medicine*, for red vitriol, or colcothar of vitriol.

DOLG-Bote, in the Saxon *Laws*, a recompence, amends, or ſatisfaction, made for a ſcar or wound.

DOLGAIA, in *Geography*, a bay of Ruſſian Lapland, in the White ſea. N. lat. 73° 25′. E. long. 20° 14′.

DOLGANOVA, a town of Ruſſian Siberia; 32 miles N. N. E. of Nertſchinſk.

DOLGELLY, or Dolgellen, a pariſh and market town of Merionethſhire, Wales, is ſeated in a deep narrow valley on the ſouthern bank of the river Avon, over which is a good ſtone bridge, and is nearly ſurrounded with mountains. Its name is derived from its ſituation in a vale once abounding with woods: Dol being of the ſame import with Dale in Engliſh, and Gellen or Kellen a place where much hazle grows. Its antiquity has not been noticed. Camden ſays, Roman coins of Trajan and Hadrian were found in his time, near a well called Fynnon-vawr. A parliament was aſſembled here, in 1404, by Owen Glyndwer, who here aſſumed the ſtyle and claims of royalty.

The ſummer aſſizes are held here; the houſes are chiefly built of quartz, or lime-ſtone, without mortar, ſmaller pieces of the ſame being forced into the interſtices: few are higher than two ſtories, with pent-houſes in front upon poles, and the ſtreets are ſo narrow as not to admit two carriages paſſing each other. The church is built of lime-ſtone, and conſiſts of a tower, and a large nave. The ſeats are forms, and the floor is paved with lime-ſtone flags, a circumſtance extraordinary for Wales. The mode of perpetuating the remembrance of departed friends is expreſſed in a whimſical way; the coffin plates, exhibiting the name, age, &c. of the deceaſed, are placed as *memento mori's* againſt the walls and other conſpicuous parts of the church.

The town is improving in building and population; and from the increaſing trade in coarſe cloth, it promiſes to become no inconſiderable place. That kind of woollen cloth called Gwen, or Webs, ſtrong or high country cloth, occupies the inhabitants of the town and neighbourhood. Every little farmer makes webs; and ſcarcely a cottage is found without a loom. All kinds of wool are indiſcriminately uſed; fleece, refuſe from ſtaplers, and even the ſkin yards. Some of the growers manufacture their own wool, and the produce from this is the beſt cloth. The webs run from ſix to ſeven quarters wide, and are two hundred yards long, divided into two pieces. In its rough ſtate, it may be purchaſed of the manufacturer from one ſhilling to three ſhillings *per* yard. The quality has varied, ſince the ſtaple of wool has been better underſtood, and it has riſen full 20 *per cent.* within the laſt ſeven years. The webs uſed to be carried to Liverpool or Shrewſbury to market; but the Liverpool dealers now employ perſons on the ſpot to purchaſe of the makers; and to aſſiſt the poorer manufacturers with money to carry on their trade; as the Blackwell-hall factors do many of the ſmaller clothiers in the weſt of England. Here, as in that country, much is made up by commiſſion. After undergoing the operation of ſcouring, bleaching, and milling, it is packed in large bales, and ſent to Liverpool and London; and thence exported to Germany, Ruſſia, and the Weſt Indies. Dolgelly is ſituated 209 miles N. W. from London; has a weekly market on Tueſdays, and ſix annual fairs. It contains, according to the late return, 630 houſes, and 2949 inhabitants. The living is a rectory.

Five miles from this town is the cataract of *Dol-y Myllyn*, which falls from a height of 35 feet into a large baſon, whence it is precipitated, with a great noiſe, 20 feet lower. It is a peculiarly pictureſque ſcene.

Immediately to the S. E. of Dolgelly is the baſe of Cader-Idris, a mountain of great altitude, and, from its rocks, lakes, botanical productions, &c. peculiarly intereſting to almoſt every ſpecies of travellers. The ingenious Mr. A. Aikin has furniſhed a conciſe and ſcientific account of this lofty region; which has been given in this work, vol. v. (See CADER-IDRIS) And the Rev. I. Evans, in his "Tour through North Wales," gives a circumſtantial deſcription of this mountain, with its dependent hills, vallies, lakes, &c.

DOLGENSEE, a lake of Germany, in the circle of Upper Saxony, and Ucker Mark of Brandenburg, a little to the north of Templin.

DOLHINOW, a town of Lithuania, in the palatinate of Wilna; 80 miles E. of Wilna.

DOLIANI, a ſmall town of France, in the department of the Sture, which formerly was a part of Piêmont in Italy. It has 4000 inhabitants, and is the chief place of a canton in the diſtrict of Mondovi. The canton contains five communes, and 8294 inhabitants.

DOLICHA, in *Ancient Geography*, a town of Macedonia, in the Pelaſgiotide territory. Ptol.—Alſo, a town of Aſia, in the northern part of Syria, which had been epiſcopal under the patriarchate of Antioch.

DOLICHE, a town of Aſia, in Syria, ſituated in the mountains of Comagene, to the W. of the Euphrates and near it, N. W. of Zeugma.

DOLICHODROMUS, in the *Ancient Exerciſes*, one who ran the length of a dolichos.

DOLICHOLITHOS, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of ſtone, of a blackiſh colour, and the ſhape of a kidney-bean, found in great abundance about Tyrol, and yielding a ſmell on rubbing.

DOLICHOS, in *Antiquity*, a word uſed by different writers in different ſenſes. The ancient phyſicians underſtood by it long or prolix, and uſed it in this ſenſe in their deſcription of diſeaſes. Others uſed it for the fruit or pod of the kidney-bean. Suidas makes it ſignify a race, or courſe, of twelve ſtadia, or of twenty-four.

The dolichos, or long courſe, in the Olympic ſtadium, conſiſted of many diauli, or doublings of the courſe; the dolichodromi, when they came to the barrier, turned again round the pillar erected at that end, in order to continue and prolong their courſe. In this exerciſe the courſe conſiſted of 7, 12, or even of 24 ſtadia, for theſe different meaſures are aſſigned to the dolichos by different authors. Accordingly, beſides agility and ſwiftneſs, a great ſtrength of body and a long wind was neceſſary for holding out through ſo long a courſe; and beſides, as the dolichodromi were obliged to make many ſhort turnings round the pillars erected at each end of the ſtadium, the labour of the race was conſiderably increaſed, and the activity and ſkill of the racers put to more frequent and ſeverer trials than in the ſimple foot-race and the diaulus or double ſtadium. But notwithſtanding the length of this courſe, and the ſwiftneſs neceſſary for gaining the victory in the other two, inſtances occur of people, in whom the two qualities of agility and ſtrength, which are ſeldom found together, were nevertheleſs ſo united and ſo eminent as to enable them to obtain the crown in all the three races in one and the ſame day.

DOLICHOS, in *Botany*, (δολιχος, *long*. a name applied by Theophraſtus to the French-bean, σμιλαξ of Dioſcorides, in alluſion rather to the length of its climbing ſtem, than, as ſome have thought, to the dimenſions of its legumes Some ſpecies or other of our genus *Dolichos* may have been the plant of the above ancient writers, as probably as the *Phaſeolus*, our French-bean. The ſpecies of each genus are very numerous, moſtly eſculent, and cultivated throughout the warmer parts of the globe. In ſuch caſes nothing can be more difficult than to point out the preciſe plant intended by any ancient author.) Linn. Gen. 372. Schreb. 494. Willd. Sp. Pl. v. 3. 1037. Mart. Mill. v. 2. Juſſ. 356. Gærtn. t. 150. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, very ſhort, with four teeth of equal length, the uppermoſt emarginate. *Cor.* papilionaceous. Standard large, roundiſh, notched, entirely reflexed, furniſhed with two ſolid excreſcences, attached to its lower ſide near the baſe, which are oblong, parallel, and longitudinal, ſerving to compreſs the wings. Wings ovate, obtuſe, the length of the keel. Keel creſcent-ſhaped, compreſſed, cloſely ſhut up at the lower edge, its top aſcending. *Stam.* Filaments diadelphous, one ſolitary, the other in nine ſegments, the former curved at its baſe; anthers ſimple. *Piſt.* Germen linear, compreſſed; ſtyle aſcending; ſtigma bearded, running along the inner edge of the ſtyle from the middle to the extremity, the point of the ſtyle being callous and obtuſe in front. *Peric.* Legume pointed, large, oblong, of two valves, ſeparated internally into ſeveral cells by tranſverſe membranes (Gærtner.) *Seeds* one in each cell, elliptical, moſtly compreſſed.

Eſſ. Ch. Stigma downy. Standard with two oblong parallel protuberances at the baſe, which compreſs the wings beneath them.

Obſ. *Phaſeolus* differs from this genus in having its keel ſpirally twiſted. In habit they are altogether ſimilar.

Willdenow enumerates 53 ſpecies of *Dolichos*, of which 42 are climbers, nine upright, and two ſo ill deſcribed by Thunberg, that no one can tell to which of thoſe tribes they belong: we preſume, however, to the former.

The moſt remarkable in that ſection are D. *Lablab*, the Egyptian Kidney-bean, figured by Proſper Alpinus, Pl. Ægypt. t. 75. "This," ſays that writer, "is a climbing tree which grows as large as a vine. It lives for 100 years, and is always green, bearing leaves exactly like thoſe of the common French-bean, and flowering both in ſpring and autumn. Its flowers ſomewhat reſemble thoſe of the French-bean, and produce long pods like very broad beans. The ſeeds are ſome of them black, others reddiſh, exactly like French-beans. The Egyptians uſe them as pulſe, and they are very pleaſantly flavoured." This plant is cultivated in Egypt for making bowers as well as for its ſeeds; but Haſelquiſt thought it not a native of the country, it being called there European-bean. It is ſeen with us in the ſtoves of the curious, but has not much to recommend it to notice. D. *purpureus*, Linn. Sp. Pl. 1021. Sm. Exot. Bot. t. 74, is a handſomer flower, and likewiſe perennial, ſoon filling the ſtove with its wide-extended branches. It is ſaid to be a native of both Eaſt and Weſt Indies. D. *pruriens*. Linn. Sp. Pl. 1019. Woodv. Med. Bot. t. 172, is the celebrated Cowhage, Cow-itch, or *Stizolobium*, uſed in the Weſt Indies as a vermifuge. It bears long magnificent cluſters of violet-coloured flowers. The legumes are denſely clothed with rigid very pungent barbed briſtles, cauſing intolerable itching in the ſkin, but ſwallowed with ſafety, in the form of a bolus, into the ſtomach, where they act mechanically, ſo as to deſtroy all kinds of worms. D. *ſcarabæoides* is ſingular for the appearance of its ſeeds, which reſemble little two-horned beetles, and are very well figured by Plukenet, Phyt. t. 52. f. 3. D. *lignoſus*, Linn. Sp. Pl. 1022. Sm. Spicil. t. 2. Curt. Mag. t. 380, is a pretty climber, bearing numerous heads of roſe-coloured flowers, thriving well with very moderate protection from our winters. It is found in many different climates, and the beans ſerve for food in India.

Of the upright kinds, D. *Soja*, Linn. Sp. Pl. 1023. Jacq. Ic. Rar. t. 145, a native of Japan and the Eaſt Indies, is famous for its ſeeds, a great article of food in China and Japan. They are made into a kind of jelly or curd, eſteemed very nutritious, and rendered palatable by adventitious ſeaſoning; or they are prepared with ſalt, ſo as to produce the liquid well known at our tables by the name of Soy. The flowers of this ſpecies are ſmall and unornamental.

The greater part of the *Dolichi* are annuals, ſeveral of them cultivated for their beans in the Eaſt as well as Weſt Indies, South America, &c., and few collections of ſeeds ſent from China are without ſeveral different ſpecies. They are puzzling to the botaniſt, troubleſome and unintereſting to the cultivator of exotics, and ſuperfluous to the kitchen-gardener. The roots of ſome of the perennial kinds are ſtrongly purgative, diuretic, and emmenagogue.

DOLICHOS, in the *Materia Medica*, *Cowhage*, or *Cowitch* The outſides of the pods of the dolichos are denſely covered with ſharp hairs which penetrate the ſkin when touched, and cauſe a moſt exceſſive and troubleſome itching.

Advantage has been taken of this irritating quality to expel worms from the human inteſtines, and it has been found to be an anthelmintic of very conſiderable efficacy. The natural mucus which lines the whole alimentary canal prevents any inconvenience which might ariſe from the irritation of the cowhage on the ſtomach or inteſtines, but that mucus is inſufficient to protect the worms from its irritating quality. The dolichos is merely mixed up with ſyrup or treacle into the form of an electuary, and the uſual doſe is a tea-ſpoonful to a young child, and more in proportion to an adult, given in the morning faſting for three ſucceſſive days, after which the inteſtines are cleared by a briſk purgative. This medicine may be given with great ſafety in all conſtitutions, as it produces no ſenſible diſturbance; and as a proof that its action is merely mechanical it may be added, that neither the tincture nor decoction of this plant has any perceptible effect whatever on the conſtitution.

In preparing the electuary care ſhould be taken not to get any of the hairs on the tender parts of the face, as the irritation they produce is very ſevere.

DOLICZA, in *Geography*, a town of Poland, in the palatinate of Podolia; 26 miles N. E. of Kaminiec.

DOLIMAN, a kind of long caſſock worn by the Turks, hanging down to the feet, with narrow ſleeves, buttoned at the wriſt,

The Turks, both men and women, wear drawers next the ſkin; over that a ſhift, or ſhirt; and over the ſhirt a doliman. In ſummer it is linen, or muſlin; in winter ſattin or ſtuff.

DOLIOCARPUS, in *Botany*, (from δολιος, *treacherous*, and καρπος, *a fruit*, becauſe the berries, though beautiful, are poiſonous,) Rolander in Stockholm Tranſ. for 1756. 261. Schreb. 348. Juſſ. 433. Mart. Mill. Dict. v. 2. (Calinea; Juſſ. 434. Aubl. Guian. v. 1. 556. t. 221.) Claſs and order, *Polyandria Monogynia.* Nat. Ord. uncertain, Juſſ.

Gen. Ch. *Cal.* Perianth of five oblong, rounded, concave, unequal, coloured, permanent leaves. *Cor.* Petals three, roundiſh, concave, plaited. *Stam.* Filaments numerous, capillary, inſerted into the receptacle; anthers compreſſed. *Piſt.* Germen ſuperior, globoſe; ſtyle long, incurved; ſtigma compreſſed, flat, ſomewhat cloven. *Peric.* Berry globoſe, crowned with the ſtyle, of one cell. *Seeds* two, coated, oblong, rounded, flat on one ſide, convex on the other. *Schreber.*

Eſſ. Ch. Calyx of five leaves. Petals three, plaited. Berry ſuperior, with two coated ſeeds.

Obſ. Lamarck, t. 463, unites with this genus the *Soramia* of Aublet, t. 219, to which Schreber was inclined, but in his appendix 832 changes his opinion. The latter has five petals and a ſolitary ſeed, but ſeems otherwiſe to agree with *Calinea*.

The ſpecies of *Doliocarpus*, as far as we have any account of them, are,

1. D. *Rolandri*. Gmel. Syſt. Nat. v. 2. 805. Mart. Mill. Dict. v. 2. "Stem upright. Leaves ovato-lanceolate, toothed. Flowers terminal." A ſtiff erect ſhrub with pendulous *leaves*, found in Surinam. 2. D. *major*. ibid. "Stem climbing. Leaves ovate, toothed. Flowers ſolitary on lateral ſimple ſtalks." From the ſame country. The *ſtem* is ſlender and zig-zag, with ſpreading *branches* and *leaves*. *Flowers* unpleaſantly aromatic. *Berries* poiſonous. 3. D. *Calinea*. ibid. (Calinea ſcandens; Aubl. Guian. t. 221.) "Stem climbing. Leaves ovate, entire. Flowers in axil-

lary bundles." Native of Guiana. *Stem* twining. *Flowers* ſmall, white, produced in April. Aublet did not ſee the ripe fruit.

DOLIONES, in *Ancient Geography*, a people of Aſia Minor, in Myſia, placed by Pliny near the town of Cyzicus, and inhabiting the territory called Dolionia, extending from the river Æſepus as far as Rhyndacus and the country of the Daſcyliani.

DOLIUM, in *Natural Hiſtory*, the name of a genus of ſhells called by ſome conchæ globoſæ, and by the French, tonnes, and referred to the genus *buccinum*. The characters are theſe: it is an univalve ſhell, with a globoſe, or round belly, with a lax aperture, ſometimes ſmooth, and ſometimes dentated. The clavicle is either moderately umbonated or depreſſed; and the columella is in ſome ſpecies ſmooth, in others wrinkled. Some authors have called thoſe conchæ ampullaceæ; and they have had, at times, many other names, but all tending to the ſame ſenſe, and expreſſing the globular figure of the body, which is the great character by which theſe are diſtinguiſhed from all other ſhells. See CONCHOLOGY.

The Perſian ſhell, ſo much eſteemed in cabinets, is a very ſingular one; but the globoſe figure of its body evidently refers it to this genus, though it differ in many other particulars from all the ſpecies of it. Aldrovandus could not tell what to make of the ſhells of this genus, but has thrown them together at the end of his book: obſerving, that they ſeemed to be of the turbinated kind, but that they want the turbo.

DOLLAR, or DALLER, a ſilver coin, nearly of the value of the Spaniſh piece of eight, or French crown.

Dollars are coined in divers parts of Germany and Holland; and have their diminutions, as ſemi-dollars, quarter-dollars, &c.

They are not all of the ſame fineneſs, nor weight. The Dutch dollars are the moſt frequent. The Daniſh dollar, called Sleſwick and Holſtein ſpecie dollar, is a ſilver coin, with much alloy, which paſſes for about 4*s.* 6*d* ſterling. This coin has a general circulation all over Sleſwick and Holſtein, even including Hamburgh itſelf; and is divided into halves, quarters, &c. In the Levant they are called aſtaini, from the impreſſion of a lion thereon. See COIN and MONEY.

DOLLART, in *Geography*, is a large bay between the departments of Groningen and Eaſt Frieſland, in the kingdom of Holland, formed by a conſiderable tract of land which was flooded over by the North ſea, in 1277, when 33 villages were ſwallowed up by the water. However, it gradually recedes from the Eaſt Frieſland ſide: the Dollart grows leſs every day, and the land which is gained is uncommonly fertile.

DOLLENDORF, a town of Germany, in Weſtphalia, and county of Blankenheim; three miles S. E. of Blankenheim.

DOLLEREN, a river of France, in the department of the Upper Rhine, which runs into the Ille, about two miles N. of Mulhauſen.

DOLL's POINT, a cape on the S. coaſt of the iſland of Jamaica, betwen Weſt harbour and Peake bay.

DOLLINGEN, or DOELLINGEN, a ſmall town of Saxony, in the Electoral circle, which has ſome vineyards. Pitch is made in its neighbourhood. It is ſituated near a lake in a large foreſt.

DOLLOND, JOHN, in *Biography*, an eminent optician, who deſerves to be recorded on account of his valuable improvement in refracting teleſcopes, was born in Spitalfields, London, June 10, 1706. His parents, who were French proteſtants, and who reſided in Normandy, were obliged to quit their country in conſequence of the revocation of the edict of Nantes, in the year 1685, and to ſeek refuge in England, in order to avoid perſecution, and to preſerve their religion. Mr. Dollond, in the earlier period of his life, was employed at the loom; but the turn of his mind being always ſtudious and philoſophical, he devoted his leiſure hours to mathematical purſuits. Having the misfortune to loſe his father when he was very young, he was under a neceſſity of applying to buſineſs; but the bent of his mind was even then apparent; ſo that at the age of 15, before he had an opportunity of peruſing elementary treatiſes of ſcience, he amuſed himſelf by conſtructing ſun-dials, drawing geometrical figures, and ſolving problems. His favourite ſtudies were ſomewhat obſtructed by an early marriage and an increaſing family; but though buſineſs demanded much of his attention, he found time, by abridging his hours of reſt, to extend his mathematical knowledge; and he made, under the diſadvantages of his ſituation, a conſiderable proficiency in optics and aſtronomy, for which he was previouſly prepared by the knowledge of algebra and geometry, which he had acquired in the earlier period of his life. Such were the powers and the activity of Mr. Dollond's mind, that, without intermitting his philoſophical purſuits, or relaxing from the labours of his profeſſion, he directed his attention to the ſtudy of anatomy, and even of theology; and acquired ſuch a knowledge of the Latin and Greek languages, as ſoon enabled him to tranſlate the Greek teſtament into Latin. It ſhould at the ſame time be mentioned to his honour, that he retained and cheriſhed juſt ſentiments of the wiſdom and goodneſs of the Creator, not only as they are exhibited in the mechaniſm of the human frame, but as they are manifeſted in the revelation of his word. His religious principles ſeem to have been rational and liberal, and under a conviction of the importance and utility of ſocial worſhip, he regularly attended, with his family, on the public ſervice of the French proteſtant church, and occaſionally joined in the worſhip of the proteſtant diſſenters, admiring as preachers, and eſteeming as men, the nonconformiſt miniſters, Benſon and Lardner, well known to the world by their valuable writings. "In his appearance Mr. Dollond was grave, and the ſtrong lines of his face were marked with deep thought and reflection; but in his intercourſe with his family and friends, he was cheerful and affectionate, and his language and ſentiments are diſtinctly recollected as always making a ſtrong impreſſion on the minds of thoſe with whom he converſed. His memory was extraordinarily retentive; and, amidſt the variety of his reading, he could recollect and quote the moſt important paſſages of every book which he had at any time peruſed." For ſome time Mr. Dollond, and his eldeſt ſon, Mr. Peter Dollond, carried on their manufactures together in Spitalfields, but this employment did not ſuit either the expectations or the diſpoſition of the ſon, who, by means of the inſtruction of his father had acquired very conſiderable acquaintance with mathematical and philoſophical ſubjects, and who was well appriſed of the high eſtimation in which his father's knowledge in optics was held by profeſſional men. He therefore determined to apply that knowledge to the benefit of himſelf and family; and, accordingly, under the directions of his father, commenced optician. Succeſs attended his efforts; and in the year 1752 Mr. John Dollond joined his ſon in this buſineſs. He began with improving the combination of the eye-glaſſes of refracting teleſcopes; and at length produced ſome of theſe furniſhed with five eye-glaſſes. (See Phil. Tranſ. vol. 48, p. 103.) Soon after he made a very uſeful improvement in Mr. Savery's micrometer. (See Phil. Tranſ. vol. 48, p. 178.) In conſequence of theſe communications, and Mr. Dollond's known ſcientific attainments, he enjoyed the friendſhip and protection of the moſt eminent mathematicians and philoſophers of that period. Thus countenanced and encouraged, he proſecuted his enquiries into a ſubject which at that time not only intereſted this country but all Europe. To thoſe who are acquainted with Mr. Dollond's ſubſequent diſcoveries it is needleſs to add, that this ſubject was the improvement of the refracting teleſcope. In this purſuit he was perſevering and indefatigable; and after a courſe of well-conducted experiments, continued from the year 1757 to June 1758, he diſcovered "the difference in the diſperſion of the colours of light, when the mean rays are equally refracted by different mediums;" and from this principle he inferred, that the object-glaſſes of refracting teleſcopes were capable of being made without the images formed by them being affected by the different refrangibility of the rays of light. (See Phil. Tranſ. vol. 50, p. 753.) In honour of this diſcovery he was preſented by the Royal Society with ſir Godfrey Copley's medal. Having eſtabliſhed a new principle in optics, he was ſoon able to conſtruct object-glaſſes, in which the different refrangibility of the rays of light was corrected, and the name of "Achromatic" was given to them (not by M. de la Lande, as we have ſtated from Dr. Hutton, under that article,) but by the late Dr. Bevis, on account of their being free from the priſmatic colours. Mr. Peter Dollond, in a paper communicated to the Royal Society, ſtated and vindicated, in the moſt unexceptionable and convincing manner, his father's right to the firſt diſcovery of this improvement in refracting teleſcopes, as well as of the principle on which it was founded. In ſo doing he has corrected the miſtakes of M. de la Lande in his account of this ſubject; thoſe of M. N. Fuſs, profeſſor of mathematics at St. Peterſburg, in his "Eulogy on Euler," written and publiſhed in 1783; and thoſe of count Caſſini, in his "Extracts of the Obſervations made at the Royal Obſervatory at Paris, in the year 1787." It muſt appear to every impartial and candid examiner, that Mr Dollond was the ſole diſcoverer of the principle which led to the improvement of refracting teleſcopes. The improvement was of ſuch importance, that it reflects great honour on the inveſtigations of Mr. Dollond; as it was of the greateſt advantage to aſtronomy, in the application of his refracting teleſcopes to fixed inſtruments, and to navigation in their connection with Hadley's quadrant. In the year 1761, Mr. Dollond was elected fellow of the Royal Society; and he was alſo appointed optician to his majeſty; but he did not long live to enjoy theſe honours. On the 30th of November, in the ſame year, as he was reading a new publication of M. Clairaut, on the theory of the moon, and on which he had been intently engaged for ſeveral hours, he was ſeized with apoplexy, which immediately deprived him of ſpeech, and occaſioned his death a few hours afterwards. Mr. Dollond left two ſons and three daughters. The ſons carried on the buſineſs of opticians in St. Paul's church yard, after their father's death; and one of them, *viz.* Mr. John Dollond, being ſince dead, the ſurvivor, Mr. Peter Dollond, already mentioned, who is well known as a philoſopher and artiſt, and much reſpected, continues it in partnerſhip with his nephew, Mr. George Huggins, who has taken the name of Dollond. Kelly's Life of John Dollond, F. R. S. &c. ed. 3. 1808. For a particular account of Mr. Dollond's diſcoveries, ſee Aberration, Dioptric *Teleſcope*, Micrometer, Quadrant, and Telescope.

DOLLSTADT, a river of Pruſſia, in the province of Oberland; ſix miles N.W. of Preuſchmark.

DOLMAR, a mountain of Germany, in the circle of Franconia, and county of Henneberg; five miles ſouth of Schmalkalden.

DOLMATOF, a town and diſtrict of Ruſſia, in the government of Perm, and province of Catharinenburg, or Echaterinenburg, ſeated on the left ſhore of the Iſſet; 80 miles S.E. of Echaterinenburg.

DOLMAYRAC, a town of France, in the department of the Lot and Garonne; three leagues north of Agen.

DOLNSTEIN, a town of Germany, in the circle of Franconia, and biſhopric of Aichſtat, on the Altmuhl; ſix miles weſt of Aichſtat.

DOLOMITE, in *Mineralogy*, chaux carbonatée aluminifere. Haüy.

Its colour is white, with a ſlight tinge of grey or yellow. It occurs in maſs or foliated; its luſtre is glimmering, between pearly and vitreous; its texture is fine-granular; its fracture is compact uneven, paſſing into imperfectly lamellar. It breaks into irregular blunt-edged fragments. It is tranſlucent on the edges; may be ſcratched by fluor ſpar, and is often more or leſs friable between the fingers. Sp. gr. 2.8. It is for the moſt part phoſphoreſcent in the dark, by percuſſion.

It is ſoluble in nitric acid, but ſlowly, and with little efferveſcence. Its component parts, according to Vauquelin, (Journal des Mines. xvi. 77.) are,

Carbonated lime	52
Carbonated magneſia	46.5
Oxyd of iron	0.5
Ditto manganeſe	0.25
	99.25

It is found in various parts of the Alps, in beds alternating with micaceous ſchiſtus; and containing tremolite, orpiment, and cupreous pyrites.

The firſt analyſis of this ſubſtance was made by Theod. Sauſſure, according to which, it conſiſted of about 88 *per cent.* of lime, with an exceſs of carbonic acid, between five and ſix *per cent.* of alumine, and the reſt magneſia and oxyd of iron. This, however, has been ſhewn by Vauquelin to be wholly erroneous, and the dolomite appears to bear the ſame relation to bitterſpath and magneſian limeſtone, as granular limeſtone does to calcareous ſpar and common limeſtone.

DOLONCÆ, or Dolonci, in *Ancient Geography*, a people of Thrace, according to Herodotus, Steph. Byz., and Solinus; the latter of whom ſays that they inhabited the vicinity of the river Hebrus. They had been once maſters of the Cherſoneſus.

DOLONOSKOI, in *Geography*, a fortreſs of Ruſſian Siberia, in the government of Kolyvan, ſeated on the Irkutſk, 16 miles weſt of Semipolatnoi.

DOLOPES, in *Ancient Geography*, a people who inhabited part of Theſſaly and part of Epirus, between the mountains that bore the name of Pindus. Thucydides ſays, that the Achelous, which ſprang in this mountain, traverſed their country. They are ſuppoſed to have formed one of the twelve nations, or diſtricts, which ſent deputies to the council of the Amphictyons. Theſe people poſſeſſed the iſle of Scyros; and they are ſaid to have been a body of Corſairs who infeſted the Ægean ſea, and pillaged the merchants that viſited their ports. When Cimon took poſſeſſion of the iſland, he expelled them from it. Their country in Theſſaly was called *Dolopia*.

DOLPHIN, Delphinus, in *Aſtronomy*. See Delphinus.

Dolphin, in *Ichthyology*. See Delphinus.

This fiſh was conſecrated by the ancients to the gods, and called the ſacred fiſh. Scarce an accident could happen at ſea but the dolphin offered himſelf to convey to ſhore the unfortunate. The ſtory of Arion, the muſician, is related by Ovid, Faſti, lib. ii. ver. 113.

Dolphin *Fly*, in *Agriculture*, a name frequently applied to an inſect which is often very deſtructive to bean and other crops.

Dolphin, *Black*. See Black *Dolphin*.

Dolphin's *Iſland*, in *Geography*, an iſland in the ſtraits of Magellan. S. lat. 53° 59′. W. long. 71° 41′.

Dolphins *of a Cannon*, in *Gunnery*, are the two handles placed on the ſecond reinforce rings of braſs guns, reſembling the fiſh of that name. They ſerve for mounting and diſmounting the guns. See Cannon.

Dolphin *of the Maſt*, in *Sea Language*, is a peculiar kind of wreath, formed of a piece of worn hawſer-laid rope, nearly as long as the circumference of the maſt, which has an eye ſpliced in each end, and is pointed over the whole length. It is laſhed occaſionally round the maſt, through the eyes, as a ſupport to the puddening, whoſe uſe is to ſuſtain the weight of the fore and main-yards, in caſe the rigging or chains, by which thoſe yards are ſuſpended, ſhould be ſhot away in the time of battle.

DOLUS, in *Geography*, a ſmall town of France, in the department of the Lower Charente, in the iſland of Oleron.

DOM, or Don, a title of honour originally Spaniſh, though uſed occaſionally in other countries. (See Title.) It is equivalent to maſter, ſir; or lord, monſieur, ſieur, mynheer, &c.

Gollut, in his Mem. des Bourg. liv. v. chap. 11, aſſures us, that the firſt on whom the Spaniards conferred the title, was dom Pelayo; when, upon their being routed and driven out by the Saracens, at the beginning of the eighth century, they rallied again on the Pyreneans, and made him king.

In Portugal, nobody is allowed to aſſume the title of dom, which is a badge or token of nobility, without the king's leave.

Dom is likewiſe uſed in France among ſome orders of religious, the Chartreux, Benedictines, &c.

We ſay, the reverend father dom Calmet, dom Alexis, dom Balthaſar, &c.

In the plural they write doms, with an *s*, in ſpeaking of ſeveral. RR. PP. doms Claude du Ruble, and Jacques Donceur.

The word is formed from the Latin domnus or dominus; of which it is an abbreviature. Domnus is found in diverſe Latin authors of the barbarous age. Onuphrius aſſures us, it was a title firſt given to the pope alone; then to the biſhops, abbots, and others, who held any eccleſiaſtical dignity, or were eminent for virtue and religion. At length it was uſurped by the mere monks.

Some ſay, the religious declined the title dominus out of humility, as belonging to God alone; and aſſumed that of domnus, as expreſſing inferiority, *quaſi minor dominus*. Indeed, the appellation domnus for dominus appears very ancient, if we conſider the ſurname of Julia, wife of the emperor Septimus Severus, who is called on medals IVLIA DOMNA, for JULIA DOMINA.

Dom and *Som*, words uſed in ancient charters, ſignifying a power of judging, and ſecurity of poſſeſſing. Hence dome's men, who were perſons appointed to determine ſuits and controverſies between parties. See Day's *Man*.

Dom-*Book*. See Domes-*Day*.

DOMA, in *Ancient Geography*, an iſland of Aſia, in the Indian ſea, towards the mouth of the river Indus, according to Arrian.

DOMAIN, the inheritance, eſtate, or poſſeſſion of any one. See Demesne.

Menage derives the word from domanium, written in the barbarous Latin for dominium.

DOMAINE, in *Geography*. See Domene.

DOMAIZE, a ſmall town of France, in the department of the Puy-de-Dôme; 21 miles S.E. of Clermont.

DOMART, a ſmall town of France, in the department of the Somme, chief place of a canton in the diſtrict of Doullens, with a population of 1030 individuals. The canton has 22 communes and 11,748 inhabitants, on a territorial extent of 182½ kiliometres.

DOMAT, John, in *Biography*, an eminent French lawyer, was born at Clermont, in 1625, where he received the elements of learning, and was then ſent to the college of Clermont, in Paris: here he diſtinguiſhed himſelf by the rapid progreſs which he made in various departments of literature. He fixed on the law as his future profeſſion, and practiſed at the bar with reputation and ſucceſs. He was the intimate friend of the celebrated Paſcal, attended him in his laſt hours, and was entruſted with his moſt important papers. About his thirtieth year he obtained the office of king's advocate to the court of Clermont, which he held for nearly thirty years. In the duties connected with this ſituation he was diſtinguiſhed for juſtice and integrity, zealous for the intereſts and comforts of the poor, and attentive to the concerns of the hoſpitals. Perceiving the confuſion which prevailed in the laws, he applied himſelf to the developement of their principles, and publiſhed a treatiſe, entitled "Les Loix Civiles dans leur ordre naturel;" this appeared in three volumes 4to. which is highly eſteemed as a truly admirable and ſcientific work. Domat died at Paris in 1696. An improved edition of his book was publiſhed in 1777, by M. de Jouy. Moreri.

DOMAZLIZE, Domazliza, or *Tauſs*, *Tuſla*, in *Geography*, a ſmall town of Bohemia, in the circle of Pilſen, or Plzenſko, near the river or torrent of Cadburze; 27 miles S.W. of Pilſen.

DOMBACA, a ſmall iſland, near the coaſt of Ava, in the bay of Bengal. N. lat. 17° 32′. E. long. 94° 35′.

DOMBES, Pagus Dombensis, formerly a province of France, which is now a part of the department of the Ain. Trevoux was its capital. Louis XV. had purchaſed it of the count d'Eu in 1762.

DOMBEY, Joseph, in *Biography*, a French botaniſt and traveller of much celebrity, was born at Macon, Feb. 22, 1742. He was brought up to the ſtudy of medicine, and took the degree of doctor of phyſic in the univerſity of Montpellier. He there imbibed, under the celebrated profeſſor Gouan, a taſte for natural hiſtory, more eſpecially for botany. To this taſte he ſacrificed his profeſſion, and all proſpect of emolument from that ſource. Content with a ſmall patrimony, he reſigned himſelf to the charms of nature in the fine country where he was ſtationed. The ſouth of France, with its varied and extenſive coaſts, its fertile plains, and its wild and lofty mountains, was his firſt theatre of obſervation. When the ſeaſon of the year obliged him to retire to his college, he returned to no ſtudies but ſuch as favoured and improved his darling propenſity. Whatever time was not devoted to that, was given to the pleaſures and diſſipation incident to his time of life, his gay and agreeable character, and the ſociety with which he was ſurrounded. To this diſſipation he, perhaps, ſacrificed more than prudence could juſtify, and it was fortunate for his moral character and worldly intereſt, probably alſo for his ſcientific ſucceſs, that he removed to Paris in 1772, to improve his botanical knowledge, under the tuition of the celebrated Bernard de Juſſieu and Le Monnier, and to cultivate the friendſhip of ſuch men as Thouin and Rouſſeau. In 1775, he travelled to Berne to viſit Haller, whoſe buſy and important life was drawing towards a cloſe. While rambling over the Alps in his return, he received a letter from his friend, Thouin, in Auguſt 1775, informing him that M. Turgot had, on the recommendation of Juſſieu, choſen him to go to Peru, in ſearch of plants that might, with advantage, be naturalized in Europe. He returned inſtantly to Paris; was preſented to the miniſter, and received his appointment, with a ſalary of 3000 livres. Part of this was obliged to be mortgaged to pay debts incurred by his youthful prodigality, and he was detained till the Spaniſh court had given its conſent to the undertaking, which could not be procured till the cloſe of the following year, 1776. To the honour of Dombey, it muſt not be forgotten, that he devoted the intermediate period to the moſt ſteady application, in order to qualify himſelf for his great and delightful undertaking. Indeed, if pleaſure, or diſſipation, could have drawn him aſide from ſuch views, he would little have deſerved his appointment, or his ſubſequent fame.

On arriving at Madrid in November 1776, his ardour met with ſeveral ungrateful checks in the ſolemn gravity and miſplaced jealouſy of the Spaniſh court, who encumbered him with futile inſtructions, and with four companions, each of whom had a ſalary of 10,000 livres. Theſe companions proved, in the firſt inſtance, of little uſe, for though two of them were botanical draughtſmen, and profeſſedly deſtined to his ſervice, Dombey was never allowed even a copy of the drawings they made under his directions. On the other hand, he was obliged to expend his own ſalary in buying paper and inſtruments requiſite for his undertaking. That ſalary had, indeed, been doubled, but it was ſtill, even with the economy he now practiſed, inadequate. His courage, however, failed him not. A new world was before him, and nothing chagrined him except what delayed his voyage. That voyage was happily accompliſhed in ſix months, and he arrived at Lima, April 8, 1778, where he obtained a favourable reception from the vice-roy of Peru, Don Emanuel de Guirrior, and from M. de Bordenave, one of the canons of Lima, an old acquaintance of his friend Juſſieu.

His firſt botanical expedition towards Quito was not without danger, from hordes of run-away negroes, but it afforded him an abundant harveſt of ſpecimens of plants, as well as of antiquities from the ſepulchres of the ancient Peruvians. Theſe, with 38 pounds of platina, and a collection of ſeeds, he ſent immediately to Europe. The ſeeds were partly picked up, in the dry ſeaſon, from the arid ſands around Lima, where they lay, blown about by the wind, or ſtored up by ants, awaiting the autumnal fogs neceſſary to their germination; for it never rains at Lima. He accompanied his collections with two manuſcript treatiſes of his own, one on a diſeaſe, which he attributed to the immoderate uſe in that country of the fruits of *Capſicum annuum*, *Phyſalis pubeſcens*, and *Solanum Lycoperſicum*; and the other on a new but uſeleſs ſpecies of *Laurus*, which ignorant obſervers had reported to the Spaniſh government as being the true cinnamon; a miſtake which Dombey found himſelf obliged to rectify. He was employed by the vice-roy to analyſe ſome mineral waters in that neighbourhood. He afterwards ſettled for a time in the mountainous province of Tarma, beyond the Cordilleras, and in May 1780, viſited Huanuco, the extremity of the Spaniſh ſettlements in that direction. In the vaſt and almoſt impervious foreſts beyond, he aſcertained the fact which had been reported of the *Cinchona*, or Peruvian bark, being abundant there, though previouſly ſuppoſed to grow at Loxa only. He determined alſo that there were ſeveral ſpecies of this valuable drug, all more or leſs uſeful in medicine. With theſe the botaniſts of Europe are now tolerably well acquainted. See Cinchona.

To inveſtigate the botanical riches of theſe foreſts, ſwarming with inſects, and filled with ſtagnant peſtiferous vapours, proved a labour of no leſs danger than difficulty. As the trees there are moſtly dioecious, it was found neceſſary to fell two of them, in order to obtain perfect ſpecimens of each ſingle ſpecies. Nor are the lofty climbers, which bind theſe ancient woods into one entangled maſs, an inconſiderable impediment to the progreſs of the botanical traveller, their flowers being no leſs inacceſſible than thoſe of the trees which ſupport them. But theſe ſavage regions ſoon became more formidable to our travellers, in conſequence of their more ſavage human inhabitants, 200 of whom were advancing by night to plunder them, had they not eſcaped by a precipitate and perilous retreat to Huanuco. From thence Dombey returned alone to Lima, where various difficulties, attended by various reſources, awaited him. The celebrated Necker, then in power, had increaſed his pecuniary income, but it was ſtill not adequate to his wants. He had, moreover, to encounter the ſcorn of the rich and ignorant, who deſpiſed his knowledge, and the perſecution of the bigotted priesthood, who, by a natural inſtinct, dreaded it. Though correct and wary in his moral and religious deportment, his being a Frenchman was enough to excite their ſuſpicions, and nothing but the public protection of his king ſecured him from the fangs of the inquiſitors. Here, however, his medical knowledge proved of the greateſt uſe. It augmented his income, and gained the reſpect and favour of all ranks, for even monks themſelves did not diſdain to be cured of their diſeaſes by a French philoſopher, who was found more ſkilful than their more orthodox countrymen. Thus, ſelf-intereſt ſecured what ſenſe and juſtice could not obtain; and the ſituation of our adventurer was ſtill further improved by the favour which his agreeable perſon and manners found with the fair ſex, to whoſe aſſemblies the young and lively Frenchman was no unwelcome gueſt. Even in the ſociety of Lima, Dombey met with ſome enlightened and diſintereſted characters, who could appreciate his merit, and who rendered him, from time to time, the moſt eſſential ſervices.

Having ſent off his ſecond collection to Europe, Dombey returned to Huanuco in the end of December 1780, though to the other difficulties of his ſituation the deſolating plague of a civil war was then ſuperadded. But this apparent miſfortune turned out to his advantage. He rouſed the latent patriotiſm of the Spaniards by offers, not only of money, but even of his perſonal ſervices, to repel the inſurgents. Though his pecuniary aſſiſtance was very properly declined, his zeal was publicly applauded by all orders of people, and accompanied by authentic documents of their gratitude. When the inſurrection was quelled, Dombey preſented to the public hoſpital the ſum he had offered towards the defence of the ſtate.

He had, ſhortly after, the mortification of hearing that his firſt collection had been taken by the Engliſh, and redeemed at Liſbon by the Spaniſh government. Conſequently, that a very valuable part of it, the ancient Peruvian vaſes and a compleat dreſs of one of the Incas, which he had deſtined for his own ſovereign, had been preſented to the Spaniſh monarch by Profeſſor Ortega, duplicates of the dried plants and ſeeds only having been forwarded to Paris. To this, as legally juſt, he could not but ſubmit; but when complaints were tranſmitted to him, "that the herbarium which he had made for the French king was ſuperior to that deſtined for the king of Spain," he ventured to repreſent in his turn the injuſtice of not ſending to France at leaſt the duplicates of his drawings, and the vice-roy of Lima ſo far acceded to the propriety of his repreſentation, as to write accordingly to Europe; with what ſucceſs we know not.

Dombey in the mean while, leaving his more recent acquiſitions in ſafety at Lima, undertook a journey to Chili. This had always been a principal object of his miſſion, on account of the nearer reſemblance of its climate to that of France, which rendered its vegetable productions more likely to be uſeful there. His journey was neceſſarily attended with vaſt expence, but his character was now ſo well known that he readily met with aſſiſtance. He arrived at La Conception in the beginning of 1782, where his adventurous deſtiny had prepared for him far other cares and purſuits than thoſe of botany. The town was afflicted with a peſtilential fever, and he was cautioned to avoid certain infected houſes where it raged. Inſtead of following this advice, he devoted himſelf to the exerciſe of his medical ſkill, aſſiſting the poor with the moſt valuable charity of his advice as well as with food and with medicine, and avoiding ſuch houſes only as were not infected. His example reſtored the public courage, and the grateful people wiſhed to retain him, with a handſome ſtipend, as their phyſician. Nor were even more tempting attractions wanting to fix him here for life. He was no longer pointed at as an heretical ſcarecrow, for even the biſhop of La Conception endeavoured to promote his union with a young lady of great beauty and riches, on whom his merit had made impreſſions as honourable to herſelf as to him. From motives of miſplaced patriotiſm he tore himſelf away, to purſue the primary object of his life, an object which wou'd have been beſt fulfilled by his permanent reſidence in Chili, from whence he might at leiſure have communicated the ſubſequent fruits of his enquiries. But the lot of Dombey was caſt in labour and ſorrow, and his greateſt mortifications were ſtill to come. Having added greatly to his collection of drawings, ſhells and minerals, as well as of plants, while in Chili, and having diſcovered a new and moſt valuable mine of quickſilver, and another of gold, for the worthleſs and ungrateful government whoſe fooliſh jealouſies rendered almoſt all his own acquiſitions finally abortive; he reviſited Lima to take his paſſage for Europe. A journey of 100 leagues among the Cordilleras, made at his own expence, had much impaired his finances and his health, but he refuſed the repayment which the country, in this inſtance not unjuſt, offered him, ſaying that "though he was devoted to the ſervice of Spain, it was for his own ſovereign, who had ſent him, to pay his expences." In Chili he diſcovered the majeſtic tree, of the tribe of Pines, 150 feet high, now named after him *Dombeya*, of which the Norfolk-iſland pine is another ſpecies. (See DOMBEYA.) While he ſtill remained at Lima, the labours of arranging and packing his collections of natural hiſtory, added to the fatigues he had already undergone, and the petty jealouſies and contrarieties he experienced from ſome of the Spaniards in power, preyed upon his health and ſpirits; and under the idea that he might poſſibly never reach Europe, he wrote to his friend Thouin to take the neceſſary precautions for the ſafety of his treaſures on their arrival in a Spaniſh port. He ſurvived however to undergo far greater diſtreſſes than he had yet known. After narrowly eſcaping ſhipwreck at Cape Horn, and being obliged to wait at the Braſils till his ſhip could be refitted, which laſt circumſtance indeed was favourable to his ſcientific purſuits and acquiſitions, he reached Cadiz on the 22d February 1785, with all the feelings of tranſport which an approach to his native country, a generous ardour to communicate his knowledge and to relate his adventures, and a deſire to reviſit the friends of his earlier years, could excite in a mind like his. But inſtead of the reception he expected and deſerved from the nation he had chiefly benefitted, every Spaniard, from the ſubalterns of the cuſtom-houſe to the miniſters of ſtate, ſeemed leagued to mortify him, and to render his labour, even for their own ſervice, of no effect. He was not only tormented with the moſt pettifogging and diſhoneſt behaviour concerning the property of his collections, but thoſe collections were expoſed, without diſcrimination or precaution, to the rude and uſeleſs ſcrutiny of the barbarians at the cuſtom-houſe, ſo as to be rendered uſeleſs, in a great meaſure, even to thoſe who meant to plunder them. The whole were thrown afterwards into damp warehouſes, where their true owner was forbidden to enter. Here they lay for the plants to rot, and the ineſtimable collections of ſeeds to loſe their powers of vegetation, till certain forms of the grave and ſapient moſt catholic court were gone through, which forms, as it afterwards appeared, tended chiefly to the rendering their plunder uſeleſs to others, rather than valuable to their own nation. In the firſt place, as much of theſe treaſures had ſuffered by this ill-treatment, Dombey was required to repair the injury from his own allotment, or from that of his maſter, the king of France. With this he could not of himſelf comply; but an order was, for ſome political reaſon, procured from the French court, and he was obliged to ſubmit. He cou'd never, however, obtain that the ſeeds ſhould be committed to the earth ſo as to be of uſe, and hence the gardens of Europe have been enriched with ſcarcely half a ſcore of his botanical diſcoveries, among which are the magnificent *Datura arborea*, the beautiful *Salvia formoſa*, and the fragrant *Verbena triphylla*, or, as it ought to have been called, *citrea*. This laſt will be a "*monumentum ære perennius*" with thoſe who ſhall ever know his hiſtory. What had been given him for his own uſe by the vice-roy of the Braſils, underwent the ſame treatment as the reſt. Finally he was required to fix a price upon the ſad remains of his collections, which, as a great part was French national property, it was obvious he could not do. He remained at Cadiz without money and without friends. His only hope was that he might hereafter publiſh his diſcoveries, ſo as to ſecure ſome benefit to the world and ſome honour to himſelf. But this laſt conſolation was denied him. Anxious to reviſit his native land, he would have compounded for his liberty with the loſs of all but his manuſcripts; but the tyrants, in whoſe hands he lay, would not let him depart till they had copied all thoſe manuſcripts, and bound him by a written promiſe never to publiſh any thing till the return of his travelling companions. In the mean while thoſe very companions were detained by authority in Peru; and in after times the original botanical deſcriptions of Dombey have, many of them, appeared verbatim, without acknowledgment, in the pompous *Flora* of Peru and Chili, which thence derives a great part of its value. Thus chagrined and oppreſſed, the unhappy Dombey ſunk into deſpair, till, no longer uſeful or formidable to his oppreſſors, he was allowed to return, with ſuch parts of his collections as they condeſcended to leave him, to Paris.

There the writer of the preſent article knew him in 1786. He was no longer the handſome lively votary of pleaſure, nor even the ardent enthuſiaſtic cultivator of ſcience. The leaden hand of tyranny had impreſſed its own ſtamp on his countenance, and he had the ſallow, ſilent, melancholy aſpect of a depreſſed and diſappointed Spaniard. He chiefly aſſociated with his faithful friends, Le Monnier and Thouin, and in their ſociety botanical converſe ſtill retained its charms. To the contents of his own collection, which, however injured and diminiſhed, was ſtill a very intereſting one, he paid little attention. Bound by his promiſe, his high ſenſe of honour would not let him make the proper uſe of it, but at length he was induced to part with it to M. de Buffon, who nobly exerted himſelf ſo as to procure from government a penſion of 6000 livres for Dombey, and 60,000 livres to pay his debts. The herbarium was confided to M. L'heritier, with orders to publiſh its contents. This was no ſooner known at Madrid, than intereſt was made by that court to defeat the meaſure, and the court of Verſailles was not in a condition to diſpute, even ſo unjuſt, and politically unimportant a requiſition, from that quarter. Buffon had orders to withdraw the herbarium, but L'heritier on the firſt alarm had taken it over to London, and the writer of this narrative, with his lamented friend, Brouſſonet, and his draughtſman Redouté, were alone entruſted with the ſecret. Happy and ſafe in a land of liberty and ſcience, L'heritier remained about 15 months devoted to the proſecution of his object, chiefly under the hoſpitable roof of his friend, ſir Joſeph Banks. But the diſtreſſed ſtate of his country obliged him to return, and his own dreadful and myſterious murder cloſed the ſcene.

The unfortunate Dombey had long been at reſt, but not without freſh previous toils, and aggravated ſufferings. He had determined to retire to a peaceful retreat at the foot of Mount Jura, where he had a friend devoted to the love and cultivation of plants. His pecuniary circumſtances were now eaſy, and he reſigned his fatal celebrity without regret. He broke off all ſcientific communication, except with M. Pavon, one of his fellow labourers in Peru, and who had all along been innocent of the execrable machinations againſt his honour and his peace. He refuſed a place in the French Academie des Sciences, as well as a large pecuniary offer from the empreſs of Ruſſia for the duplicates of his collection, ſaying, "he was not in want of money, and he had moſt pleaſure in diſtributing his ſpecimens amongſt his friends." Even one of the Spaniſh miniſtry, relenting when too late, offered him a large ſum of money by way of indemnification, which Dombey with due ſpirit abſolutely refuſed. Reſiding at Lyons for ſome time in his way towards Switzerland, he had the miſfortune to be preſent during the ſiege of that town. That energy of mind which neither vanity nor riches could recall into action, revived at the ſight of diſtreſs and danger, and thoſe who were ready to periſh found the wonted aſſiſtance of Dombey, who ſupplied their neceſſities, and healed their diſeaſes. But he ſickened at the ſight of public miſeries on every ſide, which he could not alleviate, and he procured a commiſſion to viſit North America, in order to purchaſe corn from the United States, and to fulfil ſome other objects of public importance, eſpecially relating to ſcience and commerce. A tempeſt obliged him to take ſhelter at Guadaloupe, and that ill-fated iſland was then in as diſtracted a ſtate as its mother-country. Having been ſent out by the French republic, he was conſequently odious to the royaliſt governor, and on being ſummoned into his preſence, he rather preferred making his eſcape on board a veſſel freighted by ſome republican deputies for Philadelphia. But before he could embark he was ſeized and thrown into priſon. This violence excited a public commotion in his favour, and the governor thought proper to releaſe him. In labouring to appeaſe the tumultuous mob, which threatened vengeance on his enemies, he was thrown accidentally into the river, and the conſequences were nearly fatal to his life. When recovered he waited on the governor, and though found innocent, was ordered to quit the colony in the American veſſel in which he came. That veſſel was no ſooner out of the harbour, than it was attacked by two privateers, and taken. Dombey, diſguiſed as a Spaniſh ſailor, was thrown into a priſon in the iſland of Montſerrat, where ill-treatment, mortification, and diſeaſe, put a period to his life on the 19th of February 1796. It muſt ever be the regret and the ſhame of an Engliſhman that a man like Dombey periſhed in a priſon where Engliſh laws were known. It has juſtly been the pride of civilized ſociety in our days that ſcience, being excluſively of no nation, has ſuſpended even the horrors of war in favour of its cultivators, but the horrors of war are much more commonly found to brutalize all nations in common. There muſt ſurely have been ſome perſons at Montſerrat who could read and write; ſome who, though ſlave-dealers, profeſſed Chriſtianity, but it was all in this caſe, as in many others, to very little purpoſe; for a man, the pride of his ſpecies, who went about doing good, and whoſe whole life was devoted to the ſervice of uſeful ſcience, periſhed unheeded among them! See Deleuze's Notice in Annales du Muſeum d'Hiſtoire naturelle, v. 4. 136, literally tranſlated in Sim's and Konig's Annals of Botany, v. 2. 474. Alſo Annual Regiſter for 1796, Chronicle, 57. S.

DOMBEYA, in *Botany*, (named by Lamarck in honour of his meritorious and unfortunate countryman whoſe hiſtory is given in the preceding article. L'heritier alſo gave the ſame name to a plant diſcovered by Dombey, but which its diſcoverer had already publiſhed under the appellation of *Tourretia*. Cavanilles, who is followed by Willdenow, eſtabliſhed a *Dombeya*, which ſeems not generally diſtinct from the old Linnæan *Pentapetes*. We therefore, as Schreber and Mr. Lambert have done, follow Lamarck as the original and beſt authority, though Juſſieu has given our *Dombeya* the barbarous American name *Araucaria*.) Lamarck Encyclop. v. 2. 301. Schreb. 704. Mart. Mill. Dict. v. 2. Lambert Pinus, append. 87. (Araucaria; Juſſ. 413.) Claſs and order, *Dioecia Monadelphia*. Nat. Ord. *Coniferæ*.

Gen. Ch. Male. *Cal.* Catkin cylindrical, ſomewhat ovate, ſpirally imbricated with numerous, ſhort, woody *ſcales*, each terminated by a lanceolate, acute, coriaceous, tapering point, concave beneath, recurved at the extremity. *Cor.* none. *Stam.* Filaments none, except the ſcale of the catkin: anthers 10 or 12, cluſtering round each ſcale, linear, furrowed, the length of the ſcale, attached by their upper ends to the end of the ſcale, below its tapering point, and ſeparating at their lower extremities when it is broken.

Female. *Cal.* Catkin large, roundiſh-ovate, cloſely imbricated with numerous germens reſembling ſcales. *Cor.* none. *Piſt.* Germen oblong-wedge-ſhaped, a little compreſſed, tapering at the baſe, dilated and thickened upwards; ſtyle none; ſtigma of two unequal valves, the inner one ſmall and obtuſe; the outer very large, with a broad thick baſe, curved inwards upon the ſmall valve, and terminating in a linear, acute, thin, aſcending point, almoſt as long as the germen, and bent in upon it at a right angle. *Peric.* none. *Seeds* numerous, imbricated cloſely ſo as to form the cone, each of them oblong, ſomewhat cylindrical, obtuſely quadrangular towards the baſe, furniſhed at the ſummit with a broad, ſpatulate wing, or appendage, which is curved inwards and upwards, and thickened at its margins. Shell coriaceous, coloured, without valves, containing an oblong kernel, ſlightly angular at its baſe. *Receptacle* without ſcales, downy, ſlightly cellular, cylindrical.

Eſſ. Ch. Male, Calyx the ſcales of a catkin, embraced by numerous ſeſſile anthers, and tipped with a naked point. Corolla none.

Female, Calyx the pointed imbricated ſcales of a catkin, each tipped with a ſtigma. Seed ſolitary in the coriaceous ſwelling baſe of each ſcale.

1. D *chilenſis*. Lamarck loc. cit. 301. t. 828. Mart. Mill. Dict. v. 2. (Pinus Araucana; Molin. Chil. 182. Baſilaire; Daubenton in Mem. d'Agriculture, ann. 1787, faſc. 4. 191. t. 1.) Chili Pine. Adult leaves ovate, imbricated, ſharp-pointed. Points of the cone-ſcales awl-ſhaped, nearly as long as the ſeeds. Diſcovered by Dombey in Chili. It forms a majeſtic pyramidal ever-green tree of ſlow growth, about 150 feet high, its *trunk* perfectly ſtraight and erect, its *branches* ſpreading horizontally in four directions, and its *wood* white, ſolid, but not ſo proper for maſts as was at firſt expected from the great height and ſtraightneſs of the tree, being rather brittle. Outer *bark* thick, furrowed, and wrinkled, like cork. *Leaves* cloſely and ſomewhat ſpirally imbricated, ſeſſile, an inch long, ovate, entire, concave, coriaceous, rigid, ſmooth, with a broad baſe and ſtraight ſpinous point. *Stipulas* none. *Catkins* ſolitary, terminal. *Cones* ovate, thick, three or four inches long, compoſed of innumerable ſcales whoſe long awl-ſhaped points are curved inwards. In the hollow purpliſh baſe of each ſcale is a ſolitary, oval, eatable kernel, ſcarcely an inch long. 2. D. *excelſa*. Lambert loc. cit. t. 39, 40. (Cupreſſus columnaris; Forſt. Prod. 67.) Norfolk-iſland Pine. Adult leaves cloſely imbricated, inflexed, pointleſs. Cone-ſcales winged, with very ſhort points. Diſcovered by captain Cook, in his ſecond voyage, on Queen Charlotte's Foreland, New Caledonia; alſo in the iſle of Pines. It has ſince been found abundantly on Norfolk Iſland, from whence living plants have been brought into England, but as they will not bear our climate, and ſoon overgrow our loftieſt conſervatories, they can never be ſeen here in perfection. This ſpecies riſes to 150 or 220 feet in height, and is from 12 to 30 feet in circumference, generally very ſtraight, and deſtitute of branches to the height of 40, ſometimes 60, feet from the ground. According to Capt. Hunter, the wood is ſeldom found; very heavy when freſh, as it abounds with a watery ſap; its grain ſhort and ſpongy, the gum which exudes from the bark is ſoluble in water, and not of the nature of turpentine. That experienced navigator eſteems this timber wholly unfit for the navy, though very uſeful for building houſes. The *leaves* of this tree on the young plant are awl-ſhaped, ſpreading every way, ſomewhat imbricated, about half an inch long, ſeſſile, ſmooth. *Cotyledons* four, whorled, equal, lanceolate, obtuſe, near an inch and half long. Adult *branches* numerous, cylindrical, obtuſe, ſpreading every way, covered with innumerable, cloſely imbricated, ſeſſile, ovate, inflexed, pointleſs *leaves*, about a quarter of an inch long. *Cones* almoſt globular, about ſix inches in diameter, formed of innumerable *ſcales*, which are deciduous when ripe. Each of theſe *ſcales* is dilated or winged at the ſides, and their tips are very ſhort, though greatly dilated at the baſe.

DOMBEYA of Cavanilles. See PENTAPETES.

DOMBEYA of L'Heritier. See TOURRETIA.

DOMBROWAZ, in *Geography*, a town of Poland, in the palatinate of Lemberg; 60 miles S. W. of Lemberg.

DOMBROWKEN, a town of Pruſſia, in the province of Natangen; 10 miles E. of Nordenberg.

DOME, in *Architecture*, is a roof or vault riſing from a circular, elliptic or polygonal plan, with a convexity outwards, or a concavity inwards, in ſuch a manner that all the horizontal ſections made by planes will be ſimilar figures round a vertical axis.

Domes are denominated by the figure of the baſe on which they are erected; and are therefore called polygonal, circular, or elliptic domes. Circular domes are of ſeveral kinds, as ſpherical, ſpheroidal, or ellipſoidal, hyperboloidal, paraboloidal, &c. Domes that riſe higher than the radius of the baſe are called ſurmounted domes; and thoſe that riſe leſs than this dimenſion, are termed diminiſhed or ſurbaſed domes. Domes which riſe from circular baſes are called cupolas.

Hiſtory.

With regard to the antiquity of domes, it does not appear from authentic hiſtory, that any of the ancient nations, prior to the time of the Roman emperor Auguſtus, were acquainted with the uſe of the arch, and conſequently not of the dome. It is probable that the arch was invented by the Greeks; but that ſpecies of it, called domes, ſeems to have originated in Italy among the Romans or Hetrurians. The oldeſt dome that hiſtory informs us of, is that of the Pantheon at Rome, built in the reign of this emperor, and is ſtill entire. Its cavity is hemiſpherical and enriched with coffers, and terminates upwards in an aperture called the eye of the dome. The exterior ſide riſes from ſeveral degrees or ſteps not vertically, but in a ſloping direction, which is nearly a tangent to the ſeveral internal quoins of the ſteps; and conſequently preſents to the eye a truncated ſegment of a ſphere much leſs than a hemiſphere.

The dome of the temple of Bacchus is alſo hemiſpherical internally; but without coffers. It is now covered externally with a common roof, which perhaps might have been the original form, a form which is alſo to be ſeen in the roof which covers the dome of the temple of Jupiter in the palace of Diocleſian at Spalatro in Dalmatia. Domes were of very frequent uſe among the Romans, as may be ſeen by their coins, and in the remains of their ancient edifices. But Greece, though the mother of architecture, has not furniſhed us with a ſingle example of a dome, which may be ſaid to be built; for that which covers the monument of Lyſicrates is only a ſingle ſtone, and is therefore but a lintle.

In point of antiquity, the dome of Santa Sophia at Conſtantinople comes next in order. It was built in the reign of the emperor Juſtinian by Anthemius and Iſidorus, whom the emperor had ſelected as the moſt eminent of the Grecian architects. As this church had been ſeveral times burnt, it was determined that no combuſtible materials ſhould be employed in its fabrication. Anthemius had boaſted to Juſtinian that he would outdo the magnificence of the Roman pantheon, by ſuſpending in the air a much greater dome. For this purpoſe he raiſed four pillars on the angles of a ſquare, diſtant from each other about 115 feet, and nearly of the ſame altitude. As this church was to be made in the form of a croſs, and to be vaulted with ſtone, it became neceſſary to throw arches over the pillars, and to fill up the four angular ſpaces between the archivolts, gradually forming them into a complete circle at the level of the four ſummits of the arches. Upon this circular ring the dome, the firſt ever erected upon pendentives, was raiſed. The preſſure of the eaſtern and weſtern arches was reſiſted by walls almoſt ſolid, running longitudinally in a meridional direction, two from the north, and two from the ſouth ſides of the pillars, to the diſtance of about 90 feet, forming tranſepts. It was thought that the cylindrical walls covered with half domes, which abutted on the eaſtern and weſtern arches, would have made a ſufficient reſiſtance to the preſſure of the arches on the north and ſouth; but this was not the caſe, for the dome gave way towards the eaſt, and after having ſtood a few months, it fell with the half dome on this ſide. Anthemius dying, Iſidorus, who ſucceeded to the charge, ſtrengthened the eaſtern piers by filling up certain voids, and then turning the dome a ſecond time; but its preſſure was ſtill too great for the reſiſtance of the eaſtern end, which was now ſo much fractured, that it gave way a ſecond time before its completion. Iſidorus finding ſtill that the puſh was directed eaſtwardly, built ſtrong pillared buttreſſes againſt the eaſtern wall of a ſquare cloiſter, which ſurrounded the building, and thence buttreſſes ſpanning over the void, and then turned the dome a third time. But though every precaution was taken to diminiſh its gravity, both by procuring light materials (which was pumice ſtone), and by reducing its thickneſs, the arches were ſo much fractured, that the architect was under the neceſſity of filling up the great arcades, on the north and ſouth, by other ſmaller ones in three ſtories. From theſe circumſtances we find that profeſſional men of this age were not ſo well acquainted with the principles of conſtruction in dome-vaulting as thoſe in modern times, who perhaps would have hooped or chained ſuch a dome immediately over the arches and pendentives; and by this means it might have been ſecured by making its preſſure incline more towards the perpendicular, as was the practice in after ages, firſt by Michael Angelo in the vaſtly more ponderous dome of St. Peter's at Rome; and then by ſir Chriſtopher Wren, in the interior dome and cone of St. Paul's cathedral. This dome of St. Sophia, which the Turks have preſerved, is nearly 113 French feet diameter.

The veneration with which the Chriſtian world did, and ſtill holds for this church, gave ſtimulus to the erection of the dome upon the church of St. Mark at Venice, about the year of Chriſt 973, upon a ſimilar plan.

Shortly after the commencement of the eleventh century, the dome of the cathedral church at Piſa was built after the ſame model.

The vaſt cathedral of St. Maria dei Foire, at Florence, was begun in 1298 by Arnolfo Luſii, who died in two years after. From the deceaſe of this great man there was no architect to be found who would engage to execute the dome with which the original architect Arnolfo had intended to finiſh this edifice: in conſequence of which it ſtood for 120 years, and then a convocation of architects was aſſembled; many extravagant plans were propoſed, but were all rejected. Filipo Bruneleſchi was at length choſen as the only perſon, who could be entruſted with the enterpriſe. He carried on the building, and completed the dome without difficulty, in a manner truly worthy of his great reputation. This cupola is of an octangular ſhape, and of great elevation, far exceeding in dimenſions any of the ancient Roman domes, and only inferior to St. Peter's in point of magnitude. It is double, or formed of two vaults, with a cavity between: it was erected without centering, and is only ſupported by the ſpringing wall without buttreſſes.

The church of St. Peter's at Rome, the largeſt temple ever erected, was begun by Bramante, A. D. 1513, and carried on ſucceſſively by Raphael, San-Gallo, and Michael Angelo. The dome of this edifice, deſigned by Michael Angelo, is nearly an ellipſoid on the exterior ſide. It riſes vertically from its baſe, and at the height of about 50 feet, branches into two thin vaults, which gradually ſeparate as they riſe. They are connected together by thin partitions dovetailed to each ſhell; by this means the whole is rendered extremely light and ſtiff.

St. Paul's cathedral, London, conſtructed by that great architect and mathematician ſir Chriſtopher Wren, was begun A. D. 1685, and completely finiſhed by 1710. The dome is of 18 inch brick work, and as it riſes every five feet in the altitude, has a courſe of long bricks inſerted the whole thickneſs. "The concave was turned upon a centre, which was judged neceſſary to keep the work even and true, though a cupola might have been built without a centre; but it was obſervable, that the centre was laid without any ſtandards from below to ſupport it; and as it was both centering and ſcaffolding, it remained for the uſe of the painter. Every ſtory of this ſcaffolding being circular, and the ends of all the ledgers meeting as ſo many rings, and truly wrought, it ſupported itſelf." "Although the dome wants not butment, yet for greater caution it is hooped with iron in this manner; a channel is cut in the bandage of Portland ſtone, in which is laid a double chain of iron, ſtrongly linked together at every ten feet, and the whole channel filled up with lead." The exterior dome is conſtructed of oak timber, and ſupported by a cone of brick work, ſpringing from the ſame baſe with the exterior dome, and ſupporting on its ſummit, or truncated end, a beautiful ſtone lantern, weighing 700 tons. This dome riſes higher than a ſemicircle; the ſides of its ſection being ſtruck with centres in the baſe line, and would meet in an angle, if continued, in the axis of the dome.

It may be proper to obſerve, in this place, that all the ancient Roman cupolas, on the convex ſide, are a much leſs portion of the ſphere than the hemiſphere; but thoſe from the completion of the building of Santa Sophia, to the finiſhing of St. Paul's cathedral, are all ſurmounted domes, approaching in a certain degree to the proportion of ſpires or towers, which were ſo much affected in the middle ages. Since the revival of legitimate Grecian architecture by Stewart and others, the figure or contour of the Roman dome has been again revived, particularly when the other parts of the building are decorated with any of the orders; indeed exterior domes of any deſcription are improper, when applied to the pointed ſtyle of architecture.

The preſent Pantheon at Paris, formerly the church of St. Genevieve, is the conſtruction of that diſtinguiſhed architect Soufflot. Its dome is very lofty, and is ſuſtained by four pillars arched over the croſs parts. The angular ſpaces are made good with pendentives, which terminate in a circular ring: upon this ring is erected the cylindrical wall, which ſupports the dome. In this reſpect it is ſimilar to St. Paul's.

The dome of the Halle du Bled, at Paris, is an excellent example of a wooden dome, it is more than 200 feet diameter, and only one foot in thickneſs. See our principles of CARPENTRY.

In the interior of the great towers, over the interſection of the croſs, in our Gothic cathedrals, we find domes riſing from a ſquare baſe, and generally pierced by two windows on each of the four walls, which form beautiful groins with the interſection of the domic ceiling within.

Spherical domes have this property, that they may be interſected by cylindrical or conic vaulting in every direction, and that the interſection will always be circles, provided that the axis of the cylinder, or cone, tend to the centre of the ſphere. For every ſection of a ſphere made by a plane is a circle, and every ſection of a right cylinder, or cone, perpendicular to the axis, is alſo a circle. Let the ſphere be ſo cut as to make a ſection of an equal diameter to a ſection of the cylinder or cone perpendicular to the axis; then the ſection of the cone, or cylinder, being applied to that of the ſphere, ſo that the centres of both may coincide, the circumferences of the circles will alſo coincide, and therefore only make one common line of meeting in the ſame plane, which is perpendicular to the axis of the cylinder, or cone: for the right line drawn from the centre of the circle, which is the ſection of the ſphere, to the centre of the ſphere, is perpendicular to the plane of this ſection; and ſince the axis of the cylinder, or cone, is alſo perpendicular to the ſame plane, the axis of the cylinder, or cone, and the remaining part of the radius of the ſphere, will be in the ſame ſtraight line. From this it follows, when the axis of a cylindrical, or conic vaulting, is horizontal, and tends to the axis of a ſpheric vaulting, that their mutual interſection muſt be in the circumference of a circle, the plane of which will be perpendicular to the horizon. Hence the beautiful interſections of ſphero-cylindric groins, which are ſo much admired in our principal buildings, and which never fail to ſtrike the mind, and lead it to an inveſtigation. For to people who view ſuch forms of groins, it appears, at firſt ſight, that the interſection will incline towards the vertical axis of the ſphere at the top; but upon reflecting upon the properties of the ſphere, they will ſoon diſcover that the interſection is in a plane perpendicular to the horizon.

From the above principle, any building having a polygonal baſe, may be made to terminate in a circle, and to ſuſtain either a cupola or cylindrical wall; for if the tops of the ſide walls of the polygon are brought to a level, and equal ſegments of circles raiſed on the top, meeting each other in the lines of interſection of the ſides of the polygon, the ſegments being either ſemicircles, or leſs portions; and if the angular ſpaces between theſe circular headed walls be made good to the level of the ſummits of the arches, ſo as to coincide with the circumference of a circle, which is a great circle of the ſphere, they will terminate in a circular ring at the level of the ſummit of the arches, and be portions of a ſphere, which our workmen call ſpandrals, and the French pendentives. Upon the circular ring a cornice is generally laid, and on the cornice a cylindric wall, or dome, of any deſcription is raiſed.

In the practice of building, the figures of the plans of apartments on which circular domes may be created are generally ſquares, or octagons, and the pendentives are generally equal in number to the angles of the walls; but this is not neceſſary, for arches may be thrown acroſs the angles to double the number of ſides of the polygon, and to preſerve the equal ſides; then over the middle part of the walls may be built equal, and ſimilar arches, touching thoſe acroſs the angles at the bottom, and having their ſummits in the ſame level. Inſtead of walls, piers may be carried to a proper height upon each angle of the polygonal plan, returning on each ſide of the angle; then over every two adjacent piers, on each ſide of the polygon, let archivolts be turned, and the ſpandrals filled in to the level of the ſummits of the arches, or archivolts, as before, and the termination will be a circle on the inſide, as has been obſerved. The under bed of the cornice is not always laid on a level with the top of the archivolt; but the ſpheric ſurface is ſometimes continued another courſe, or two courſes with brick or ſtone work; then over this a cupola or cylindrical wall may be raiſed. In this manner the piers of the veſtibule of St. Paul's cathedral, London, have archivolts thrown over them, on each ſide of the octagonal plan, reſting upon every two adjacent piers, forming eight arcades below, then the ſpandrals are filled in with ſpheric portions to the ſummits of the archivolts; upon this circular level is laid the entablature, which ſupports upon its cornice the whiſpering gallery; the cylindric wall is then carried up to the baſe of the dome. St. Stephen's church, Walbrook, is a beautiful example of a dome, ſupported upon eight arcades, the arches of which are ſuſtained by the ſame number of inſulated columns; the area of the veſtibule is ſquare, but the columns are ſo diſpoſed in the ſides of it, as to form an equilateral and equiangular octagon; the entablature, ſupported by the columns, is alſo formed upon a ſquare plan; the archivolts between every two contiguous columns form on the plan an octagon; and the ſpheric ſpandrals, being made up to the level of the ſummits of the archivolts, form at laſt a complete circle; on this circular level is laid the cornice, which is at laſt ſurmounted with the dome and lantern.

Plate VII. exhibits the forms of various domes.

Fig. 1. ſhews three different contours upon a ſquare plan. No. 1 is the plan: No. 2 a bell-formed contour, uſed in turrets, upon a ſquare plan, in the reigns of Elizabeth and James I.: No. 3 a pointed contour; and No. 4 a ſemicircular.

Fig. 2. repreſents various contours of domes upon an octagonal plan. No. 1 is the plan: No. 2 an elevation with a ſemi-elliptic-contour upon the greater axis, the leſs being vertical: No. 3 a ſemi-elliptic-contour upon the leſs axis, which is the diameter of the circle of its baſe; and No. 4 an elevation, having its contour, or vertical ſection, pointed at the ſummit. The dome of the cathedral church of St. Maria dei Foire, at Florence, is of this form; for all its horizontal ſections are octagons, and its vertical ſection is a pointed arch.

Fig. 3. repreſents five contours upon a circular plan. No. 1 is the plan: No. 2 the elevation, having a ſemicircular contour, as is ſometimes uſed in modern practice: No. 3 an elevation, ſhewing the contour of a ſegment leſs than a ſemicircle, as was the practice of the Romans; the dome ſpringing from the uppermoſt of a ſeries of ſteps, or degrees, and ſometimes terminating with an eye at the top, as in the Pantheon: No. 4 an elliptic contour, the baſe being the longer axis: No. 5 an elliptic contour, the baſe being the ſhorter axis. Roofs with elliptic contours upon circular plans, are properly denominated ellipſoidal domes, or ſpheroidal domes, as in the two laſt contours: No. 6 the pointed contour, as employed in St. Peter's, at Rome, and St. Paul's, London.

Fig. 4. repreſents domes of four different contours upon a circular plan. No. 1 is the plan: No. 2 ſhews the elevation of a parabolical contour: No. 3 the elevation of a hyperbolical contour: Nos. 4 and 5 elevations, having the contours of contrary curvatures on the ſides: No. 4 bends inwardly at the bottom, and No. 5 riſes vertically from its baſe. The ſides of theſe contours are convex below, and concave above; the convex part being a much greater portion of the ſide than the concave part. Such forms may be denominated Moreſque, Turkiſh, or Hindoo domes, as being the practice of the Moors, Turks, and Hindoos. The contour, No. 5, was introduced into England in the reign of king Henry VII., and in conſtant uſe in the time of Henry VIII. Its uſe was in the crownings of turrets, as in the octagonal buttreſſes of king Henry VIIths chapel, and the towers of king's college chapel, Cambridge: the turrets at the entrance into Chriſt's college, Oxford, executed by ſir Chriſtopher Wren, are ſurmounted with domes of this form. The bell-formed contour, No. 2, *fig.* 1, ſucceeded to No. 5, *fig.* 4; examples of it may be ſeen at Audley-end, in Eſſex, built in the reign of James I., and in the tower of London.

No. 3, *fig.* 1; Nos. 3 and 4, *fig.* 2; Nos. 5 and 6, *fig.* 3, are all ſurmounted domes. Domes with pointed contours, conſiſting of circular ſegments meeting in the apex, were much uſed during the middle ages. The forms exhibited in No. 2, *fig.* 2; Nos. 3 and 4, *fig.* 3, are ſurbaſed domes, being lower than ſemicircles upon the ſame baſe.

Fig. 5. ſhews a complete hemiſphere, or the centre of a hemiſpheric dome. If this hemiſphere is cut by four vertical

cal planes, repreſented by the lines AB, BC, CD, DA, the middle part will exhibit the form of *fig.* 6. No. 1, in the ſame poſition; No. 2 is one of the ends; and No. 3 one of the ſides: No. 4 ſhews the ſame figure as No. 1 in the middle of four cylinders which are joined with it; the whole forming the centre for erecting a hemiſpheric dome pierced with four cylindrical vaults. The arches, or groins of the aiſles of the cathedral of St. Paul's, are vaulted in this manner; the cylindrical arches, tranſverſe to the length of the building, being of greater diameter than thoſe in the direction of the aiſles, form the pendentives double, No. 5 the ſide of the ſame.

Fig. 7, a hemiſphere joined to four equal cylinders, which do not meet at the baſe, as in *fig.* 6. This figure forms four equal and diſtinct pendentives, ſuppoſing the upper part above the ſummits of the arches cut off, or ſeparated by a cornice at the ſame place. No. 1 ſhews the plan, or horizontal projection: No. 2 the elevation of one ſide.

Plate VIII. *fig.* 1. No. 1 is the plan, and No. 2 the elevation of a dome invented by Mr. Bunce, and ſo conſtructed as to require no centering. All the abutting joints are continued in vertical planes without interruption; but the horizontal joints of every two ſtones break on the middle of the ſtone on either ſide; therefore in the building every alternate ſtone of a courſe will project upwards, and leave a receſs for placing each ſtone of the next courſe, and ſo on to the top, as ſhewn by the figure. It is evident that as the building approaches nearer to the top, the intervals will become more wedge-formed, and as the interior circumference is leſs than the exterior, the ſtones can only be inſerted from the outſide; and, conſequently, if made ſo exact as juſt to fit their places, they cannot fall inwardly; this dome will therefore require no centering. But though this manner of joining the ſtones may be convenient, as requiring no centering, yet it is more ſubject to burſt than one conſtructed in the uſual manner, if not equilibrated, as every row of ſtones, from the baſe to the top, form arches independent of each other. However, in order to break the vertical joints, the ſtones may be cut and joined, as in *fig.* 2: No. 1 ſhews the connection of the ſtones next to the bottom, and No. 2, at the crown.

Fig. 3. is the manner in which the ſcaffolding and centering of a dome may be ſupported without ſtandards from below. No. 1 is the plan of the baſe of the dome and centering: No. 2 the internal elevation, ſhewing the manner and form of the centering: No. 3 a ſection of the dome, ſhewing the different ſtages as they riſe upwards; and No. 4 one of the ſtays, or brackets. Every bracket is ſupported on a corbel below, as ſhewn at A, or the horizontal piece BC may be houſed into the wall at C, but care ſhould be taken to ſtrap it to the upright. It is evident, that when a number of brackets, conſtructed as in No. 4, is placed around the interior circumference, as at Nos. 1 and 2, and fixed into the wall at the bottom, or top, as deſcribed with tranſverſe pieces, as at No. 1, fixed firmly to the tops of the brackets, this combination of timbers cannot fall inwardly, becauſe of the wedge-formed ſides which form the polygon, and they are prevented from falling downwards by the corbels at their bottoms, or from the houſings at the ends of the horizontal pieces at the top. By this means the ſcaffolding may be made as durable and firm as if carried up from the bottom; nothing more is required to complete it than to cover the bearers with boards. The centering, for ſupporting the ſtones or bricks, may be formed by thin pieces of timber placed in vertical planes, in the manner of ribs, at ſuch diſtances from each other that one may be oppoſite to the middle of a ſtone or brick. The centering of the dome of St. Paul's was probably executed in this manner. *Fig.* 4. ſhews a plan for another mode of ſcaffolding a dome. Four beams are let into the wall, ſo as to form a ſquare; and then four others above theſe, in the ſame manner diagonally placed; the two upper four may be bolted to the lower four.

Plate VIII. *a. fig.* 1. Given the ichnography of a hemiſpheric dome, the direction and ſection of a cylindroidal vault interſecting the domic ſurface; to find the ſeat of the interſection, and form of the boarding laid out in plano or ledgement.

Let ABCDA be the plan of the dome, BEFAB that of the cylindroid, and EGFE the ſection of the cylindroid; divide the arch EGF into any number of parts, and draw lines parallel to AF, ſo that each line may cut the curve of the baſe of the dome in two points. On each of theſe lines, terminated by the curve of the baſe of the hemiſphere, deſcribe a ſemicircle. On the ſeveral points of the baſe EF, where the ſeveral parallels cut it, deſcribe quadrants of circles, with the length of each reſpective ordinate, ſo as to cut EF or EF produced on the ſame ſide with the ſemicircles: from the points thus cut, draw lines again parallel to AF, ſo as to cut each reſpective ſemicircle: from theſe points in the ſemicircles draw lines perpendicular to each reſpective diameter, ſo as to cut it at the points *i, g, k, l, m, n, o*, draw the curve A *igklmno* B, which will give the ſeat of the angle. The form of the boarding in plano is thus found: let PQ, No. 2, be the perimeter of the arch EGF, croſſed at the ſeveral diviſions interſected by the chords, draw lines perpendicular to PQ, and make the lengths of thoſe lines reſpectively equal to the lengths of the parallels contained between EF and the ſeat A *igklmno* B of the angle; then a curve being traced through the points ſo found, will give the lengths and form of the boards which cover the ſurface of the cylindroid, ſo as to coincide with the domic ſurface at their ends. If the axis of the cylindroid paſs through the centre of the hemiſphere, only one-half of the lines will be neceſſary to produce the ſeat of the interſection of the groin, as at CD, and the boarding, as in No. 3. In this manner the groins of the nave of St. Paul's are formed by the lunettes, or cylindroids, cutting each ſpheric ſurface from each window. No. 4 ſhews the ſection for bending round the ſeat A *igklmno* B, ſo as to coincide with the common ſection of the cylindroid and the hemiſphere. This is found by making RS equal to the ſeat A *igklmno* B, and the ordinates equal to thoſe of the arch FGE.

Given the ichnography of a dome of a hemiſpheric form, and the ichnography of a ſemi-conic vault cutting the hemiſphere obliquely to find the ſeat of the groin and the form of the boarding of the conic vault.

Let ABCDA (*fig.* 2.) be the ichnography of the dome, and CED be that of the conic vault, E being the vertex. Let the cone be cut by any ſection CGF perpendicular to its axis, and divide the arch CGF into any number of equal parts, from which draw lines at right angles to the baſe FC. Through each of theſe points in the baſe CF, and the vertex of the cone E, draw lines cutting the ichnography of the dome in two points each; on each of the lines intercepted by the baſe of the dome as a diameter, deſcribe a ſemicircle. Draw perpendiculars from the points in the line CF to the ſeveral lines drawn from E, and the bottom of the ordinates in CF, and make each reſpective perpendicular equal to each reſpective ordinate at the ſame point. From E draw lines through the ends of theſe perpendiculars to cut each ſemicircle: from the points ſo cut in the ſemicircle draw lines parallel to the perpendiculars; that is, perpendicular to the baſes of the ſemicircles: then a line being traced from C to D, through theſe points, gives the ſeat of the angle.

If the axis of the cone paſs through the axis of the hemiſphere, the ſeat of the interſection will be a ſtraight line, as at A B.

Fig. 3. is the repreſentation of a pendentive dome covering an area bounded by a ſquare plan, No. 1 is the plan the pendentives are here ſhewn at A. No. 2 the elevation. Here the ſpheric covering is the ſame as if penetrated by four equal ſemicylinders, the plane of each wall being the ſame as the ends of the ſemicylinders, terminating in ſemicircles. In this repreſentation, the contour of the dome, and the ſemicircles which terminate the tops of the wall, are concentric. At the ſummits of the four arches a cornice is generally carried round, this is ſhewn by the dotted line E F. The ſpheric portion above E F may be of any rotative form whatever: it is here continued upwards with the ſame concavity as the pendentives, that is, a portion of the ſame ſphere of which the pendentives are parts. G E C and H F D ſhew the parts of the ſphere cut off by the four walls.

Fig. 4. is the repreſentation of a pendentive dome, covering an octagonal area, No. 1 is the plan, No. 2 the interior elevation.

Fig. 5. is the repreſentation of a ſaloon: No. 1 is the plan: No. 2 the interior elevation. This is compoſed of three different geometrical ſolids: firſt an octagonal priſm to the ſpring of the arches: ſecondly, a portion of a hemiſphere extending upwards a little above the ſummits of the arches, the dotted line ſhewing the complete hemiſphere of which this is the portion; and, thirdly, a cylinder which is crowned with a hemiſphere. This is the general form of the ſaloon of St. Paul's, and other modern churches: the octagonal part is generally decorated with pilaſters: the entablature of which ſeparates the priſmatic part from that of the ſpheric zone, and covers every defect at the tranſition of theſe two different figures. An entablature or cornice is generally carried round the upper part of the zone. This is the place of the whiſpering gallery in St. Paul's. The cylindrical part ſurmounting a high podeum is generally decorated with a pilaſtrade, and pierced on the ſides for windows, as in this laſt mentioned edifice.

The equilibrium and preſſure of domes is very different from that of common arching, though there are ſome common properties; for in their cylindrical or cylindroidal vaulting of uniform thickneſs, if the tangent to the arch at the bottom be perpendicular to the horizon, the vault cannot ſtand, nor can it be built with a concave contour in the whole or in any part, and to equilibrate the arch whether its ſection be circular or elliptical, ſuppoſing the intrados to be given, the two extremes of the arch muſt be loaded infinitely high between the extrados of the curve which runs upwards, and the tangent to the arch which is an aſſymptote riſing vertically from each foot or extreme of the arch. In like manner in thin domic vaulting of equal thickneſs, if the curved ſurface riſe perpendicularly from the baſe, whatever be the contour, it will burſt at the bottom. Dome vaulting, though agreeing in this particular with common vaulting, differs eſſentially in ſeveral others, for in order to equilibrate its figure, after the convexity has been carried to its full extent of equilibrium around, and equidiſtant from the ſummit on the exterior ſide, the curvature may then change into a concavity; for ſince the interior circumference of the courſes is leſs than the exterior circumference, and therefore whatever be the preſſure towards the axis the courſe cannot fall inwardly without ſqueezing the ſtones into a leſs compaſs, which is impoſſible: they muſt therefore be cruſhed to powder before ſuch a vault can give way. Hence a vault may be executed with a convex ſurface inwardly and concave outwardly, and be ſufficiently firm; but the ſtrongeſt form of a circular or rotative vault to carry a load at the top, is a truncated cone; ſuch has ſir Chriſtopher Wren adopted in ſupporting the ſtone lantern and exterior dome of St. Paul's: with regard to the ſtrength of this vault, it is impoſſible to conceive any force acting on the ſummit that is capable of putting it out of equilibrium: ſince the preſſure is communicated in the ſloping right line of the ſides of the cone, and perpendicular to the joints, the conic ſides will have no tendency to bend to one ſide more than the other, (except from the gravity of the materials towards the axis, but this tendency is counteracted by the abutting verticle joints). The caſe is very different in dome vaulting, ſince the contour is convex, there is a certain load which, if laid on the top, muſt burſt the dome outwardly, and this weight will be greater as the contour approaches nearer to the chords of the arches of the two ſides, or to a conic vaulting on the ſame baſe, carried up to the ſame altitude, and ending in the ſame circular courſe. Let us begin at the key ſtone and proceed downwards from courſe to courſe; ſuppoſing a horizontal line to be a tangent at the vertex, it is evident that every ſucceſſive courſing joint may be made to ſlope ſo much, and conſequently the preſſure of the arch ſtones of any courſe towards the axis ſo great, as to be more than ſufficient to reſiſt the weight of all the part above: it is therefore plain that there is a certain degree of curvature to be given to the contour which will juſt prevent the ſtones in any ſucceeding courſe from being forced outwardly: the circular vault thus balanced is an equilibrated dome; but inſtead of being the ſtrongeſt it is the weakeſt of all intermediate ones between its own contour and that of a cone upon the ſame baſe, riſing to the ſame altitude in a key ſtone, or in an equal circular courſe. The equilibrated dome is therefore the boldeſt contour, and is the limit of an infinity of inſcribed circular vaults, which are all ſtronger than itſelf. Circular vaulting differs from ſtraight vaulting in other reſpects, being built with courſes in circular rings; and the ſtones in each courſe of equal length, and preſſing equally towards the axis cannot ſlide inwardly: circular vaults may therefore be open at the top; and the equilibrated dome, which is the weakeſt, may be made to carry a lantern of equal gravity with the part that would have been neceſſary to complete the whole; but domes of flatter contours may be made to carry more, according as they are nearer to a conic contour, as has already been obſeryed; and thoſe circular vaults that are either ſtraight or concave on the ſides may be loaded without limit, and will never fail till they are cruſhed to powder, provided they are hooped at the bottom.

Having thus given a popular deſcription of the equilibrium and preſſure of domes, ſuch as might eaſily be comprehended by perſons of ordinary conception, though unacquainted with the uſe of algebra or fluxions, we ſhall here lay before our readers Dr. Robinſon's theory.

Prop. To determine the thickneſs of dome vaulting when the curve is given, or the curve when the thickneſs is given.

" Let B b A (*fig.* 6.) be the curve which produces the dome by revolving round the vertical axis A D. We ſhall here ſuppoſe the curve to be drawn through the middle of the arch ſtones, and that the courſing or horizontal joints are every where perpendicular to the curve. We ſhall ſuppoſe (as is always the caſe) that the thickneſs K L, H I, &c. of the arch ſtones is very ſmall in compariſon with the dimenſions of the arch. If we conſider any portion H A b of the dome, it is plain that it preſſes on the curve of which H L is an arch ſtone, in a direction b C, perpendicular to the joint H I, or in the direction of the next ſuperior element βb of the curve. As we proceed downwards, courſe after courſe, we ſee plainly that this direction muſt change, becauſe the weight of each courſe is ſuperadded to that of the portion above it to complete the preſſure of the courſe below. Through B draw the vertical line B C G meeting βb, produced in C. We may take $b c$ to expreſs the preſſure of all that is above it, propagated in this direction to the joint K L. We may alſo ſuppoſe the weight of the courſe H L united in b, and acting on the vertical. Let it be repreſented by b F. If we form the parallelogram b F G C, the diagonal b G will repreſent the direction and intenſity of the whole preſſure on the joint K L.

" We have ſeen that if b G, the thruſt compounded of the thruſt b C exerted by all the courſes above H I L K, and if the force b F, or the weight of that courſe be every where coincident with b B, the element of the curve, we ſhall have an equilibrated dome; if it falls within it, we have a dome which will bear a greater load, and if it falls without it, the dome will break at the joint. We muſt endeavour to get analytical expreſſions of theſe conditions. Therefore draw the ordinates $b\,\delta\,b''$, B D B″, C d C″. Let the tangents at b and b'' meet the axis in M, and make M O, M P, each equal to b C, and complete the parallelogram M O N P, and draw O Q perpendicular to the axis, and produce b F, cutting the ordinates in E and e. It is plain that M N is to M O as the weight of the arch H A b to the thruſt b C, which it exerts on the joint K L (this thruſt being propagated through the courſe of H I L K,) and that M Q, or its equal $b e$, or δd, may repreſent the weight of the half A H.

" Let A D be called x, and D B be called y. Then $b e = \dot{x}$, and $e\,\mathrm{C} = \dot{y}$ (becauſe b C is in the direction of the element βb.) It is plain that if we make $\dot{y}$ conſtant, B C is the ſecond fluxion of x, or $\mathrm{BC} = \ddot{x}$, and $b e$ and b E may be conſidered as equal, and taken indiſcriminately for $\dot{x}$. We have alſo $b\,\mathrm{C} = \sqrt{\dot{x}^2 + \dot{y}^2}$; let d be the depth or thickneſs of H I of the arch ſtones. Then $d\sqrt{\dot{x}^2 + \dot{y}^2}$ will repreſent the trapezium H L; and ſince the circumference of every courſe increaſes in the proportion of the radius y, $dy\sqrt{\dot{x}^2 + \dot{y}^2}$ will repreſent the whole courſe. If $\int$ be taken to repreſent the ſum or aggregate of the quantities annexed to it, the formula will be analogous to the fluent of a fluxion, and $\int dy\sqrt{\dot{x}^2 + \dot{y}^2}$ will repreſent the whole maſs, and alſo the weight of the vaulting down to the joint H I. Therefore we have this proportion; $\int dy\sqrt{\dot{x}^2 + \dot{y}^2} : dy\sqrt{\dot{x}^2 + \dot{y}^2} = be : b\mathrm{F} = be : \mathrm{CG} = \delta d$; $\mathrm{CG} = x : \mathrm{CG}$. Therefore $\mathrm{CG} = \frac{dy\dot{x}\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}}$.

" If the curvature of the dome be preciſely ſuch as puts it in equilibrium, but without any mutual preſſure in the vertical joints, this value of C G muſt be equal to C B, or to $\ddot{x}$, the point G coinciding with B. This condition will be expreſſed by the equation $\frac{dy\dot{x}\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + y^2}} = \ddot{x}$, or more conveniently by $\frac{dy\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}} = \frac{\ddot{x}}{\dot{x}}$. But this form gives only a tottering equilibrium, independent of the friction of the joints and coheſion of the cement. An equilibrium, accompanied by ſome firm ſtability produced by the mutual preſſure of the vertical joints, may be expreſſed by the formula $\frac{dy\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}} 7 \frac{\ddot{x}}{\dot{x}}$, or by $\frac{dy\sqrt{\dot{x}^2 + y^2}}{\int dy\sqrt{\dot{x}^2 + y^2}} = \frac{\ddot{x}}{x} + \frac{t}{t}$, where t is ſome variable poſitive quantity which increaſes when x increaſes. This laſt equation will alſo expreſs the equilibrated dome, if t be a conſtant quantity, becauſe in this caſe $\frac{\dot{t}}{t}$ is $= 0$.

" Since a firm ſtability requires that $\frac{dy\dot{x}\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}}$ ſhall be greater than $\ddot{x}$, and C G muſt be greater than C B. Hence we learn that figures of too great curvatures, whoſe ſides deſcend too rapidly, are improper. Alſo, ſince ſtability requires that we have $\frac{dy\dot{x}\sqrt{\dot{x}^2 + \dot{y}^2}}{\ddot{x}}$ greater than $\int dy\sqrt{\dot{x}^2 + \dot{y}^2}$, we learn that the upper part of the dome muſt not be made very heavy. This, by diminiſhing the proportion of b F to b C, diminiſhes the angle C b G, and may ſet the point G above B, which will infallibly ſpring the dome in that place. We ſee here alſo, that the algebraic analyſis expreſſes that peculiarity of dome vaulting, that the weight of the upper part may even be ſuppreſſed.

" The fluent of the equation $\frac{dy\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}} = \frac{\ddot{x}}{\dot{x}} + \frac{\dot{t}}{t}$ is moſt eaſily found. It is $\mathrm{L}\int dy\sqrt{\dot{x}^2 + \dot{y}^2} = \mathrm{L}\,\dot{x} + \mathrm{L}\,t$ where L is the hyperbolic logarithm of the quantity annexed to it. If we conſider $\dot{y}$ as conſtant and correct the fluent, ſo as to make it nothing at the vertex, it may be expreſſed thus; $\mathrm{L}\int dy\sqrt{\dot{x}^2 + \dot{y}^2} - \mathrm{L}\,a = \mathrm{L}\,\dot{x} - \mathrm{L}\,\dot{y} + \mathrm{L}\,t$. This gives us $\mathrm{L}\,\frac{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}}{a} = \mathrm{L}\,\frac{\dot{x}}{\dot{y}}\,t$, and therefore $\frac{\int dy\sqrt{\dot{x}^2 + \dot{y}^2}}{a} = t\,\frac{\dot{x}}{\dot{y}}$.

" This laſt equation will eaſily give us the depth of the vaulting, or thickneſs d of the arch, when the curve is given. For its fluxion is $\frac{dy\sqrt{\dot{x}^2 + \dot{y}^2}}{a} = \frac{\dot{t}\dot{x} + t\ddot{x}}{\dot{y}}$, and $d = \frac{a\dot{t}\dot{x} + at\ddot{x}}{y\dot{y}\sqrt{\dot{x}^2 + \dot{y}^2}}$, which is all expreſſed in known quantities; for we may put in place of t any power or function of x or of y, and thus convert the expreſſion into another, which will ſtill be applicable to all ſorts of curves.

" Inſtead of the ſecond member $\frac{\ddot{x}}{\dot{x}} + \frac{\dot{t}}{t}$, we might employ $\frac{p\ddot{x}}{\dot{x}}$, where p is ſome number greater than unity. This will evidently give a dome having ſtability; becauſe the original formula $\frac{dy\dot{x}\sqrt{\dot{x}^2 + \dot{y}^2}}{\int dy\sqrt{\dot{x}^2 + y^2}}$ will be greater than $\ddot{x}$. This will give $d = \frac{pa\dot{x}^{p-1}\ddot{x}}{y\dot{y}^p\sqrt{\dot{x}^2 + \dot{y}^2}}$. Each of theſe forms has its advantages when applied to particular caſes. Each of them alſo gives $d = \frac{a\ddot{x}}{y\dot{y}\sqrt{\dot{x}^2 + \dot{y}^2}}$, when the curvature is ſuch as in preciſe equilibrium: and, laſtly, if d be conſtant, that is, if the vaulting be of uniform thickneſs, we obtain the form of the curve, becauſe then the relation of $\ddot{x}$ to $\dot{x}$ and to $\dot{y}$ is given.

" The chief uſe of this analyſis is to diſcover what curves are improper for domes, or what portions of given curves may be employed with ſafety.

“ The chief difficulty in the caſe of this analyſis ariſes from the neceſſity of expreſſing the weight of the incumbent part, or $\int d y \sqrt{\dot{x}^2+\dot{y}^2}$. This requires the meaſurement of the conoidal ſurface, which, in moſt caſes, can be had only by approximation, by means of infinite ſerieſes. We cannot expect that the generality of practical builders are familiar with this branch of mathematics, and therefore will not engage in it here; but content ourſelves in giving ſuch inſtances as can be underſtood by ſuch as have that moderate mathematical knowledge, which every man ſhould poſſeſs, who takes the name of engineer.

“ The ſurface of any circular portion of a ſphere is very eaſily had, being equal to the circle inſcribed with a radius equal to the arch. This radius is evidently equal to $\sqrt{\dot{x}^2+\dot{y}^2}$.

“ In order to diſcover what portion of a hemiſphere may be employed (for it is evident we cannot employ the whole) when the thickneſs of the vaulting is uniform, we may recur to the equation or formula $\frac{d y \dot{x} \sqrt{\dot{x}^2+\dot{y}^2}}{\ddot{x}}=\int d y \sqrt{\dot{x}^2+\dot{y}^2}$. Let a be the radius of the hemiſphere. We have $\dot{x}=\frac{a y \dot{y}}{\sqrt{a^2-y^2}}$ and $\ddot{x}=\frac{a \dot{y}^2}{\overline{a^2-y^2}|^{\frac{3}{2}}}$. Subſtituting theſe values in the formula, we obtain the equation $y^2 \sqrt{a^2-y^2}=\int \frac{a^2 y \dot{y}}{\sqrt{a^2-y^2}}$. We eaſily obtain the fluent of the ſecond member $=a^3-a^2 \sqrt{a^2-y^2}$, and $y=a \sqrt{-\frac{1}{2}+\sqrt{\frac{5}{4}}}$. Therefore if the radius of the hemiſphere be one-half, the breadth of the dome muſt not exceed $\sqrt{-\frac{1}{2}+\sqrt{\frac{5}{4}}}$, or 0.786, and the height will be 618. The arch from the vertex is about 51° 49′, much more of the hemiſphere cannot ſtand even, though aided by the cement, and by the friction of the courſing joints. This laſt circumſtance, by giving connection to the upper parts, cauſes the whole to preſs more vertically on the courſe below, and this diminiſhes the outward thruſt; but at the ſame time diminiſhes the mutual abutment of the vertical joints, which is a great cauſe of firmneſs in the vaulting. A Gothic dome, of which the upper part is a portion of a ſphere not exceeding 45° from the vertex, and the lower part is concave outwards, will be very ſtrong, and not ungraceful.

“ Perſuaded that what has been ſaid on this ſubject convinces the reader that a vaulting, perfectly equilibrated throughout, is by no means the beſt form, provided that the baſe is ſecure from ſeparating, we think it unneceſſary to give the inveſtigation of that form, which has a conſiderable intricacy, and ſhall merely give its dimenſions. The thickneſs is ſuppoſed uniform. The numbers in the firſt column of the table expreſs the portion of the axis counted from the vertex, and thoſe of the ſecond are the length of the ordinates.

A D	D B	A D	D B	A D	D B
0.4	100	610.4	1080	2990	1560
3.4	200	744.	1140.	3442	1600
11.4	300	904.	1200.	3972	1640
26.6	400	1100.	1260.	4432	1670
52.4	500	1336.	1320.	4952	1700
91.4	600	1522.	1360.	5336	1720
146.8	700	1738.	1400.	5756	1740
223.4	800	1984.	1440.	6214	1760
326.6	900	2270.	1480.	6714	1780
465.4	1000	2602.	1520.	7260	1800

“ The curve formed according to theſe dimenſions will not appear very graceful, becauſe there is an abrupt change in its curvature at a ſmall diſtance from the vertex. If, however, the middle be occupied by a lantern of equal, or of ſmaller weight than the part, whoſe ſpace it ſupplies, the whole will be elegant, and free from defect.”

Dome, in *Chemiſtry*, is the upper-vaulted portion of ſeveral kinds of Furnaces, which ſee.

DOMENE, or Domaine, in *Geography*, a ſmall town of France, in the department of the Iſere, chief place of a canton, in the diſtrict of Grenoble, 6 miles E. of Grenoble, with a population of 1231 individuals. The canton has an extent of 200 kiliometres, 11 communes, and 8201 inhabitants.

DOMENGER, in *Middle Age Writers*, is ſometimes uſed for damſel.

DOMENICO, Anibali, in *Biography*, an Italian ſinger in Handel's operas, who performed the ſecond man's part in Siroe, when Conti was here, and Strada was the firſt woman. His voice was a contralto, the power and ſweetneſs of which Handel gave him an opportunity of diſplaying in his firſt air, “ Al par della mia ſorte,” by a “ Meſſa di voce,” or ſwell, at the beginning, but no peculiar taſte, expreſſion, or power of execution appear in his part; his bravura air in the ſecond act, “ Si Cadro,” contains only common, and eaſy paſſages. We can only judge of a ſinger, whom we have never heard, by examining the ſcore of the ſongs compoſed expreſsly for him or her. The abilities of Anibali, during his ſtay in England, ſeem to have made no deep impreſſion, as we never remember him to have been mentioned by thoſe who conſtantly attended the operas of thoſe times, and were rapturiſts in ſpeaking of the pleaſure they had received from ſingers of the firſt claſs.

We found a muſic-book of one of Anibali's ſcholars at a ſtall in Middle-row, with graces to all the airs of Siroe, in his own hand-writing. which, for the time, were good.

DOMENZAIN, in *Geography*, a town of France, in the department of the Lower Pyrenées, and diſtrict of Mauleon; 7 miles N. N.W. of Mauleon.

DOMES-Day, or Dooms-Day-*Book*, *Liber judiciarius vel cenſualis Angliæ*, the judicial book, or book of the ſurvey of England: a moſt ancient record made in the time of William the Conqueror, by his order and with the advice of his parliament; upon a ſurvey, or inquiſition of the ſeveral counties, hundreds, tithings, &c. Sir H. Spelman calls it, “ if not the moſt ancient, yet without controverſy, the moſt venerable monument of Great Britain.”

Its name is formed from the Saxon *dom*, doom, judgment, ſentence, and *day*, which has the ſame force; ſo that domeday is no more than a reduplicate, importing judgment-judgment.

But ſome condemn this etymology as whimſical; and contend that if it was juſt, the Latin for domeſday would be *dies judicii;* whereas, as appears above, it is ſtyled “ Liber judiciarius, vel cenſualis Angliæ.” Bullet, in his Celtic Dictionary, hath the word *dom*, which he reads ſeur, ſeigneur, (and hence the Spaniſh word *don*,) as alſo the words *deya*, and *deia*, which he renders proclamation, advertiſement. Doomſday, therefore, ſignifies the lord's, or king's proclamation, or advertiſement, to the tenants who hold under him; and agrees well with great part of the contents of this famous ſurvey. Obſervations on the Statutes, p. 190. note (*m*).

The drift, or deſign of the book, is to ſerve as a regiſter, by which ſentence may be given in the tenures of eſtates; and from which that noted queſtion, whether lands be ancient demeſne, or not, is ſtill decided. (See DEMAIN.) Its contents are ſummed up in the following verſes:

> "Quid deberetur fiſco, quæ, quanta tributa,
> Nomine quid cenſus, quæ vectigalia, quantum
> Quiſque teneretur feodali ſolvere jure,
> Qui ſunt exempti, vel quos angaria damnat,
> Qui ſunt vel glebæ ſervi, vel conditionis,
> Quive manumiſſus patrono jure ligatur."

This book is ſtill remaining, fair and legible, conſiſting of two volumes, a greater and a leſs; the greater comprehending all the counties of England, except Northumberland, Cumberland, Weſtmoreland, Durham, and part of Lancaſhire, which were never ſurveyed; and except Eſſex, Suffolk, and Norfolk, which are comprehended in the leſſer volume, which concludes with theſe words: "Anno milleſimo octogeſimo ſexto ab incarnatione Domini, vigeſimo vero regis Wilhelmi, facta eſt iſta deſcriptio non ſolum per hos tres comitatus, ſed etiam alios."

It was begun in the year 1081, but not completed till the year 1087. For the execution of this great ſurvey, ſome of the king's barons were ſent commiſſioners into every ſhire, and juries ſummoned in each hundred, out of all orders of freemen, from barons down to the loweſt farmers, who were ſworn to inform the commiſſioners what was the name of each manor, who had held it in the time of Edward the Confeſſor, and who held it then; how many hides, how much wood, how much paſture, how much meadow-land it contained; how many ploughs were in the demeſne part of it, and how many in the tenanted part; how many mills, how many fiſh-ponds, or fiſheries belonged to it; what had been added to it, or taken away from it; what was the value of the whole, together, in the time of king Edward; what when granted by William; what at the time of this ſurvey; and whether it might be improved, or advanced in its value. They were, likewiſe, to mention all the tenants, of every degree, and how much each of them had held, or did hold, at that time; and what was the number of the ſlaves. Nay, they were even to return a particular account of the live ſtock on each manor. Theſe inquiſitions, or verdicts, were firſt methodized in the county, and afterwards ſent up into the king's exchequer. The leſſer doomſday-book, containing the originals ſo returned from the three counties of Eſſex, Norfolk, and Suffolk, includes the live ſtock. The greater book was compiled, by the officers of the exchequer, from the other returns, with more brevity, and a total omiſſion of this article, which gave much offence to the people; probably, becauſe they apprehended, that the deſign of the king, in requiring ſuch an account, was to make it a foundation for ſome new impoſition. And this apprehenſion ſeems to have extended itſelf to the whole ſurvey at that time. But whatever jealouſy it might have excited, it certainly was a work of great benefit to the public; the knowledge it gave to the government of the ſtate of the kingdom, being a moſt neceſſary ground-work for many improvements, with relation to agriculture, trade, and the increaſe of the people, in different parts of the country; as well as a rule to proceed by, in the levying of taxes. It was alſo of no ſmall utility for the aſcertaining of property, and for the ſpeedy deciſion or prevention of law-ſuits. In this light it is conſidered by the author of the dialogue "De Scaccario," who ſpeaks of it (l. i. c. 16.) as the completion of good policy and royal care for the advantage of his realm in William the Conqueror; and ſays, it was done to the intent, that every man ſhould be ſatisfied with his own right, and not uſurp with impunity what belonged to another. He likewiſe adds, that it was called "Domeſday-book" by the Engliſh, becauſe a ſentence, ariſing from the evidence therein contained, could no more be appealed from, or eluded, than the final doom at the day of judgment. From this authority aſcribed to it, we might be led to ſuppoſe, that the verdicts, on which the regiſter had been grounded, were found, in general, to be faithful; notwithſtanding the confeſſion made by Ingulphus, abbot of Croyland, that, with reſpect to his abbey, the return was partial and falſe. For it does not appear that the deſign imputed to Ralph Flambard, as miniſter to William Rufus, of making another and more rigorous inquiſition, was ever put in execution, or that any amendments were made in either of the books. It appears, that many lands are declared in theſe records to be of much greater value when this ſurvey was made, than in the time of Edward the Confeſſor, and capable of being ſtill very conſiderably improved by more cultivation. But, from other evidence, it appears, that the four northern counties were then, for the moſt part, in a waſte and deſolate condition; which, we may imagine, was one reaſon of their not being ſurveyed together with the others. And, indeed, it is ſurpriſing, that this defect was not afterwards ſupplied by a ſimilar inquiſition. (Littleton's Hiſt. Hen. II. vol. iii.) It is called "Liber judicialis," becauſe a juſt and accurate deſcription of the whole kingdom is contained therein; with the value of the ſeveral inheritances, &c.

Camden calls it "Gulielmi Librum cenſualem, king William's Tax-book."

This book was formerly kept under three different locks and keys; one in the cuſtody of the treaſurer, and the others of the two chamberlains of the exchequer. It is now depoſited in the chapter-houſe at Weſtminſter, where it may be conſulted, on paying to the proper officers a fee of *6s.* and *8d.* for a ſearch, and *4d. per* line for a tranſcript.

Our anceſtors had many dome-books. We are told by Ingulphus, that king Alfred made a like regiſter with that of William the Conqueror. It was begun upon that prince's dividing his kingdom into counties, hundreds, tithings, &c. when an inquiſition being taken of the ſeveral diſtricts, it was digeſted into a regiſter, called Domboc, *q. d.* the Judgment-book, and was repoſited in the church of Wincheſter; whence it is alſo called the "Wincheſter-book," and "Rotulus Winton." It was compiled for the uſe of the court-baron, hundred, and county-court, the court-leet, and ſheriff's tourn; tribunals, which he eſtabliſhed, for the trial of all cauſes civil and criminal, in the very diſtricts wherein the complaints aroſe; all of them ſubject, however, to be inſpected, controlled, and kept within the bounds of the univerſal, or common law, by the king's own courts, which were then itinerant, being kept in the king's palace, and removing with his houſhold in thoſe royal progreſſes, which he continually made from one end of the kingdom to the other. This book is ſaid to have been extant ſo late as the reign of king Edward IV., but is now unfortunately loſt. It probably contained the principal maxims of common law, the penalties for miſdemeanors, and the forms of judicial proceedings. And upon the model of this Dom-boc it is, that the Domeſday of the Conqueror was formed.

That of king Alfred referred to the time of king Ethelred, and that of the Conqueror to the time of Edward the Confeſſor: the entries being thus made, "C. tenet rex Gulielmus in dominico, & valet ibi ducatæ, &c. T. R. E. valebat;" *q. d.* it is worth ſo much tempore regis Eduardi, in the time of king Edward.

There is a third Dom-boc, or Domes-day-book, in quarto, differing from the other in folio, rather in form than matter. It was made by order of the ſame conqueror, and ſeems to be the more ancient of the two.

A fourth book there is in the exchequer, called domeſday; which though a very large volume, is only an abridgment of the other two. It has abundance of pictures and gilt letters at the beginning, which refer to the time of Edward the Confeſſor. There is alſo a fifth book called Domes-day, and the ſame with the fourth, now mentioned.

DOMESTIC, from *domus*, houſe, a term of ſomewhat more extent than that of ſervant; the latter only ſignifying ſuch as ſerve for wages, as footmen, lacquies, porters, &c., whereas domeſtic comprehends all who act under a man, compoſe his family, and live with him, or are ſuppoſed to live with him. Such are ſecretaries, chaplains, &c.

Sometimes domeſtic goes farther, being applied to the wife and children.

Domestic *gown, toga domeſtica*. See Toga.

DOMESTICUS, Δομεστικος, in *Antiquity*, was a particular officer in the court of the emperors of Conſtantinople.

Fabrot, in his gloſſary on Theophylax Simocatta, defines domeſticus to be any perſon entruſted with the management of affairs of importance; a counſellor, "cujus fidei graviores alicujus curæ & ſolicitudines committuntur."

Others hold, that the Greeks called domeſtici thoſe who at Rome were called comites; particularly, that they began to uſe the name *domeſticus*, when that of count was become a name of dignity, and ceaſed to be the name of an officer in the prince's family.

Domeſtici, therefore, were ſuch as were in the ſervice of the prince, and aſſiſted him in the adminiſtration of affairs; both thoſe of his family, thoſe of juſtice, and thoſe of the church.

The grand Domestic, *Megadomeſticus*, called alſo abſolutely the domeſticus, ſerved at the emperor's table, in quality of what we occidentals call *dapifer*. Others ſay he was rather what we call a *majordomo*.

Domesticus *menſæ* did the office of grand ſeneſchal, or ſteward.

Domesticus *rei domeſticæ*, acted as maſter of the houſhold.

Domesticus *ſcholarum*, or *legionum*, had the command of the reſerved forces, called *ſcholæ palatinæ*, whoſe office was to execute the immediate orders of the emperor.

Domesticus *murorum*, had the ſuperintendance of all the fortifications.

Domesticus *regionum*, that is, of the eaſt and weſt, had the care of public cauſes, much like our attorney or ſolicitor-general.

Domesticus *icanatorum*, or of the military cohorts.

There were diverſe other officers of the army, who bore the appellation domeſticus, which ſignified no more than commander or colonel. Thus, the domeſtic of the legion called optimates was the commander thereof.

Domesticus *chori*, or *chanter*, whereof there were two in the church of Conſtantinople; one on the right ſide of the church, and the other on the left. They were alſo called protopſaltes.

Dom. Magri diſtinguiſhes three kinds of domeſtici in the church: "domeſtic of the patriarchal clergy; domeſtic of the imperial clergy; that is, maſter of the emperor's chapel; and domeſticus deſpoinicus, or of the empreſs. There was another order of domeſtics, inferior to any of thoſe above mentioned, and called patriarchal domeſtics.

Domestici was alſo the name of a body of forces in the Roman empire. Pancirollus takes them to have been the ſame with thoſe called protectors; who had the chief guard of the emperor's perſon, in a degree above the prœtorians; and who under the Chriſtian emperors had the privilege to bear the grand ſtandard of the croſs.

They are ſuppoſed to have been 3500 before Juſtinian's time, who added 2000 more to the number. They were divided into ſeveral companies, or bands, which the Latins called ſcholæ, ſome whereof are ſaid to have been inſtituted by Gordian. Some of them were cavalry and ſome infantry.

Their commander was called comes domeſticorum.

DOMEVRE, in *Geography*, a very ſmall town of France in the department of the Meurthe, chief place of a canton in the diſtrict of Toul. It has only 332, but the canton contains 10,289 inhabitants, diſperſed in 29 communes on a territorial extent of 310 kiliometres.

Domevre *ſous Avière*, a town of France in the department of the Voſges, and diſtrict of Epinel; one league N. W. of Epinel.

DOMFRONT, a ſmall town of France in the department of the Orne, chief place of a diſtrict, with a population of 1548 individuals. It is ſituated on a ſteep mountain in the midſt of a foreſt near the river Varennes, 42 miles N. W. of Alençon and 171 W. of Paris. Long 58° 34′. Its canton compriſes 11 communes and 13,226 inhabitants upon a territorial extent of 180 kiliometres.

As chief place of a diſtrict Domfront has a ſub-prefect, a court of juſtice, a regiſter-office, and a ranger. The ſoil of the diſtrict is bad, it produces only rye, oats, and apples, which are converted into cyder. There is alſo ſome graſs land. The trade is chiefly confined to cyder, butter, and cattle.

The whole diſtrict compriſes ſeven cantons, 100 communes, an extent of 1315 kiliometres, and a population of 110,526 individuals.

DOMICELLARY *canons*. See Canons.

DOMICELLUS. See Damsel.

DOMIFYING, Domification, in *Aſtrology*, the dividing or diſtributing of the heavens into twelve houſes; in order to erect a theme, or horoſcope, by means of ſix great circles, called circles of poſition.

There are diverſe ways of domifying, according to diverſe authors. That of Regiomontanus, which is the moſt uſual, makes the circle of poſition paſs through the interſections of the meridian and horizon. Others make them paſs through the poles of the world, or the equator; and others through the poles of the zodiac.

DOMINANT, *Fr.* The title given by the muſicians of France to the 5th of a key, with a ※ 3d, as a governing or leading note to a cloſe on the key-note.

Sous dominant is the 5th below the key note and with us the 4th. As theſe terms are not wanted in our muſical technica nor in the Italian, we wiſh not to multiply terms of art, which convey no new or uſeful meaning. The 5th of a key being underſtood, and a 5th requiring no new language to expreſs it. See Fifth. Rameau generally gives the name of dominant to every note accompanied by the chord of the 7th, and diſtinguiſhes that to the 5th of a key by dominant tonique; but more agree in only calling that with a ※ 3 dominant tonique. Other 5ths with a 7th they call fundamental. Dominant in canto-fermo implies the ſound moſt frequently repeated.

DOMINATION, in *Theology*, the fourth order of angels, or bleſſed ſpirits, in the hierarchy; reckoning from the ſeraphim. See Hierarchy, and Seraph.

DOMINGO, St., San Domingo, *Iſla Eſpanola*, *Eſpanola*, or *Hiſpaniola*, in French *Saint Domingue*, and in the language of the natives *Hayti*, in *Geography*, one of the great Antilles, is the largeſt and moſt fertile of the Weſt India iſlands. It is ſituated in the Atlantic ocean between the iſlands of Jamaica and Cuba on the weſt, and Porto Rico on the eaſt, in the latitude of 18° 20′ N. and in 68° 40′ W. longitude from Greenwich. Its length from eaſt to weſt is 800 kiliometres, or about 480 Engliſh miles. The breadth varies from 60 to 100 and even 150 Engliſh miles, and it is about 1800 kilometres, or 1050 miles in circumference. Its ſuperficies is reckoned at 1432 ſquare miles, 69 to a degree, 882 of which conſtituted the Spaniſh part of St. Domingo till the treaty of Baſil (Baſle) of the fourth Thermidor third year of the French Republic (22d of July, 1795) when it was ceded by Spain to France.

This beautiful iſland was diſcovered by Chriſtopher Columbus, who landed at a ſmall bay which he called St. Nicholas, on the 6th day of December 1492. He named the iſland Eſpanola, or Little Spain, in honour of the country by whoſe king he was employed. The inhabitants appeared, ſays Robertſon, who has conſulted the beſt authorities, in the ſimple innocence of nature, entirely naked, their black hair, long and uncurled, floated upon their ſhoulders, or was bound in treſſes around their heads. They had no beards; every part of their bodies was perfectly ſmooth. Their complexion was of a duſky copper colour; their features were ſingular rather than diſagreeable; their aſpect gentle and timid; though not tall, they were well-ſhaped and active. Placed in a medium between ſavage life and the refinement of poliſhed ſociety, their induſtry exceeded the meaſure of their wants. They were governed by ſeven caziques, or kings, who reigned each over a different diviſion of the iſland, and, according to the report of Columbus to the Spaniſh monarch, they were the moſt unoffending, gentle, and benevolent of the human race. Sir Walter Raleigh ſuppoſed, that they were deſcended from the Arrowauk tribe of Guiana.

The Spaniards, on their firſt landing, were conſidered as ſupernatural beings. The inhabitants gladly exchanged their gold againſt bells, beads, or pins. They pointed to the Cibao mountains as the great repoſitory of the metal which their viſitors ſo ardently deſired.

Encouraged by the ſimplicity of the natives, and their fear of the inhabitants of the Caribbean iſlands, their enemies, Columbus reſolved to form a ſettlement on a ſpot which he conſidered as the original ſeat of paradiſe. He left thirty-eight Spaniards under the command of Diego de Arado in his colony, and ſailed for Spain on the 4th of January 1493.

Regardleſs of his inſtructions, the Spaniards, after his departure, gratified their licentious deſires at the expence of the natives to ſuch a degree, that the cazique of Cibao, exaſperated at their inſolence, cut off a part of the coloniſts, ſurrounded the remainder, and deſtroyed their fort.

Columbus, on his return to Hiſpaniola in the month of November of the ſame year, founded a new town in a large plain near a ſpacious bay. This town he named Iſabella, in honour of his patroneſs the queen of Caſtile. On the 24th of April 1494, he left his colony for the proſecution of new diſcoveries; but after an abſence of five months, he found his ſettlement once more on the brink of diſſolution. The continual attempts of the natives to rid themſelves of neighbours, whoſe voracity threatened their deſtruction, compelled Columbus to have recourſe to arms. Thrown into conſternation by the ſuperiority of European warfare, by the attack of twenty horſemen, and by the fierce onſet of an equal number of large dogs, the Indians yielded an eaſy victory.

To gratify the avarice of the Spaniſh court, Columbus, on completing the ſubjection of the iſland, impoſed a tribute on all the natives above the age of fourteen. This taxation cauſed an attempt to ſtarve the Spaniards. The inhabitants pulled up the roots of the vegetables which depended on their agricultural operations, and retiring to inacceſſible mountains, they fell the firſt victims to the famine which they intended for their oppreſſors.

In 1496, Columbus returned to Spain, leaving his brother Bartholomew as lieutenant-governor, and Francis Roldan as chief juſtice. During his abſence, his brother removed the colony to a more eligible ſtation on the oppoſite ſide of the iſland, where he founded a city which he dedicated to St. Domingo, in honour of the name of his father.

Roldan in the mean time excited rebellions among the Spaniards. It was to calm their diſcontents, that Columbus, on his return in 1498, allotted them lands in different parts of the iſland, and appointed the natives to cultivate theſe allotments for their new maſters. This taſk proved to the poor Indians an intolerable ſource of oppreſſion. Proviſions were made for working the mines and cultivating the country: but the plans of Columbus were miſrepreſented, and he himſelf was ſent in chains to Spain. (See COLUMBUS.)

Francis de Bovadilla, the new governor, to render himſelf popular, gratified the avaricious inclinations of his countrymen. He numbered all the remaining Indians, and dividing them into claſſes, diſtributed them among the Spaniards, who ſent them to the mines, and impoſed on them ſuch a diſproportioned labour, as threatened their utter and ſpeedy extinction.

On his arrival in Spain, Columbus was inſtantly ſet at liberty, and Bovadilla diſgraced. Nicholas de Ovando replaced the latter, and brought to St. Domingo a moſt reſpectable armament, conſiſting of thirty-two ſhips with 2500 ſettlers. Bovadilla, with Roldan and his accomplices, were ordered to return to Spain.

In the mean time, Columbus obtained permiſſion in 1502 to make a fourth voyage of diſcovery to the eaſt: but having experienced ſome inconvenience from one of his veſſels, he altered his courſe and bore away for St. Domingo, with the hope of exchanging it againſt a ſhip of Ovando's fleet. He found indeed eighteen veſſels richly laden ready to depart for Europe: but was refuſed acceſs to the harbours of the country which he had diſcovered. (See COLUMBUS.)

Under the government of Ovando, the natives of St. Domingo were relieved from compulſory toil: but without the aſſiſtance of the inhabitants, the Spaniards could not cultivate the ſoil nor work the mines. Many of the new ſettlers quitted the iſland, and great numbers died of diſorders incident to the climate.

Theſe circumſtances induced Ovando to make a new diſtribution of the Indians among the Spaniards, with the difference only, that the Indians were to be paid for their labour. He alſo endeavoured to turn the attention of his countrymen to the purſuits of agriculture, and having obtained from the Canary iſlands ſome ſlips of the ſugar cane, which throve exceedingly, he tempted them to form ſugar plantations. The colony flouriſhed, but the ſource of its proſperity was very nearly dried up. Fatigue, to which they were unequal, diſeaſes, famine, and deſpair, reduced the natives, in the ſpace of fifteen years, to ſo inconſiderable a number, that Ovando, to ſupply their diminution, decoyed forty thouſand of the inhabitants of the Lucay or Bahama iſlands into Hiſpaniola.

In the year 1509 Ovando was recalled to make room for Diego, the ſon of Columbus, whoſe arrival, however, effected no change in the condition of the unfortunate Indians. His government would have rendered the colony proſperous and happy, had he not been thwarted in ſeveral meaſures by his inferior officers. The power of making out the *repartimientos* of the natives was even taken from the governor and conferred upon Roderigo Albuquerque. This induced him to return to Spain.

Albuquerque ordered a new numeration of the natives in

1517. Although their number did not exceed 14 000, he yet put them up to ſale, and by a conſequent ſeparation from the habitations to which they had been accuſtomed, and the impoſition of additional labour for the indemnification of their purchaſers, he completed the extinction of this unfortunate people, which Las Caſas in vain endeavoured to prevent. Benzoni aſſerts that towards the middle of the ſixteenth century, ſcarcely one hundred and fifty of the natives of St. Domingo remained alive.

In 1586, ſir Francis Drake came before the iſland, pillaged the capital, deſtroyed one third part of it, and accepted of about 7000 *l.* ſterling, as a ranſom for the remainder.

The coloniſts, in the mean time, degenerated from the ſpirit and manners of their anceſtors. Aſſociating with their female ſlaves, they became a mixed colony, of which Spaniards formed a very ſmall part. The mines were deſerted; agriculture was neglected, and the cattle ran wild in the plains. The Spaniards became demi-ſavages, plunged in the extremes of ſloth, living upon fruits and roots, in cottages without furniture, aed moſt of them without clothes. The colony was reduced to the neceſſity of adopting pieces of leather as a circulating medium.

While Spain neglected St. Domingo, its vigilance was abſurdly directed to prevent other powers participating in the produce of the iſland, or in the acquiſition of any territory in the Weſt Indies. But notwithſtanding this care, the Engliſh and French, during a war with Spain, had become acquainted with the Windward iſlands, and having taken poſſeſſion of the iſland of St. Chriſtopher, on the ſame day, had divided it into two equal ſhares. They were ſoon attacked in their new ſettlement by the Spaniards, and thoſe who were not either killed or taken, fled for refuge to the neighbouring iſlands. A ſmall number retreated to the little barren iſle of Tortuga, lying off the north-weſt coaſt of Hiſpaniola, and within a few leagues of Port de Paix.

By the middle of the ſeventeenth century theſe refugees in the iſland of Tortuga aſſumed an appearance as formidable as it was ſingular. (See BUCCANIERS, FREEBOOTERS, and FLIBUSTIERS.) They had gradually obtained notice under the appellation of Buccaniers, from the mode of curing animal food, which they procured by hunting the cattle with which the Spaniards had ſtocked St. Domingo.

Afraid of their more active neighbours, the indolent coloniſts determined to deſtroy all the bulls by a general chaſe. This had the effect of turning the attention of the Buccaniers to the more permanent purſuits of agriculture. They planted tobacco, and the moſt intrepid began predatory excurſions on the neighbouring ocean. Several Spaniſh armaments were commiſſioned for their extirpation: but after having alternately loſt and recovered Tortuga, the Buccaniers, moſtly French, under a captain of their own choice and nation, ultimately retained it, and ſoon after obtained a firm footing in St. Domingo, almoſt at the ſame time when their Engliſh companions in arms poſſeſſed themſelves of Jamaica.

Though ſeparated from each other the Engliſh and French ſtill continued to act in concert, the latter retiring after the conflict to St. Domingo to ſhare their booty, and the former to Jamaica. They continued to increaſe in force and to depreſs the Spaniards, till at length a few ſucceſſive defeats on the ocean turned their attention to agriculture. It was then that the infant colony of St. Domingo attracted the notice of the French government.

Bertrand Dogeron, a man of uncommon talents, probity, and fortitude, was deputed by France to form the planters, whoſe number did not exceed four hundred, into a more regular ſociety. Although he had been unſucceſsful in his own commercial enterprizes, he yet ſucceeded in civilizing the half barbarian coloniſts by the introduction of French women, by reconciling the idle to labour, by affording the principal encouragement to the planters, and by alluring new inhabitants to the iſland. At the end of four years, in 1669, the number of planters amounted to more than fifteen hundred.

The injudicious meaſures of the French Weſt India company cauſed the inhabitants of St. Domingo to have recourſe to arms in 1670 Tranquillity was reſtored at the price of a free trade to France, ſubject to a duty of five *per cent.* paid to the company by all ſhips on their arrival and departure.

The colony proſpered under the benevolent regulations of Dogeron, but after his death, which happened in 1673, it languiſhed under the oppreſſive monopoly of excluſive trading companies. Three years before his death the town of cape François had been founded by Gobin, a French Proteſtant, whom the perſecutions of the bigotted Louis XIV. had driven to this diſtant aſylum.

Several ſlaves having been taken from the Engliſh in the war of 1688, the inhabitants of St. Domingo began to turn their attention to the culture of the ſugar cane. With this view they continued to increaſe their ſtock of negroes by every means in their power, and in 1694, taking advantage of the misfortunes which had befallen the Engliſh colony of Jamaica, they effected a landing in that iſland, and carried off a conſiderable number of negro ſlaves. The year following, the Engliſh, in their turn, attacked the ſettlement of cape François, which they plundered and reduced to aſhes. It was, however, ſoon rebuilt on the ſame ſite.

By the peace of Ryſwick, the French obtained the firſt regular ceſſion of the weſtern part of St. Domingo. In 1702, Port au Prince was made the ſeat of the government, but the town of the cape continued in every other reſpect the capital of the colony.

In proportion as the French flouriſhed in St. Domingo, the Spaniards decayed. Their colony, which in the time of Herrera, counted 14,000 Caſtilians, beſides a proportional number of other inhabitants, had, in 1717, only 18,410 individuals of every deſcription; whilſt, according to Raynal, the produce of the French colony, in 1720, amounted to 1,200,000 lb. of indigo, 1,400,000 lbs. of white ſugar, and 21,000,000 lbs. of raw ſugar.

From the year 1722, when the French colony of St. Domingo was freed from the yoke of excluſive trading companies, it roſe gradually to the higheſt pitch of proſperity. In the year 1754, the amount of the various commodities of the colony was equal to 1,261,469 *l.* ſterling, and the imports from the mother country amounted to 1,777,509 *l.* ſterling. There were 14,000 white inhabitants, nearly 4000 free mulattoes, and upwards of 172,000 negroes; 599 ſugar plantations, 3379 of indigo, 98,946 cocoa trees, 6,300,367 cotton plants, and near 22,000,000 caſſia trees; 63,000 horſes and mules, 93,000 heads of horned cattle, 6,000,000 banana trees; upwards of 1,000,000 plots of potatoes; 226,000 plots of yams; and near 3,000,000 trenches of manioc.

Even the Spaniſh government was excited to ſome degree of emulation. About the year 1757, a company was privileged at Barcelona, to attempt a re-eſtabliſhment in the eaſtern part of the iſland; but it was only in 1765, when Charles III. opened a free trade to all the Windward iſlands, that Hiſpaniola, ſo long depreſſed by abſurd regulations, recovered ſomething of its former activity. During the five years preceding 1774, the cuſtom-houſe duties were more than doubled.

The progreſs of the French, in the mean time, was extremely rapid. Their ſlaves increaſed to 206,000, and in 1767, they loaded 347 ſhips for France. But on the 3d of June, 1770, a dreadful earthquake levelled Port au

Prince with the ground. It was, however, rebuilt with additional convenience.

In 1776, a new line of demarcation was drawn between the Spaniſh and French part of St. Domingo, and the Spaniards opened a more liberal commerce with their neighbours. Yet their colony and their trade continued greatly inferior to the French. At the epoch of the French revolution, in 1789, the Spaniards had only four and twenty ſugar works. They paid with raw ſugar, hides, timber, and piaſtres, for the ſmall number of cargoes they received from Europe. Beſides 11,000 heads of cattle, they furniſhed the French part of St. Domingo with horſes, mules, and ſome tobacco. Next to the ancient city of St. Domingo, their principal towns were Monte Chriſti, La Vega, St. Jago, Zeibo, St. Thomé, Azua, and Iſabella.

At the time of its ceſſion to France, the Spaniſh part of St. Domingo counted only 125,000 inhabitants, 110,000 of whom were free people, and 15,000 negro ſlaves. Land was at ſix French livres, or 5*s.* the arpent; and labour at two French livres, ſixty-one centimes, or a little better than 2*s. per* day.

From 1776 till 1789, the proſperity of the French colony of St. Domingo was at its greateſt height. It was divided into the northern, weſtern, and ſouthern provinces. The firſt extended about forty leagues along the northern coaſt, from the river Maſſacre to cape St. Nicholas, and contained, incluſive of the iſland of Tortuga, 26 pariſhes. The principal towns were cape François, fort Dauphin, Port de Paix, and cape St. Nicholas. The weſtern province commenced at this cape, and terminated at cape Tiburon. It contained fourteen pariſhes; its chief towns were Port au Prince, St. Marc, Leogane, Petit-Goave, and Jérémie. The ſouthern province occupied the remaining coaſt from cape Tiburon to l'Anſe-à-Pitre, and contained ten pariſhes and two towns, Cayes and Jacmel.

The cultivated land in the French colony of St. Domingo amounted to 2,290,000 Engliſh acres, or 771,275 carreaux of French meaſurement, 350 feet on every ſide to the carreau. Mr. Barbé Marbois, in his "Compte rendu des finances de St. Domingue, en 1789," reckons the cultivated land at 570,210 carreaux only. There were 792 ſugar plantations, 2810 coffee plantations, 705 cotton plantations, 3097 indigo plantations, 69 cacao plantations, and 173 diſtilleries of rum.

The produce of theſe different plantations, in 1788, conſiſted of 163,405,500lb. of ſugar, 68,151,000lb. of coffee, 6,289,000lb. of cotton, 930,000lb. of indigo, 150,000lb. of cacao, 34,453,000lb. of ſyrup, worth in all, with ſome leſs important articles, 135.763,000 French livres. It was ſent to France in 686 veſſels of 199,122 tons. The goods imported into the colony from different ports of France, in 465 veſſels of 138,624 tons, amounted to the value of 54,578,000 French livres.

Before the laſt revolution, the exportation from the whole iſland employed 1070 veſſels, navigated by 7936 ſeamen.

The population, which in 1775, was of 32,600 white, conſiſted in 1788, according to Mr. Barbé Marbois, of 27,717 white, of whom there were 14,571 males, 4482 females, and 8664 children; of 405,564 negro ſlaves, of whom there were 174 971 males, 138,800 females, and 91,793 children; and of 21,808 free people of colour.

Of the whole iſland, the population, in 1801, is ſaid to have amounted to 42,000 whites, 44,000 free people of colour, and 600,000 blacks.

At the ceſſion of the Spaniſh part of St. Domingo to the French, the whole iſland was divided into five departments, of the ſouth, of the weſt, of the north, of Samana, and of l'Inganne.

The department of the ſouth was ſub-divided into 25 cantons, *viz.* Leogane, Grand Goave, Petit Goave, Fond des Négres, l'Anſe à veau, l'île de la Cayemite, Petit Trou, Jérémie, l'ile à vache, Torbeck, Cayes du fond, Cavailhon, Saint Louis, Acquin, Beynet, Jacmel, Plimouth, Cap d'Anne Marie, Tiburon, Les Coteaux, Port Salut, Cayes de Jacmel, Paletrou, Neybe, Ile la Béate.

The department of the weſt was divided into 13 cantons, *viz.* Port au Prince, les Gonaïves, Saint Marc, Petite Riviere, Verrettes, Mirebalais, Banica, l'Arcahaye, Croix des bouquets, l'île de la Gonave, San Juan, Saint Thomé, Aſua.

The department of the north was divided into 33 cantons, *viz.* Monte Chriſto, Laxavon, Ouanaminthe, fort Dauphin, Terrier Rouge, Trou, Valliére, Limonade, Grande Riviére, Sainte Suſanne, Le quartier Morin, la Petite Anſe, le Cap, la Plaine du Nord, l'Acul, le Limbé, le Port Margot, le Borgue, Plaiſance, Petit Saint Louis, Tortuga, or l'île de la Tortua, Dondon La Marmelade Hinche, San Raphael, San Miguel, l'Altalaya, le Port de Paix, le Gros Morne, Jean Rabel, le Môle St. Nicholas, Bombarde, le Port à Piment.

The department of Samana was divided into five cantons, *viz.* San Yago, La Vega, Porto Plata, Cotin, Samana.

The department of l'Inganne was divided into ten cantons, *viz.* Santo Domingo, Monte Plata, Zeibo, Higney, Baya Guyana, Baya, Ile Sainte Catherine, San Lorenzo, Illegnos, Ile la Saône.

But France never enjoyed this acceſſion of territory in her moſt important colony. Several years before the treaty of Baſle, the ſpirit of revolt had broken out in the French part of St. Domingo, and in the year 1791, a moſt alarming inſurrection of the negroes had deluged half of the northern province with blood. In two months upwards of 2000 white perſons periſhed; 1200 families were reduced to indigence; 180 plantations of ſugar, about 900 of coffee, cotton, and indigo, were deſtroyed, and the buildings conſumed by fire. Deſtruction every where marked the progreſs of the blacks, and reſiſtance, ſays Mr. Edwards, who was an eye witneſs of their ravages, was conſidered as unavailing and hopeleſs. From the northern province the rebellion ſpread to the weſt, where, it was, however, ſoon quelled by the concordat of the 12th of September.

The wavering conduct of the firſt national aſſembly of France, with reſpect to the abolition of the negro ſlavery; the decree of the legiſlative aſſembly, which acknowledged the political equality of the free negroes and people of colour with the whites; the appointment of three commiſſioners noted for the violence of their republican principles; and the arrival of a force of 8000 men in the month of September 1792, inſtead of reſtoring the peace of the colony, kept alive the flame of diſcontent, which raged with renovated fury in 1793, when the two remaining commiſſioners of the convention, Santhonax and Polverel, proclaimed the emancipation of all the ſlaves in the colony. On the 21ſt of June, Macaya, a leader of the blacks, entered cape Francois with upwards of 3000 ſlaves, and begun an indiſcriminate ſlaughter.

Under theſe circumſtances, ſome of the planters prevailed with the Britiſh government to take poſſeſſion of St. Domingo. A ſmall armament of about 870 rank and file, ſent from Jamaica, took Jérémie and the mole of cape St. Nicholas. In the middle of January, 1794, the Britiſh troops entered Tiburon, and directed their views towards Port de Paix. The fort of l'Acul, in the vicinity of Leogane, was carried on the 19th of February; fort Bigotton, on the road from Leogane to Port au Prince, was taken on the 31ſt of May, and the town of Port au Prince ſurrendered on the 4th of June. But from this period the Britiſh power in St. Domingo declined; the yellow fever manifeſted itſelf among the troops; 40 officers, and 600 rank and file fell victims to its ravages within two months after the ſurrender of port au Prince.

In the mean time the French commiſſioners, Santhonax and Polverel, returned to France. Rigaud, a mulatto, and a negro named Touſſaint l'Ouverture, who headed the army of the blacks, re-captured Tiburon, Leogane, Jean Rabel, la Petite Riviere, and retained the whole of the northern province, except the Mole and fort Dauphin. In the month of May, 1795, ſir Adam Williamſon, governor of Jamaica, arrived at Port au Prince, as commander in chief of the Britiſh forces, but was ſoon ſucceeded in command by major-general Forbes.

A reinforcement of about 7000 Britiſh troops arrived at the Mole of St. Nicholas in May 1796; but a dreadful mortality impeded the progreſs of the Britiſh arms. The republicans commenced operations in every quarter round the capital, and at the very time when general Simcoe arrived at St. Domingo to recover the Britiſh character, the celebrated Touſſaint l'Ouverture received the ſanction of the command which he had long poſſeſſed, by being appointed general in chief of the armies in St. Domingo by the French government.

General Simcoe returned to England in Auguſt 1797, General Maitland, who arrived at Port au Prince in April 1798, withdrew the remainder of the Engliſh forces to Jérémie, and at laſt ſurrendered all the Britiſh poſſeſſions in St. Domingo, and evacuated the iſland.

At this time the force of Touſſaint l'Ouverture, in the northern province, amounted to ſomething leſs than 40,000 men, but in the year 1800 it had increaſed to more than double that number. The independence of St. Domingo was proclaimed on the firſt of July 1801.

But in the month of December 1801, an expedition ſailed from France with a force of 20,000 men, commanded by general le Clerc, brother-in-law to Bonaparte, the firſt conſul of the French republic. They arrived in the bay of Samana, on the eaſtern coaſt of the iſland, on the 28th of the ſame month. But before they entered cape François the city was laid in aſhes.

On the 17th of February 1802, general le Clerc commenced his campaign, and fought with varied ſucceſs until the firſt of May, when hoſtilities ceaſed with generals Touſſaint l'Ouverture and Chriſtophe. During this treacherous truce the unfortunate Touſſaint l'Ouverture was ſurpriſed in his plantation and conveyed a priſoner on board a French veſſel with his wife and children. He lingered in a French dungeon till the month of April 1803, when death put a term to his unjuſt ſufferings. But even the nature of his death muſt have been a torment inflicted by his perſecutors, as the floor of the dungeon is reported to have been found actually covered with water.

The perfidy experienced by the great and benevolent leader of the blacks rouſed them to a renovated and more vigorous oppoſition. General Chriſtophe rejoined the black forces under Deſſalines. A number of new chiefs aroſe and numerous defections from the French army inſpired the negroes with increaſed confidence. Thoſe who had been incorporated with the French troops were exterminated with the moſt unheard of cruelty. The uſe of bloodhounds was even introduced againſt them. But contagious diſeaſes ſeemed to puniſh theſe enormities.

By the middle of October 1802, fort Dauphin, Port de Paix, and ſeveral other important poſts, were again completely loſt to the French. Their general in chief, Victor Emanuel le Clerc, died in the night of the firſt of November. His ſucceſſor, Rochambeau, continued the war with no better fortune until the beginning of the year 1803, when another treacherous ceſſation of arms gave place to new but ſecret cruelties.

During this armiſtice the blacks under Deſſalines received daily freſh reinforcements. At its expiration they drove the French into the cape, and on the 30th of November, 1803 forced them to ſurrender and evacuate the iſland. To avoid being ſunk with red-hot ſhot in the harbour, the French put themſelves under the protection of an Engliſh ſquadron, then cruizing before the cape, which conveyed them priſoners to Jamaica. General Rochambeau was ſent to England.

The independence of St. Domingo was proclaimed on the 29th of Nov. 1803, and to obliterate every remembrance of their former ſlavery, the chiefs, who had effected the freedom of the iſland, reſtored to it on the firſt of January, 1804, with its priſtine ſimplicity of government, its ancient name of Hayti. In the beginning of May general Deſſalines was inveſted with the government of the iſland for life, and on the 8th of September he aſſumed the title of emperor of Hayti, by the name of Jaques the Firſt. His reign, however, was not of long duration. He fell in a conſpiracy, and republican principles revived at his death, under the alternate command of generals Chriſtophe and Petion. (See Hayti.) (Marcus Rainsford's Black Empire of Hayti, 1805. Bryan Edwards's St. Domingo. Barbé Marbois's Compte rendu des Finances de St. Dominique 1789. Page's Traité de l'Economie politique et de Commerce des Colonies, 1802. Lyonnet's Statiſtique de la partie Eſpagnole de St. Dominique, 1800. Herbin's Statiſtique de la France, vol. vii, 1803.)

Domingo, *St.*, a little walled town of Spain, in Old Caſtile, containing a church, an epiſcopal palace, two convents, an hoſpital, &c.; eight leagues weſt of Logrono, in a fertile plain, on the rivulet Oja.

Domingo, *St., Company of.* See Company.

DOMINI, *Bull in Cœno.* See Bull.

DOMINIAL Offices. See Office.

DOMINICA, Island of, in *Geography*, an iſland of the Weſt Indies, ſituated between 15° 20′ and 15″ 45′ N. lat. and 61° 23′ and 61° 30′ W. long.; ſo called by Chriſtopher Columbus, from the circumſtance of its having been diſcovered by him on a Sunday, November 3, 1493. This iſland, as well as St. Vincent, and ſeveral other iſlands, were included in the earl of Carliſle's patent, dated June 2, 1627, and, therefore, attempts were made at different times to bring them under the Engliſh dominion. But theſe attempts proving ineffectual, it was ſtipulated between the Engliſh and French by the treaty of Aix-la-Chapelle, in 1748, that Dominica, St. Vincent, St. Lucia, and Tobago, ſhould remain neutral, and that the ancient proprietors, the Charaibes, ſhould be left in unmoleſted poſſeſſion. But no ſooner was the treaty of neutrality concluded, than both the Engliſh and French appeared to be diſſatisfied with the arrangement which they had made. The Charaibes, however, were little regarded; for in the 9th article of the peace of Paris, in 1763, the three iſlands of Dominica, which, in 1759, had fallen by conqueſt under the Engliſh dominion, St. Vincent, and Tobago, were aſſigned to Great Britain, and St. Lucia to France; and the Charaibes were not mentioned in the whole tranſaction. Indeed they were reduced to a ſmall remnant; for of the ancient, or as they were called by the Engliſh, the red Charaibes, not more than 100 families ſurvived in 1763, and of all their ancient extenſive poſſeſſions, they retained only a mountainous diſtrict in the iſland of St. Vincent. Although Dominica previouſly to this period had been conſidered as a neutral iſland, many of the ſubjects of France had eſtabliſhed coffee plantations, and other ſettlements, in various parts of the country; and it reflects honour on the Britiſh adminiſtration, that theſe people were ſecured in their poſſeſſions, on condition of taking the oaths of allegiance to his Britannic majeſty, and paying a ſmall quit-rent. The cultivable lands, to the amount of 94,346 acres, comprehending one-half of the iſland, were ſold in allotments from 50 to 100 acres, yielding the ſum of 312,092 *l.* 11*s.* 1*d.* ſterling money.

The French inhabitants are ſtill more numerous than the Engliſh, and poſſeſs the moſt valuable coffee-plantations, the produce of which has hitherto been found its moſt important ſtaple. They differ but little in manners, cuſtoms, and religion from the inhabitants of the other French iſlands in the Weſt Indies, and their prieſts have been appointed by ſuperiors in Martinico; to the government of which iſland, and to the laws of their own nation, they uſed to conſider themſelves to be amenable. At the commencement of the American war, the iſland of Dominica was in a flouriſhing ſituation. The port of Roſeau, or Charlotte's town, having been declared a free port by act of parliament, was reſorted to by trading veſſels from moſt parts of the foreign Weſt Indies, as well as from America. The French or Spaniards purchaſed many negroes there for the ſupply of their ſettlements, together with vaſt quantities of the merchandize and manufactures of Great Britain, for which payment was made chiefly in bullion, indigo, and cotton, and completed in mules and cattle. In 1778, the French, attracted by the fertility of the iſland, encouraged by its defenceleſs ſtate, and invited by ſome of their former fellow-ſubjects, prepared a naval and military armament againſt the iſland under the command of the marquis de Bouillé, governor of Martinico, who made himſelf maſter of it after an obſtinate reſiſtance. Dominica remained in the poſſeſſion of the French during five years and three months, and by the failure of its trade was reduced to great diſtreſs. But in January 1783, it was again reſtored to the government of England, the legiſlative authority was veſted in a governor, with an annual ſalary of 1200*l.* ſterling, beſides fees of office, a council of 12 gentlemen, and an aſſembly of 19 members.

Dominica contains 186,436 acres of land; and is divided into 10 pariſhes. Its capital is *Roſeau*, which ſee. The iſland is 29 miles in length, and may be reckoned 16 miles in breadth. It contains many high and rugged mountains, interſperſed with fine vallies, which generally appear to be fertile. Several of the mountains exhibit unextinguiſhed volcanoes, which frequently diſcharge vaſt quantities of burning ſulphur. From theſe mountains alſo iſſue ſprings of hot water, ſome of which are ſuppoſed to poſſeſs great virtue in tropical diſorders. In ſome places the water is ſaid to be hot enough to coagulate an egg. In the woods are innumerable ſwarms of bees, which hive in the trees, and produce great quantities of wax and honey, equally good with any in Europe. The bee is ſaid to be the European ſpecies, which muſt have been tranſported hither; as the native bee of the Weſt Indies is a ſmaller ſpecies, without *ſtings*, and very different from the European. The iſland is well watered, having upwards of 30 fine rivers, beſides a great number of rivulets. The ſoil, in the greateſt part of the interior country, is a light brown-coloured mould, which appears to have been waſhed from the mountains. Towards the ſea-coaſts, and in many of the vallies, it is a deep, black, and rich native earth, and ſeems well adapted to the cultivation of all the articles of Weſt Indian produce. The under ſtratum is, in ſome parts, a yellow, or brick clay, in others a ſtiff terrace, but in moſt places it is very ſtony. The fertile land bears a ſmall proportion to the whole; there being no more than 50 ſugar plantations, which, one year with another, do not produce annually more than 3000 hogſheads of ſugar. Coffee ſeems to ſuit the ſoil better than ſugar; as there are more than 200 coffee-plantations, which, in favourable years, have produced three millions of pounds weight. A ſmall part of the lands is alſo applied to the cultivation of cacao, indigo, and ginger. The number of white inhabitants appeared, in 1788, to be 1236, of free negroes, &c. 445, and of ſlaves 14,967. Of the ancient natives, or charaibes, there are alſo from 20 to 30 families. Theſe are quiet and inoffenſive, ſpeak a language of their own, and a little French, but none of them underſtand Engliſh. They are of a clear copper colour, with long, ſleek, black hair; their perſons are ſhort, ſtout, and well made, but they disfigure their faces, by flattening their foreheads in infancy. They live chiefly by fiſhing in the rivers and ſea, or by fowling in the woods, uſing their bows and arrows with wonderful dexterity. It is ſaid that they will kill the ſmalleſt bird with an arrow at a great diſtance, or transfix a fiſh at a conſiderable depth in the ſea. They diſplay alſo great ingenuity in making curiouſly wrought panniers, or baſkets, of ſilk graſs, or the leaves and barks of trees. Their race is now almoſt extinct. The exports of the iſland, from January the 5th, 1787, to Jan. 5th, 1788, were 71,302 cwt. of ſugar, 63,392 gallons of rum, 16,803 gallons of melaſſes, 1,194 cwt. of cacao, 18,149 cwt. of coffee, 11,250lbs. of indigo, 970,816lbs. of cotton, 161 cwt. of ginger, with miſcellaneous articles, ſuch as hides, dyeing woods, &c. to the value of 11,912*l.* 10*s.* 9*d.* Edwards's Weſt Indies, vol. i.

DOMINICA, *La*, or *Ohevahooa*, the largeſt of the Marqueſas iſlands, in the South Pacific Ocean, extending E. and W. 6 leagues; its breadth is unequal, but it is about 15 or 16 leagues in circuit. It is full of rugged hills, riſing in ridges directly from the ſea; which ridges are disjoined by deep vallies, clothed with wood, as are the ſides of ſome of the hills; its aſpect is barren; nevertheleſs, it is inhabited. S. lat. 9° 44′ 30″. W. long. 139° 13′ at its weſt end. See MARQUESAS.

DOMINICA, *La*, a town of the iſland of Cuba; 45 miles W. of Havanna.

DOMINICAL LETTER, in *Chronology*, properly called Sunday Letter, one of the ſeven letters of the alphabet A B C D E F G, uſed in almanacs, ephemerides, &c. to denote the Sundays throughout the year.

The word is formed from *Dominica*, or *Dominicus dies*, Lord's day, Sunday.

The dominical letters were introduced into the calendar by the primitive Chriſtians, in lieu of the nundinal letters in the Roman calendar.

Theſe letters, we have obſerved, are ſeven: and that in a common year, the ſame letter ſhould mark all the Sundays will eaſily appear; inaſmuch as all the Sundays are ſeven days apart, and the ſame letter only returns in every ſeventh place. But in the biſſextile, or leap year, the caſe is otherwiſe, as we have already ſtated and explained under the article CYCLE *of the Sun*, to which the reader is referred.

To find the Dominical letter of any given year. Seek the cycle of the ſun for that year, as directed under CYCLE *of the Sun;* and the dominical letter is found correſponding to it in the table annexed to that article; where the method of finding the dominical letter for any year, of any century, is explained. When there are two, the propoſed year is biſſextile; and the firſt obtains to the end of February; and the laſt for the reſt of the year.

Thus, the year 1809 being the 26th of the cycle, the letter in the table correſponding to it is A.

The dominical letter may be found univerſally for any year of any century, by the following canon:

> "Divide the centuries by four; and twice what does remain
> Take from ſix; and then add to the number you gain
> The odd years and their fourth; which dividing by ſeven,
> What is left take from ſeven, and the letter is given."

Thus, for the year 1809, if the number of centuries, 18, be divided by 4, we ſhall have a remainder of 2, and twice 2 or 4, taken from ſix, leaves 2; to which add 9 of the odd years, and 2 their fourth part, we ſhall have the ſum $2 + 9 + 2 = 13$, and 13, divided by 7, leaves the remainder 6, which, taken from 7, gives 1, or A, the dominical letter required. It is evident, that four Gregorian centuries, containing three centeſimal common years, which remove the letter two forward, and one centeſimal leap-year, which removes it one forward, will complete a revolution of the letter. Thus, the dominical letter of 1600 is A; of 1700 C; of 1800 E; of 1900 G; of 2000 A, &c. Therefore A, the ſixth letter backward from G, is the dominical letter of a biſſextile centeſimal year; and, as the firſt common centeſimal year brings the letter two forward from A, or two leſs than ſix backward from G, the remainder, after dividing the centuries by 4, muſt be doubled; and ſo we ſhall have $6 - 2 = 4$ to be added to the odd years, and their 4th, in the ſecond common century; and $6 - 4$, or 2, muſt be added in the third, and 0 in the 4th, becauſe the Gregorian biſſextile recurs, and the number of centuries may be divided by 4, without leaving any remainder.

By the reformation of the calendar under pope Gregory, the order of the dominical letters was again diſturbed in the Gregorian year; for the year 1582, which, at the beginning, had G for its dominical letter; by the retrenchment of ten days after the 4th of October, came to have C for its dominical letter; by which means the dominical letter of the ancient Julian calendar is four places before that of the Gregorian; the letter A in the former anſwering to D in the latter. When the dominical letter is known, the day of the week correſponding to any day of the month may be eaſily found by the following canon:

> "At Dover Dwells George Brown Eſquire,
> Good Chriſtopher Finch And David Fryer."

Theſe words correſpond to the 12 months of the year, and the firſt letter of each word marks in the order of the dominical letters the firſt day of each month; whence any other day may be eaſily found. *E. G.* Let it be required to find on what day of the week Chriſtmas day, or the 25th of December, falls in the year 1808, the dominical, or Sunday letter, of which is B. Fryer anſwers to December, and the firſt day is F, *i. e.* B being Sunday, it is Thurſday, and, therefore, Chriſtmas day, or the 25th, is Sunday.

Dominical, in *Church Hiſtory*. The council of Auxerre, held in 578, decrees, that women communicate with their dominical. Some authors contend, that this dominical was a linen cloth, wherein they received the ſpecies; as not being allowed to receive them in the bare hand. Others will have it a kind of veil wherewith they covered the head. The moſt probable account is, that it was a ſort of linen cloth, or handkerchief, wherein they received, and preſerved the euchariſt, in times of perſecution, to be taken on occaſion at home. This appears to have been the caſe by the practice of the firſt Chriſtians, and by Tertullian's book "Ad Uxorem."

Dominical was alſo formerly uſed in the ſame ſenſe with homily.

DOMINICANS, an order of religious, called in ſome places Jacobins, in others Predicants, or Preaching Friars, and in others *Fratres majores*, by way of oppoſition to the Franciſcans, who called themſelves *Fratres minores*. See Jacobins, &c.

The Dominicans take their name from the founder Dominic de Guzman, a Spaniſh gentleman, born in 1170, at Calaroga, in Old Caſtile. He was firſt canon and archdeacon of Oſma; and afterwards preached with great zeal and vehemence againſt the Albigenſes in Languedoc, where he laid the firſt foundation of his order. It was approved of in 1215, by Innocent III. and confirmed in 1216, by a bull of Honorius III. under the title of St. Auguſtin; to which Dominic added ſeveral auſtere precepts and obſervances, obliging the brethren to take a vow of abſolute poverty, and to abandon entirely all their revenues and poſſeſſions; and alſo the title of "Preaching Friars," becauſe public inſtruction was the main end of their inſtitution.

The firſt convent was founded at Tholouſe by the biſhop thereof, and Simon de Montfort. Two years afterwards they had another at Paris, near the biſhop's houſe; and ſome time after, *viz.* in 1218, a third in the rue St. Jaques, St. James's-ſtreet, whence the denomination of Jacobins.

Juſt before his death, Dominic ſent Gilbert de Freſney, with twelve of the brethren, into England, where they founded their firſt monaſtery at Oxford, in the year 1221, and ſoon after another at London. In the year 1276, the mayor and aldermen of the city of London gave them two whole ſtreets by the river Thames, where they erected a very commodious convent, whence that place is ſtill called Black Friars, from the name by which the Dominicans were called in England.

St. Dominic, at firſt, only took the habit of the regular canons, that is, a black caſſock, and rochet; but this he quitted in 1219, for that which they now wear, which, it is pretended, was ſhewn by the bleſſed Virgin herſelf to the beatified Renaud d'Orleans.

This order is diffuſed throughout the whole known world. It has forty five provinces under the general, who reſides at Rome; and twelve particular congregations, or reforms, governed by vicars-general.

They reckon three popes of this order, above ſixty cardinals, ſeveral patriarchs, a hundred and fifty archbiſhops, and about eight hundred biſhops; beſide maſters of the ſacred palace, whoſe office has been conſtantly diſcharged by a religious of this order, ever ſince St. Dominic, who held it under Honorius III. in 1218.

The Dominicans are alſo inquiſitors in many places. For a further account of Dominic and the Dominicans; ſee Inquisition.

Of all the monaſtic orders, none enjoyed a higher degree of power and authority than the Dominican friars, whoſe credit was great and their influence univerſal. Nor will this appear ſurprizing, when we conſider that they filled very eminent ſtations in the church, preſided every where over the terrible tribunal of the inquiſition, and had the care of ſouls, with the function of confeſſors in all the courts of Europe, which circumſtance, in thoſe times of ignorance and ſuperſtition, manifeſtly tended to put moſt of the European princes in their power.

But the meaſures they uſed, in order to maintain and extend their authority, were ſo perfidious and cruel, that their influence began to decline towards the beginning of the ſixteenth century. The tragic ſtory of Jetzer, conducted at Bern in 1509, for determining the unintereſting diſpute between them and the Franciſcans, relating to the immaculate conception, will reflect indelible infamy on this order. (See an account of it in Burnet's Travels through France, Italy, Germany, and Switzerland, p. 31. or Moſheim's Eccl. Hiſt. vol. iv. p. 19.) They were indeed perpetually employed in ſtigmatizing with the opprobrious name of hereſy numbers of learned and pious men; in encroaching upon the rights and properties of others, to augment their poſſeſſions; and in laying the moſt iniquitous ſnares and ſtratagems for the deſtruction of their adverſaries. They were the principal counſellors, by whoſe inſtigation and advice Leo X. was determined to the public condemnation of Luther. The papal ſee never had more active and uſeful abettors than this order and that of the Jeſuits.

The dogmata of the Dominicans are uſually oppoſite to thoſe of the Franciſcans.

They concurred with the Jeſuits in maintaining, that the ſacraments have in themſelves an *inſtrumental* and *efficial* power, by virtue of which they work in the ſoul (independently of its previous preparation or propenſities) a diſpoſition to receive the divine grace; and this is what is commonly called the *opus operatum* of the ſacraments. Thus, according to their doctrine, neither knowledge, wiſdom, humility, faith, nor devotion, are neceſſary to the efficacy of the ſacraments, whoſe victorious energy nothing but a *mortal ſin* can reſiſt.

There are alſo nuns, or ſiſters of this order, called in ſome places "Preaching Siſters." Theſe are even more ancient than the friars; St. Dominic having founded a ſociety of religious maids, at Prouilles, ſome years before the inſtitution of his order of men; *viz.* in 1206.

There is a third order of the Dominicans, both for men and women.

DOMINION. See PROPERTY and DOMINIUM.

DOMINIS, MARK ANTHONY DE, in *Biography*, a learned Italian prelate, who flouriſhed towards the cloſe of the ſixteenth, and in the ſeventeenth centuries, was deſcended from a family of rank at Arba, a town in Dalmatia. He finiſhed his education at Padua, where he made much proficiency in the different branches of learning. He connected himſelf with the ſociety of the Jeſuits, by whom he was employed as a profeſſor in polite literature, philoſophy, and mathematics. In this important truſt he acquired the higheſt reputation, but finding the duties of his office more laborious than pleaſant, he determined, after twenty years' application, to retire. He was, upon quitting the ſociety, nominated to the biſhopric of Segni, and afterwards to the archbiſhopric of Spalato. In the latter high ſtation, he conſecrated all his talents to the ſervice of his benefactors, the ſenate of Venice, whom he defended with much learning and reſolution, in a diſpute which they had with pope Paul V. who had iſſued an interdict againſt the republic. The inquiſition eſpouſed the cauſe of the pope, but fortunately for Dominis he was out of their reach, and replied to their cenſures without heſitation or fear. His ardent mind was now led to examine the doctrines, the diſcipline, and rights of the church; the reſult was, an entire ſeparation from the papal communion. He openly joined the proteſtants, but was very deſirous of uniting the two churches, and reſolved to withdraw into ſome country in which he might with ſafety mature and publiſh his plans for the purpoſe. He accordingly reſigned his archbiſhopric in favour of a near relation, and ſpent ſome time at Venice for the ſake of the ſociety of father Paul. He came to England in the year 1616, where he was received with reſpect by all ranks, and preached and wrote againſt the church of Rome, with the zeal and ardour of a new convert. He almoſt immediately upon his arrival publiſhed a long letter, addreſſed to all the biſhops of the Chriſtian church, explaining the reaſons which had compelled him to quit his dioceſe. Between the years 1617 and 1620, he publiſhed his great work which he had been long in preparing, and which he hoped would ſtrike a fatal blow at the foundations of the papal power and dominion. This work was entitled, "M. Ant. de Dominis de Republica Eccleſiaſtica," Libri x. in three volumes folio.

He is ſuppoſed to have had a principal concern in the publication of father Paul's hiſtory of the council of Trent, which appeared at London in the year 1619. In England he acquired ſome preferment: was made maſter of the Savoy, and dean of Windſor. Theſe honours and the emoluments attached to them, did not anſwer the expectations which he had formed of the liberality of the Engliſh to a convert, ſo diſtinguiſhed as himſelf, to the proteſtant faith. Diſappointment, or a deſire to return to his native country, induced him to accept of the invitation ſent him in the name of pope Gregory XV. to return to Rome. In 1622, in that city, he renounced the proteſtant faith, abjured all his errors, and aſked pardon in a public conſiſtory for the apoſtacy of which he had been guilty. After this, he made a ſtill more public expoſition of his conduct in a treatiſe entitled, "M. A. de Dominis Archiepiſcopus Spalatenſis ſui reditus ex Anglia conſilium exponit."

By ſuch unmanly conceſſions, which were truly unworthy of a man of ſuperior talents, he was at firſt well received at Rome. This was not ſufficient; he hoped to be admitted to the pope's confidence, which as he could not obtain, and he felt, when too late, that he muſt perpetually remain, notwithſtanding his profeſſions, an object of ſuſpicion, he began to entertain thoughts of coming a ſecond time to England, and of uniting himſelf a ſecond time with the proteſtants. Letters to this effect were intercepted, and De Dominis was inſtantly, at the order of the pope, arreſted and committed a cloſe priſoner to the caſtle of St. Angelo, where he died in 1625, in the 64th year of his age, not without ſuſpicion of poiſon. Some time after his death his body was dug from the grave in which it had been depoſited, and burnt, together with his writings, by a decree of the inquiſition.

De Dominis was author of a work in optics, which obtained the applauſe of the illuſtrious ſir I. Newton, and which is entitled "De Radiis Viſus & Lucis in Vitris perſpectivis et Iride Tractatus." Our great philoſopher complimented the author of this tract ſo far as to declare, that he was the firſt perſon who had explained the phenomena of the colours of the rainbow. Moreri.

DOMINIS, in *Geography*, a group of ſmall iſlands in the Eaſt-Indian ocean, lying off the eaſtern part of *Lingen*, which ſee.

DOMINIUM, DOMINION, in the *Civil Law*, denotes the abſolute power, or property, of a thing, to uſe or diſpoſe of it how we pleaſe.

Directum dominium is the right alone of dominium: and dominium utile, the profit redounding from it. The wife retains the dominium directum of her jointure, and the dominium utile paſſes to her huſband. With reſpect to ſignory, he who pays rent, has the dominium utile of the lands; and the lord he pays it to, the dominium directum.

DOMINIUM, *Dominion*, or *Domaine*, in our *Ancient Cuſtoms*, denotes a rent due to the lord, where the property is not his.

DOMINORUM, AFFIDATIO. See AFFIDATIO.

DOMINUS, or LORD, in *Roman Antiquity*, was expreſſive, according to its primitive ſignification, not of the authority of a prince over his ſubjects, or of a commander over his ſoldiers, but of the deſpotic power of a maſter over his domeſtic ſlaves. Thus Pliny (in Panegyr. c. 3. 55, &c.) ſpeaks of dominus with execration, as ſynonymous to tyrant, and oppoſite to prince. Conſidered in this odious light, it had been rejected with abhorrence by the firſt Cæſars. Their reſiſtance, however, in proceſs of time, became more feeble, and the name leſs odious; till at length the ſtyle of *our lord* and *emperor* was not only beſtowed by flattery, but was regularly admitted into the laws and public monuments. Diocleſian and Maximian uſurped even the titles, if not the attributes, of the divinity, and tranſmitted them to their ſucceſſors.

DOMINUS, in *Ancient Times*, a title prefixed to a name, uſually to denote the perſon either a knight or clergyman. See VICE-DOMINUS.

Though the title was ſometimes alſo given to a gentleman not dubbed; eſpecially if he were lord of a manor. See DOM, GENTLEMAN, and SIRE.

In Holland, the title dominus is ſtill retained, to diſtinguiſh a miniſter of the reformed church.

Recto quando DOMINUS *remiſit*. See RECTO.

DOMITIAN, (TITUS FLAVIUS DOMITIANUS,) in *Biography*, Roman emperor, was the ſecond ſon of Veſpaſian, and born at Rome, October the 24th, A.D. 51. At the cloſe of the reign of Vitellius, and when he was reduced to the neceſſity of abdicating the empire, Domitian was with his uncle Sabinus, and retired with him into the capitol. When the capitol was beſieged and ſet on fire by the ſoldiers of Vitellius, Sabinus was taken priſoner, and ſoon put to death; but Domitian concealed himſelf in an apartment of the temple, where he remained till the tumult ſubſided, and then made his eſcape to the houſe of a friend. In memory of this deliverance he afterwards erected two monuments; the one, in the life-time of his father, which was a ſmall chapel in honour of Jupiter the preſerver, on the ſpot where he had been concealed, with an altar, and an inſcription on the marble, expreſſing the event that had befallen him; the other was a magnificent temple, built after his acceſſion to the empire, and dedicated to the "Guardian Jupiter," in which he placed a ſtatue of that god holding him in his arms. Upon the tragical death of Vitellius, A.D. 69, Domitian was proclaimed Cæſar, and in the following year he obtained the prætorſhip, together with the power of conſul. When he firſt took his ſeat in the ſenate, he ſpoke modeſtly of himſelf and of his youth. The comelineſs of his perſon added to the graces of his diction; and as his true character was not then known, his bluſhes were interpreted as a token of the meekneſs of his temper. Some of his firſt acts were conciliatory and popular; but he ſoon threw off the veil that diſguiſed him, and purſued a courſe of licentiouſneſs and debauchery, which occaſioned great uneaſineſs to his father Veſpaſian. Addicted to the moſt infamous pleaſures, he corrupted married women, and forced away Domitia, the wife of Elius Lamia, and daughter of Corbulo, and having firſt kept her as his miſtreſs, he afterwards married her. Ambitious as he was diſſolute, he attempted to uſurp every kind of authority; and in the moſt laviſh manner he gave away, in one day, upwards of twenty conſiderable poſts in the city and provinces; which made Veſpaſian ſay to him, in one of his letters, "I thank you for not having yet ſent me a ſucceſſor, and for your kindneſs in vouchſafing to let me enjoy the empire." Domitian, jealous of the riſing fame which his brother Titus had acquired in the Jewiſh war, expreſſed his deſire of taking the command againſt Civilis in Gaul: but Mucian, who at this time poſſeſſed the chief power at Rome, wiſhed to divert him from his purpoſe, fearing leſt the precipitance and ardour of his youth, in the conduct of a large army, might induce him to liſten to pernicious counſels, and to form projects injurious to the peace and welfare of the ſtate. Mucian, however, was under a neceſſity of acquieſcing, and accordingly he accompanied the young prince to Gaul: but receiving intelligence before they had paſſed the Alps, of the proſperous exploits of Cerialis, the Roman commander, Mucian diſſuaded Domitian from proſecuting his journey, and prevailed with him to remain at Lyons. Here he brooded over the ſeditious projects which he had formed, and determined, if poſſible, to accompliſh them: he diſpatched private emiſſaries to Cerialis, in order to gain information whether that general was diſpoſed to ſurrender, in his favour, the command of the army. What were his ſecret views it is impoſſible to ſay; whether he wiſhed to make war againſt his father, or to form a party againſt his brother, the event does not aſcertain; for Cerialis returned no anſwer to his propoſals, but conſidered them as childiſh fancies. Thus diſappointed, he reſolved to diſſemble; and carried his falſe modeſty ſo far as to renounce the exerciſe of the prerogatives due to his rank, to retire for the ſake of ſtudy, and even to write verſes, which received the fulſome adulation of the poets of his time, and the commendation even of the judicious Quintilian, although he had no previous taſte for poetry, and afterwards held it in great contempt. Thus, however, he endeavoured to maſk his ambition, and to avoid giving umbrage to his brother, whoſe mild and open temper he charged with hypocriſy, and whoſe virtues he diſregarded, and would not even allow to exiſt.

When Veſpaſian returned from the Eaſt to take poſſeſſion of the empire, Domitian was the only perſon who did not partake of the general joy on this occaſion, and he alone was unfavourably received in the interview which he had with his father at Beneventum. Veſpaſian was well appriſed of his diſpoſition and conduct, and repoſed no confidence in him during his whole reign. Domitian, however, accompanied his father and brother in their triumph, on account of the ſucceſsful iſſue of the Jewiſh war, A.D. 71. Upon the death of Veſpaſian, this ambitious prince manifeſted a diſpoſition to diſpute, or at leaſt, to ſhare, the empire with his brother, who was unanimouſly acknowledged his father's ſucceſſor, both by the ſenate and the army. With this view he thought of doubling the gratification to the troops, which Titus had given them; and he alſo pretended, that his father's will had been altered, and that it was his intention that his two ſons ſhould inherit the empire jointly; for which ſuggeſtion there was not the leaſt foundation. His intrigues were continued, and he proceeded ſo far as ſecretly to ſolicit the armies to revolt. Titus, however, though not unappriſed of his hoſtilities, took no meaſures for ſecuring his perſon; nor did he deſiſt from treating him with civility and kindneſs. He made him his colleague in the conſulſhip; and from the firſt day of his acceſſion to the empire, always declared to him, that, as he had no male iſſue, he looked upon him as his ſucceſſor to the empire. When they were alone, he frequently conjured him, even with tears, to ſecond his endeavours, and to return him affection for his kindneſs. Some have ſaid, that Domitian haſtened the death of his brother by poiſon; a charge, indeed, which is not warranted by the circumſtances of Titus's death. (See TITUS.) Although, through life, he had been the object of Domitian's envy and hatred, ſo that he never miſſed any opportunity which occurred of cenſuring and reviling him, he cauſed him, after his death, to be ranked among the gods.

Immediately upon the death of Titus, A.D. 81, Domitian,

tian, who was then 30 years of age, was proclaimed emperor; and having attained this eminence, his character ſoon began to be developed. For ſome time, however, he reſtrained the indulgence of his worſt paſſions, and contented himſelf with puerile diſplays of vanity and oſtentation. He began his career with accepting all thoſe titles of honour, which other emperors had been generally accuſtomed to defer till they had done ſomething that ſeemed to merit them. He did not ſcruple to declare, in full ſenate, that the ſupreme power, to which he had attained, was merely a reſtitution, on the part of his father and brother, of his right, and which he had condeſcended to permit them to enjoy; and he cauſed himſelf to be appointed conſul for ten years to come; ſo that, adding theſe to the ſeven conſulſhips which he had enjoyed under Veſpaſian and Titus, he prided himſelf on having been conſul 17 times, which was an honour never poſſeſſed by any Roman, either before or after him. Inſtead of 12 lictors he had 24; and after he had once triumphed, he always preſided in the ſenate in his triumphal dreſs. On the various edifices which he cauſed to be built, inſtead of thoſe that had been deſtroyed by fire, he had his own name inſcribed, without the leaſt mention of their firſt founders; and he filled the world, as Dion Caſſius ſays, with his ſtatues, nor would he ſuffer any to be erected to him in the capitol, which were not of gold, or at leaſt ſilver, and of a certain height. In every ſtreet and corner of Rome he built triumphal arches, as monuments of his pretended victories. Although the Germans had every where repulſed and defeated him, he aſſumed the ſurname of Germanicus, and he gave it likewiſe to the month of September, in which he aſcended the imperial throne; and he ordered October, the month in which he was born, to be called Domitianus, after his own name. He cauſed himſelf to be proclaimed "Imperator," or victorious general, 22 times during the courſe of his reign, though he was almoſt always ſhamefully defeated. Not ſatisfied with the title of Lord and Maſter, which Auguſtus and Tiberius had rejected with a kind of horror, he added to it that of God; and this impious ſtyle was obſerved through his whole reign. At the commencement of his reign, notwithſtanding all theſe diſplays of conſummate vanity and arrogance, he performed ſome acts of humanity and generoſity. He reſtrained the powers of the magiſtrates of the city and provinces within due bounds; he adminiſtered juſtice with integrity, and ſeverely puniſhed thoſe judges who took bribes; and he iſſued ſeveral laudable edicts for the reformation of manners, though his own private conduct was very unconformable to his public decrees. His treatment of the aſtrologers was equally inconſiſtent; for, though he firmly believed in their deluſive arts, he paſſed an edict by which they were all baniſhed from Rome. He ſuppreſſed defamatory libels, regulated the police of the theatres, and forbade pantomimes to appear on the public ſtage. He was for a conſiderable time an enemy to every kind of rapine and extortion; he inſiſted on his officers abſtaining from all ſordid gains; he declined accepting eſtates that were left him by thoſe who had children of their own; and he diſcouraged calumniators and informers, alleging, that "the prince who does not puniſh informers, countenances and encourages them." With a change of circumſtances, however, the conduct of Domitian changed. Fond of magnificence and ſhew, he raiſed the means of gratifying his ruling paſſion by tyrannical exactions, and on the moſt frivolous pretences confiſcated the eſtates of the living and the dead. Incurring boundleſs expence by building, by theatrical ſhews and entertainments, and in various other ways, he had recourſe to unwarrantable means in order to provide himſelf with the neceſſary ſupply for defraying theſe charges.

Domitian, in the ſecond year of his reign, made an unprovoked attack on the Catti, a people of Germany, and laid waſte their borders; but he was intimidated by a report that they were collecting together their forces, and haſtily retreated. On his return to Rome, however, he claimed the honours of a triumph, and hired perſons to perſonate German priſoners. Other inſtances might be adduced, in order to prove that his ruling paſſion was vanity; and in the progreſs of his reign this vanity appeared to be blended with timidity and cruelty, ſo that in his general conduct and diſtinguiſhing character he was one of the moſt deteſtable tyrants that ruled the Roman world. Reſembling Caligula in his madneſs, he declared himſelf a god, and cauſed temples to be erected to his honour, and divine worſhip to be paid him. He was fond of flattery, and he found among the poets of his time too many who were diſpoſed to offer him this incenſe; and, among others, the licentious Martial frequently addreſſed him as his "dominus deuſque," lord and god. His jealouſy was always excited by merit and popularity; and thoſe whom he dreaded or declined to put to death, he deprived of poſts of honour and command, as was the caſe with Agricola. One of the moſt conſiderable among the public events of his reign was his war with the Dacians (ſee Dacia,) which, though terminated by a diſhonourable peace and treaty, afforded him occaſion for a new triumph, and for aſſuming the ſurname of Dacicus. In his warlike expeditions, he was commonly carried with effeminate luxury in a litter; and ſuch were his exactions and pillages in his marches, that his preſence was dreaded no leſs than that of the enemy. Jealous of ſubordinate commanders, and licentious in his own conduct, he enervated diſcipline, and encouraged licentiouſneſs in his armies. At Rome his chief occupation was the celebration of games and ſolemn feſtivals. By anticipating the eſtabliſhed period, he aſſumed the honour of celebrating the ſecular games. He alſo inſtituted a variety of other new games, ſuch as the gymnaſtic, muſical, and equeſtrian; or rather revived thoſe which had been inſtituted by Nero, and which were aboliſhed at his death. Theſe games he conſecrated to Jupiter Capitolinus. (See Capitoline *Games.*)

In his amphitheatrical ſhews he was both profuſe and cruel. Having cauſed to be dug an immenſe lake near the Tiber, he exhibited a ſea fight, in which the ſhips were ſo numerous that they formed almoſt two complete fleets; and during this exhibition, when a heavy rain fell, he would not ſuffer any of the ſpectators to withdraw, ſo that many died in conſequence of the cold, which they took on this occaſion. The diverſions which he appointed often laſted through the whole night; and he exhibited combats of gladiators, and fights of wild beaſts, by moonlight, or by the help of torches; and even females ran races and fought in the circus, like gladiators. Savage by nature, his cruelty was cheriſhed by ſuſpicion and diſtruſt; and he often uſed to ſay, alluding to an expreſſion of Demoſthenes, "that diſtruſt is the people's ſafeguard againſt tyrants, and the tyrant's ſafeguard againſt all." He is ſaid to have taken an inhuman pleaſure in the groans and tears of ſuffering men. With his cruelty he blended the moſt refined diſſimulation; ſo that he was never more to be dreaded than when he affected to appear moſt mild and merciful. The moderation which he aſſumed emboldened the ſenators to requeſt him to paſs an act for diſabling the emperor from putting any member of their body to death, by virtue only of his military power. Domitian, however, hated the ſenate, and refuſed to grant them this privilege: and in the exerciſe of the prerogative he retained, ſo conſonant as it was to his own nature, he put to death ſeveral illuſtrious ſenators on no other ground than that of their having become the unfortunate objects of his ſuſpicion and jealouſy. Nor were even the common people exempt from his inſatiable vengeance. Acts of cruelty afforded him ſo much pleaſure, that he was glad to find or to feign opportunities for indulging his ſavage diſpoſition. Accordingly, conceiving that the puniſhing of a veſtal, according to the ancient laws, that is, burying her alive, would give luſtre to his reign, he ordered Cornelia, chief of the veſtals, to be the devoted victim. As he advanced in years, his cruelty increaſed; and in the 11th year of his reign a circumſtance occurred, which was the rebellion of L. Antonius, who commanded the army on the Upper Rhine, that rouſed into exerciſe all the moſt ferocious paſſions of his nature. The rebellion was ſuppreſſed, and Antonius was ſlain; and yet he indulged a groundleſs ſuſpicion that many perſons were concerned in it, and determined to make them the victims of his wanton ſeverity. On this occaſion, and about this time, ſome of the moſt virtuous and dignified perſons in Rome were ſelected as ſacrifices. The number of thoſe who were put to death is not known; but among them were Helvidius Priſcus, Herennius Senecio, and Arulænus Ruſticus, three of the beſt and moſt illuſtrious ſenators who then lived. As theſe eminent perſons were philoſophers of the Stoic ſchool, their condemnation was followed by a decree of the ſenate, which baniſhed all philoſophers from Rome and Italy. Domitian, ſays Tacitus, could not bear to ſee the leaſt trace of honour and virtue; but drove from him all that profeſſed and taught the ſtudy of wiſdom and the liberal arts. Some of theſe philoſophers fled to the fartheſt parts of Gaul; others to the deſerts of Lybya and Scythia; and others again renounced the profeſſion, that expoſed them to ſuch danger, and conformed to the manners of the times.

Among the fugitives were Dio Chryſoſtom, Pontius Teleſinus, Epictetus, and Artemidorus. With philoſophy, Domitian baniſhed the liberal arts; and even eloquence was reduced to ſilence. This ſavage tyrant, confounding Chriſtianity with Judaiſm, and feigning ſome defalcation in the tributes due by his exactions to the imperial treaſury, filled the meaſure of his crimes by the perſecution of the Chriſtians. Another reaſon for this perſecution is alſo aſſigned; which was, his fear that ſome of the poſterity of David remained, and that at one period or other they would excite the Jews, whom he did not diſtinguiſh from the Chriſtians, to rebel. This perſecution took place A. D. 95, and continued till the emperor's death. (See Persecution.) Some have ſaid that, at this time, St. John was thrown into a caldron of boiling oil (ſee John); but it is more certain, that Flavius Clemens, a couſin of Domitian, who had been his partner in the conſulſhip, ſuffered death. The ſenate was at this time reduced to a ſtate of abſolute ſlavery: nor could the members of it dare to complain under the ſeverity they ſuffered, nor remonſtrate againſt any of the decrees, or ſentences of condemnation, which the emperor propoſed. "Under Domitian," ſays Tacitus, (Vit. Agricol.) "it was the principal part of our wretchedneſs to behold and to be beheld; when our ſighs were regiſtered; and that ſtern countenance, with its ſettled redneſs, his defence againſt ſhame, was employed in noting the paleneſs of ſo many by-ſtanders."

In his own family, at length, his tyranny was felt, and excited enemies againſt him; and a conſpiracy was formed againſt him under his own roof, and among his officers and freedmen, at the head of whom was Domitia, for whom he had, at various times, manifeſted great attachment and averſion. Suſpecting that ſome deſign was meditating againſt him, and apprehending real danger more from the ſurmiſes of his own guilty and gloomy ſoul, than from any of thoſe aſtrological predictions and warnings, which he is ſaid to have regarded, he became very cautious and circumſpect with regard to his own ſafety. But the plot was too deeply laid, and his deſtiny was fixed. As he was going to bathe, before dinner, his chamberlain, Parthenius, introduced to him Stephanus, ſteward of Domitilla, his niece, and wife of Clemens, under pretence of having ſome important buſineſs to communicate. Stephanus, having his arm in a ſling, as if he had been hurt, concealed a dagger; and, after preſenting a memorial to the emperor, and whilſt he was reading it, he plunged the dagger in his belly. Domitian had ſtrength enough remaining to ſeize the aſſaſſin and throw him upon the ground; and calling for his ſword, which was placed under his pillow, the ſcabbard only remained. Whilſt they were ſtill ſtruggling, the other conſpirators entered, and, with ſeven different ſtabs, diſpatched the tyrant. Some officers of his guard were alarmed, and entered, too late to ſave his life, though they killed Stephanus. Domitian's death took place Sept. 18th A. D. 96, when he was 44 years, 10 months, and 26 days old, and after he had reigned 15 years and 5 days. His body was privately buried by his nurſe, named Phyllis; and ſhe afterwards carried his aſhes privately to the Flavian family, where ſhe mixed them with thoſe of Titus's daughter Julia, whom ſhe had alſo taken care of in her infancy. In him terminated the race of emperors of the Flavian family. The ſenate, who deteſted and dreaded him whilſt he lived, rejoiced in his death. As ſoon as it was known, the ſenators ran in crowds to their place of aſſembly, and expreſſed their abhorrence of his memory with the bittereſt invectives. They wiſhed to have his body dragged with ignominy to the "Gemoniæ;" they ordered all the pictures, buſts, ſtatues, and other repreſentations of him to be demoliſhed; his name to be ſtruck out of the Roman annals, and all public monuments; from ſeveral of which, that are ſtill remaining, we find, that the decree of the ſenate was actually executed. The ſoldiers, whoſe affections he had ſtudiouſly gained by his liberalities and complaiſance, were the only perſons who regretted his death, and who wiſhed to avenge it upon his aſſaſſins. Suetonius. Dion Caſſius. Tacitus. Crevier.

DOMITIANA Statio, in *Ancient Geography*, a port of the Italian ſea, in Etruria, marked in the Itinerary of Antonine, near the river Almiana.

DOMITIOPOLIS, a town of Aſia, in Cilicia. Ptolemy.

DOMITZ, or Doemitz, in *Geography*, a ſmall town of Germany, in the duchy of Mecklenburg-Schwerin, near the Elbe, with an ancient caſtle; 60 miles S. of Schwerin, and 24 of Grabow.

DOMMAIGNE, a town of France, in the department of the Ille and Vilaine, and diſtrict of Vitré; 7 miles W.S.W. of Vitré.

DOMMALAIN, a town of France, in the department of the Ille and Vilaine, and diſtrict of La Guerche; one league N. of La Guerche.

DOMMART les Ponthieu, a town of France, in the department of the Somme, and diſtrict of Doulens; 4 leagues N.W. of Amiens.

DOMME, Mons Domæ, a ſmall town of France, in the department of the Dordogne, chief place of a canton, in the diſtrict of Sarlat, ſituated on a hill, near the river Dordogne; 6 miles S.E. of Sarlat. The town contains 1898, and the canton 12,465 inhabitants, diſperſed in 18 communes, on a territorial extent of 242 kiliometres and a half.

DOMMEL, a river of the kingdom of Holland, in the department of Brabant, which has its ſource in France, in the department of the Ourthe, paſſes by Bois-le-Duc, joins the river Aa, a little below that town, and falls into the Meuſe, near Crevecœur.

DOMMITZSCH, a ſmall town of the kingdom of Saxony, in the circle of Meiſſen, or Miſnia, near the Elbe, not far from Torgau. It has about 1000 inhabitants, chiefly employed in navigating the Elbe, and in agricultural purſuits. It was one of the commanderies of the Teutonic order in the bailiwick of Saxony.

DOMNAU, a ſmall town of the kingdom of Pruſſia, in the province of Natangen, a ſubdiviſion of Eaſtern Pruſſia. It was built in the year 1400; but there are, cloſe to the town, ruins of ancient fortifications, from which, it is ſuppoſed, that it had originally a ſtrong caſtle.

DOMNUS, or DONUS, in *Biography*, was born at Rome, and raiſed to the high office of pope in the year 676. He died in leſs than two years, during which time nothing of any great importance occurred, excepting the final ſubjugation of the church of Ravenna to that of Rome, after a long ſtruggle in maintenance of its independence.

DOMNUS, or DONUS, a ſecond pope of this name, was alſo born in Rome, and ſucceeded to the papal chair on the death of pope Benedict VI. in the year 974. His reign was of very ſhort duration, not being extended to a year. Nothing is recorded of him worthy of praiſe or blame. Moreri.

DOMO D'OSCELLO, or DOSSOLA, in *Geography*, a town of Piedmont, in the valley of Oſſola, defended by a fortreſs; 51 miles N.W. of Milan, and 70 N.N.E. of Turin. N. lat. 46°. E. long. 8° 2'.

DOMO REPARANDA, in *Law*, a writ that lies for one againſt his neighbour, by the fall of whoſe houſe he fears damage to his own: (Reg. of Writs, fol. 153,) in which caſe the civilians have the action *de damno infecto*.

DOMPAIRE, in *Geography*, a ſmall town of France, in the department of the Voſges, chief place of a canton, in the diſtrict of Mirecourt, with a population of 626 individuals; 12 miles N.E. of Darney, and 18 N.W. of Remiremont. The canton has 30 communes, 8466 inhabitants, and a territorial extent of 202½ kiliometres.

Dompaire was anciently the reſidence of the kings of Auſtraſia; and, in leſs remote times, that of the dukes of Lorraine.

DOMPIERRE, a ſmall town of France, in the department of the Allier, diſtrict of Moulins. It has 1158 inhabitants, and is the chief place of a canton, which in 9 communes, and upon a territorial extent of 355 kiliometres, has only a population of 7260 individuals.—Alſo, a ſmall town of France, in the department of the Lower Charente; 6 miles N.E. of La Rochelle. There are beſides ſeveral villages of that name in France.

DOM-REMY, a ſmall town of France, in the department of the Meuſe, not far from the little river Vaire, which, below this place, falls into the Meuſe; 6 miles N. of Neuf Château, and 9 S. of Vaucouleurs. It has been ſurnamed *La Pucelle*, for having been the native place of the celebrated Joan d'Arc, better known by the French name of *La Pucelle d'Orleans*, the Maid of Orléans.

DOMRIANKA, a town of Ruſſia, in the government of Perm; 40 miles N. of Perm.

DOMUS CONVERSORUM. See CONVERSOS.

DOMUS *Dei*, a name anciently applied to many hoſpitals.

DON, in *Geography*, called *Tuna* by the Tartars and *Tanaïs* by the ancients, who conſidered it as the boundary between Europe and Aſia, is one of the largeſt rivers of Europe, and the ſecond of thoſe which fall into the Palus Mæotis, or ſea of Aſoph, and through it into the Euxine. It has its ſource not far from Tula, in the government of Rezan in the Ivanofskoe lake. It ſtill divides the moſt eaſtern part of Ruſſia in Europe from Aſia, and in its courſe towards the eaſt approaches ſo near the Volga, that the czar Peter I. had undertaken to form a communication between them, by means of a canal, which is reported to be again in contemplation under the preſent emperor Alexander. The courſe of the Don, excluſive of its turnings and windings, is computed at 1000 verſts. It flows for the moſt part through a flat country, covered with foreſts of pines and oaks. Its bed is generally ſand, marle, and lime; it has many ſand banks and ſmall iſlands. In its courſe through the governments of Rezan, Tambof, Voronetz, and Ekatarinoſlaf, it takes up nearly three hundred rivers and ſtreamlets, the principal of which are the Voronetz, the Khoper, the Donetz, and the Manitſh.

The Don is liable to violent inundations. Its water is reckoned not very wholeſome, being turbid and chalky; yet it abounds in fiſh. Below Voronetz, the Don commonly freezes about November, but the ice goes off in the beginning of February.

The Steppe of the Don and Volga comprizes the whole ſpace between the Don, the Volga, and the Cuban; but is more generally known by the name of *Kuman Steppe* (which ſee.) Tooke's View of the Ruſſian Empire.

DON is the name of a ſmall river in Yorkſhire, England, and of another which riſes in the mountains of Culgarff, Scotland. The latter, after paſſing by Kintore, diſembogues its waters into the German ocean, and is navigable for ſmall veſſels a conſiderable way from its mouth. Several very valuable ſalmon weirs are formed on this river.

DON, a river of America, in the Eaſt Riding of the county of York, in Upper Canada, which diſcharges itſelf into York harbour.

DON, or *Dun River*, in the Weſt Riding of Yorkſhire. This river is navigable from its efflux into the York Ouſe river at Goole bridge, to Attercliff, two miles below Sheffield; it ſerves for the export of coals, iron, and iron ware from the great run of coal ſtrata. (See CANAL.) The lower part of this river is through level fens, above which it is embanked, and the warping of lands in its neighbourhood is practiſed as on the Trent river.

DON *Chriſtopher's Cove*, a cove on the north ſide of the iſland of Jamaica, having Anna's bay on the W., and Mammee bay on the S. E.; remarkable for having afforded ſhelter to the diſcoverer of America during a ſtorm, in 1503, and for being the ſite of the old town of Seville de Nueva. N. lat. 18° 58'. W. long. 77° 1'.

DONABURG. See DUNABURG.

DONAGHADEE, a poſt town of the county of Down, Ireland. It is a ſeaport on the north-eaſt ſide of the Ardes, and nearly oppoſite to port Patrick in Scotland, from which it is diſtant about 25 miles. Its quay is made of large ſtones, in form of a creſcent, without any cement, and is 128 yards in length, and about 21 or 22 feet broad, beſides a breaſt wall of the ſame kind of ſtones about ſix feet broad. The town conſiſts of two principal ſtreets beſides croſs lanes, one open and expoſed to the ſea, and the other at the back of it, which is well paved. This is the place from which the packets, which take the northern mail, ſail to port Patrick, and from it is a conſiderable exportation of horſes and horned cattle to Scotland. Donaghadee is 94½ Iriſh miles N. from Dublin. Long. 5° 26' W. Lat. 54° 37' N.

DONAIECZ, a river of Poland, which runs into the Viſtula; 25 miles below Cracow.

DONARIA, among the *Ancients*, in its primary ſignification, ſication, was taken for the places where the oblations offered to the gods were kept; but afterwards was uſed to denote the offerings themſelves; and ſometimes, though improperly, the temples.

DONAT, Saint, in *Geography*, is a ſmall town of France, in the department of the Drome, chief place of a canton in the diſtrict of Valence, 9 miles N.W. of Romans. It has 1595 inhabitants. The canton comprizes nine communes and a population of 4773 individuals upon a territorial extent of 107½ kiliometres.—Alſo, a fort of Holland, near Helvoet-ſluice.

DONATELLO, or Donato, in *Biography*, one of the principal revivers of ſculpture in Italy, was deſcended from humble origin at Florence, and born in the year 1383. He learned deſign under Lorenzo de Bicci, and by his aſſiduous application became an excellent ſculptor, and a maſter of perſpective and architecture. Abandoning the old dry manner, he was the firſt who gave his works the grace and freedom of the productions of ancient Greece and Rome. His talents and performances ſoon attracted the notice of the great Coſmo de Medici, who employed him on a tomb for pope John XXIII., and in other works, both public and private. Such was the high eſtimation in which he was held by Coſmo, that he availed himſelf of his taſte and judgment in forming thoſe grand collections, which gave celebrity to Florence as the parent of modern art. Amongſt his performances in that city are his Judith and Holofernes in bronze, his Annunciation, his St. George and St. Mark, and his Zuccone. To his St. Mark, Michael Angelo is ſaid to have addreſſed the queſtion, "Marco, perche non mi parli?" "Mark, why do you not ſpeak to me?" His equeſtrian ſtatue of bronze at Padua, to the honour of their general Gallamalata, is admirable and worthy of being compared with the beſt antiques. Conſcious of the excellence of his performances, he exclaimed to a Genoeſe merchant, who had beſpoke a head, and eſtimated its value by the number of days which it had employed the artiſt, "this man better knows how to bargain for beans than for ſtatues:—he ſhall not have my head;" and then daſhed it to pieces. Nevertheleſs, no man leſs regarded money than Donatello. Upon his return to Florence, Coſmo, at his death, recommended him to his ſon, who gave him an eſtate; but in a little while he begged his benefactor to take it again, as he did not like the trouble of it. The gift was reſumed, and a weekly penſion of the ſame value aſſigned to the artiſt. He had no notion of hoarding; but it is ſaid that he depoſited what he received in a baſket, ſuſpended from a cieling, from which his friends and work-people might ſupply themſelves at their pleaſure. He died in 1466, at the age of 83, and was buried in the church of St. Lorenzo, near his friend Coſmo, that, as he expreſſed himſelf, "his ſoul having been with him when living, their bodies might be near each other when dead." He left a ſon, named "Simon," who adopted his manner and acquired reputation. Tiraboſchi. Roſcoe's Lorenzo de Medici. Gen. Biog.

DONATIA, in *Botany*, (ſo named by Forſter, in memory of Vitaliano Donati, a native of Padua, appointed profeſſor of Botany at Turin, and ſent by his ſovereign on a botanical expedition into Aſia Minor, but he died on his voyage. He publiſhed at Venice in 1750, a ſmall folio with plates, entitled, *Della Storia Naturale Marina dell' Adriatico*, to which his friend Seſler ſubjoined the botanical hiſtory of a plant, named after him *Vitaliana*, ſince juſtly referred to *Primula*.) Forſt. Gen. 5. t. 5. Schreb. 787. Willd. Sp. Pl. v. 1. 491. Mart. Mill. Dict. v. 2. Juſſ. 300. Claſs and order, *Triandria Trigynia*. Nat. Ord. *Caryophylleæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of three awl-ſhaped, ſhort, diſtant leaves. *Cor.* Petals nine, or rather from eight to ten, linear-oblong, twice the length of the calyx, ſpreading. *Stam.* Filaments three, awl-ſhaped, the length of the calyx; anthers roundiſh, two lobed. *Piſt.* Germen ſuperior; ſtyles three, thread-ſhaped, ſomewhat longer than the ſtamens; ſtigmas bluntiſh. *Peric.* unknown.

Eſſ. Ch. Calyx of three leaves. Corolla of many petals.

1. D. *faſcicularis*, (Polycarpon magellanicum; Linn. Suppl. 115.) is the only ſpecies. A native of moiſt rocky places in Terra del Fuego. It forms tufts like a moſs or mountain Saxifrage, the *ſtems* being, moſtly ſimple, denſely clothed with imbricated, permanent, thick, ſmooth, lanceolate, obtuſe, entire *leaves*. *Flowers* terminal, ſeſſile, ſolitary, white. Forſter did not ſee the fruit, nor is our ſpecimen, gathered by him, ſufficient to throw any light upon the ſubject. The younger Linnæus referred this plant to the genus *Polycarpon*, ſurely without any thing in its habit or character to juſtify the meaſure, yet Dr. George Forſter ſubmitted to his judgment, and publiſhed it as ſuch in the Goettingen Commentaries, v. 9. 23. t. 3. mentioning at the ſame time the opinion of Sparrmann, that it really conſtituted a diſtinct genus.

DONATIANA, in *Ancient Geography*, an epiſcopal town of Greece, in Epirus.

DONATION, Donatio, an act or contract, whereby a man transfers to another, either the property or the uſe, of the whole, or a part of his effects, as a free gift.

A donation, to be valid and complete, ſuppoſes a capacity both in the donor, and the donee; and requires conſent, acceptance and delivery, and by the French law regiſtry alſo. See Gift.

Donation *mortis cauſa*, in *Law*, a diſpoſition of property made by a perſon in his laſt ſickneſs, who apprehending his diſſolution near, delivers or cauſes to be delivered to another, the poſſeſſion of any perſonal goods, (including bonds, and bills drawn on his banker,) to keep in caſe of his deceaſe. If the donor dies, this gift needs not the aſſent of his executor; but it ſhall not prevail againſt creditors; and it is accompanied with this implied truſt, that, if the donor lives, the property ſhall revert to himſelf, being only given in contemplation of death, or *mortis cauſa*. (Prec. Chanc. 269. 1 P. Wms. 406, 441. 3 P. Wms. 357.) This method of donation ſeems to have been conveyed to us from the civil lawyers, (Inſt. 2. 7. 1. Ff. l. 39. t. 6.) who borrowed it from the Greeks. Odyſſ. lib. xvii. ver. 78. and Euripides, Alceſtes, ver. 1020. See Blackſt. Comm. vol. ii. p. 514.

DONATISTS, in *Eccleſiaſtical Hiſtory*, ancient ſchiſmatics in Africa, ſo denominated from their leader Donatus.

As in the faction of the Donatiſts there were two eminent perſons of the name of Donatus, the one a Numidian, and biſhop of Caſæ Nigræ, and the other who ſucceeded Majorinus, biſhop of Carthage, as leader of this party, and who, on account of his learning and virtue, was called by his ſect, Donatus the Great; it has been a queſtion, from which of theſe the ſect derived its name? Probably they were thus denominated from both.

They had their origin in the year 311, when, in the room of Menſurius, who died in that year, on his return to Rome, Cæcilian was elected biſhop of Carthage, and conſecrated without the concurrence of the Numidian biſhops, by thoſe of Africa alone; whom the people refuſed to acknowledge, and to whom they oppoſed Majorinus; who, accordingly, was ordained by Donatus, biſhop of Caſæ Nigræ. They were condemned, in a council held at Rome, two years after their ſeparation; and afterwards in another at Arles in the year following; and again at Milan, before Conſtantine the Great, in 316, who deprived them of their churches in

Africa, and ſent their ſeditious biſhops into baniſhment, and puniſhed ſome of them with death. This treatment occaſioned violent commotions and tumults in Africa, the ſect of the Donatiſts being there both numerous and powerful. Their cauſe was ſupported by a confederacy of deſperate ruffians called *Circumcelliones*, (which ſee,) who filled Africa with ſlaughter and rapine. Conſtantine having tried various methods for conciliating them without effect, at length aboliſhed, by the advice of the governors of Africa, the laws that had been enacted againſt the Donatiſts, and allowed the people full liberty of adhering to the party they liked the beſt. Their cauſe was eſpouſed by another Donatus, called the Great, the principal biſhop of that ſect, who, with a number of his followers, was exiled by order of Conſtans. Many of them were puniſhed with great ſeverity. However, after the acceſſion of Julian to the throne in 362, they were permitted to return, and reſtored to their former liberty. Gratian publiſhed ſeveral edicts againſt them; and in 377 deprived them of their churches, and prohibited all their aſſemblies. But notwithſtanding the ſeverities they ſuffered, it appears that they had a very conſiderable number of churches towards the cloſe of this century, which were ſerved by no leſs than 400 biſhops; but at this time they began to decline, on account of a ſchiſm among themſelves, occaſioned by the election of two biſhops, in the room of Parmenian, the ſucceſſor of Donatus; one party elected Primian, and were called Primianiſts, and another Maximian, and were called Maximianiſts. The decline was alſo precipitated by the zealous oppoſition of St. Auguſtin, and by the violent meaſures which were purſued againſt them, by order of the emperor Honorius, at the ſolicitation of two councils held at Carthage; the one in 404, and the other in 411. Many of them were fined, their biſhops were baniſhed, and ſome put to death. This ſect revived and multiplied under the protection of the Vandals, who invaded Africa in 427, and took poſſeſſion of this province; but it ſunk again under new ſeverities, when their empire was overturned in 534. Nevertheleſs they remained in a ſeparate body till the cloſe of this century, when Gregory, the Roman pontiff, uſed various methods for ſuppreſſing them; his zeal ſucceeded, and there are few traces to be found of the Donatiſts after this period. They were diſtinguiſhed by other appellations; as Circumcelliones Montenſes, or Mountaineers, Campites, Rupites, &c. They held three councils, or conciliabules; one at Cirta in Numidia, and two at Carthage.

The errors of the Donatiſts, beſides their ſchiſm, were, 1. That baptiſm conferred out of the church, that is, out of their ſect, was null; and accordingly they rebaptized thoſe who joined their party from other churches, and re-ordained their miniſters. 2. That their's was the only true, pure, and holy church; all the reſt of the churches they held as proſtitute, and fallen.

Donatus ſeems likewiſe to have given into the doctrine of the Arians, with whom he was cloſely allied; and accordingly, St. Epiphanius, Theodoret, and ſome others, accuſed the Donatiſts of Arianiſm; and it is probable that the charge was well founded, becauſe they were patronized by the Vandals, who were of theſe ſentiments. But St. Auguſtine. ep. 185. to count Boniface, and Hær. 69. affirms, that the Donatiſts, in this point, kept clear of the errors of their leader.

DONATIVE, DONATIVUM, a preſent made to any perſon; called alſo *gratuity*.

The Romans made large donatives to their ſoldiers. Julia Pia, wife of the emperor Severus, is called, on certain medals, MATER CASTRORUM, becauſe of the care ſhe took of the ſoldiery, by interpoſing for the augmentation of their donatives, &c.

Donative was properly a gift made to the ſoldiery; as congiarius was that made to the people.

Salmaſius, in his notes to Lampridius, in his Life of Heliogabalus, mentioning a donative that emperor gave of three pieces of gold *per* head, obſerves, that this was the common and legitimate rate of a donative. Caſaubon, in his notes on the Life of Pertinax by Capitolinus, obſerves, that Pertinax made a promiſe of three thouſand denarii to each ſoldier; which amounts to upwards of ninety-ſeven pounds ſterling. The ſame author writes, that the legal donative was twenty thouſand denarii; and that it was not cuſtomary to give leſs, eſpecially to the prætorian ſoldiers; that the centurions had double, and the tribunes, &c. more in proportion.

DONATIVE, in the *Canon Law*, a benefice given, and collated to a perſon, by the founder, or patron; without either preſentation, inſtitution, or induction by the ordinary; ſo called becauſe they began only by the foundation and erection of the *donor*. If chapels founded by laymen be not approved by the dioceſan, and, as it is called, *ſpiritualized*, they are not accounted proper benefices, neither can they be conferred by the biſhop, but remain to the pious diſpoſition of the founders; ſo that the founders, and their heirs, may give ſuch chapels without the biſhop.

Gwin obſerves, that the king might of ancient time found a free chapel, and exempt it from the juriſdiction of the dioceſan; ſo may he, by letters patent, give liberty to a common perſon to found ſuch a chapel, and make it donative, not preſentable; and the chaplain, or beneficiary, ſhall be deprivable by the founder or his heir, and not by the biſhop. And this ſeems to be the original of donatives in England. See ADVOWSON.

When the king founds a church, &c. *donative*, it is of courſe exempted from the ordinary's juriſdiction, though no particular exemption be mentioned, and the lord chancellor ſhall viſit the ſame; and where the king grants a licence to any common perſon to found a church or chapel, it may be donative, and exempted from the juriſdiction of the biſhop, ſo as to be viſited by the founder, &c. (Co. Litt. 134. 2 Rol. Abr. 230.) The reſignation of a donative muſt be to the donor or patron, and not to the ordinary; and donatives are not only free from all ordinary juriſdiction, but the patron and incumbent may charge the glebe to bind the ſucceſſor, and if the clerk is diſturbed, the patron may bring *quare impedit*, &c. Alſo the patron of a donative may take the profits thereof when it is vacant. (Co. Litt. 344. Cro. Jac. 63.)

Donatives are within the ſtatute againſt ſimony; and if they have cure of ſouls, within that againſt pluralities. If the patron of a donative doth not nominate a clerk, there can be no lapſe thereof, unleſs it be ſpecially provided for in the foundation; but the biſhop may compel him to do it by ſpiritual cenſures. But if it be augmented by queen Anne's bounty, it will lapſe like other preſentative livings. 1 Geo. I. ſtat. 2. cap. 10. The ordinary cannot viſit a donative, and therefore it is free from procuration, and the incumbent is exempted from attendance at viſitations.

No perſon is capable of a donative, unleſs he be a prieſt lawfully ordained, &c. (Yelv. 61. ſtat. 14 Car. II. c. 4. 1 Litt. 488.) There may be a donative of the king's gift with cure of ſouls, as the church of the Tower of London is. A parochial church may be donative, and exempt from the ordinary's juriſdiction. (Godolph. 262.) The church of St. Mary-le-Bow in Middleſex is donative, and the incumbent being cited into the ſpiritual court, to take a licence from the biſhop to preach, pretending that it was a chapel and that the parſon was a ſtipendiary, it was ruled in the king's bench, that it was a donative; and if the biſhop viſit, the court of B. R. will grant a prohibition. (1 Mod. 90. 1 Nelſ. Abr. 676.) If a patron of a donative doth once preſent his clerk to the ordinary, and the clerk is admitted, inſtituted, and inducted, then the donative ceaſeth, and it becomes a church preſentative. (Co. Litt. 344.) But when a donative is created by letters patent, by which lands are ſettled upon the parſon and his ſucceſſors, and he is to come in by the donation of the king, and his ſucceſſors; in this caſe, though there may be a preſentation to the donative, and the incumbent come in by inſtitution and induction, yet that will not deſtroy the donative. (2 Salk. 541.)

All biſhoprics in ancient time were donative by the king. (3 Rep. 75.) Again, where the biſhop has a gift of the benefice, it is properly called a donative, becauſe he cannot preſent to himſelf.

Donatives have two peculiar properties, one, that the preſentation does not devolve to the king as in other livings, when the incumbent is made a biſhop. (Ca. Parl. 184.) The other is, that a donative is within the ſtatute of pluralities, if it is the *firſt* living; but if the donative is the ſecond benefice taken without a diſpenſation, the firſt would not be void; for the words of the ſtatute are *inſtituted and inducted* to any other, which are not applicable to donatives. (1 Woodd. 330.) And therefore it ſeems that, if donatives are taken laſt, they may be held with any other preferment.

DONATO, Bernardino, in *Biography*, a learned Italian, was born at Zano in the Veroneſe. The exact time of his birth and death are not aſcertained. He flouriſhed in the ſixteenth century, and was greatly celebrated as a tranſlator. His verſion of the Demonſtratio Evangelica of Euſebius has been ſeveral times reprinted. He tranſlated the works of Galen, Ariſtotle, Xenophon, and of ſome of the early eccleſiaſtical writers. As an author, he publiſhed a Latin dialogue on the difference between the philoſophy of Ariſtotle and that of Plato. A Latin grammar is alſo aſcribed to him, which was printed at Venice in 1529. Moreri.

Donato, Girolamo, a patrician of conſiderable rank at Venice, who was both a ſtateſman and man of letters. The exact time of his birth is not known, but it is ſuppoſed to have been about 1454. As a literary man, he wrote an apology for the pope's ſupremacy againſt the Greek church, and a letter to cardinal Caraffa upon the ſame ſubject. He drew up a long and forcible apology for the Venetians againſt Charles VIII. king of France, and tranſlated into Latin ſome of the works of Chryſoſtom, and other Greek authors. He was confeſſedly one of the moſt learned men of the age. He died in 1511: as a ſtateſman, he was eminent for probity and talents, and was employed by his country in various important and very difficult negociations. Moreri.

. Donato, Baldassave, a muſical compoſer of Naples, who publiſhed at Venice, in 1555, "Canzone Villaneſche alla Napolitana," in very good counterpoint of four parts. In theſe little national ſongs there is generally more humour in the words, and more air and vivacity in the melody, than in any other ſongs, equally ancient, that we have ſeen. They ſeem to have been ſung about the ſtreets, in parts, as the words of ſeveral imply. In one of them, a ſinging-maſter ſpeaks, who offers to teach the Guidonian hand, or gamut, in an hour; and in one of the following, the ſyllables *ut, re, mi, fa,* &c. are ingeniouſly applied in moſt of the parts, to ſuch ſounds as require them, in ſolmiſation.

DONATUS, Ælius, flouriſhed in the time of Conſtantine, and was one of the preceptors of St. Jerom. He was a commentator upon the works of Virgil and Terence. He compoſed ſome grammatical pieces which are ſtill remaining.

DONAUESCHINGEN, or Doneschingen, in *Geography*, a ſmall town of Germany, in Suabia, is the principal reſidence of the princes of Furſtenberg, in the court yard of whoſe palace the Danube, in German the Donau, takes its riſe. Some ſmall ſprings bubbling from the ground, form a baſon of about thirty feet ſquare, and from this baſon iſſues the mighty Danube, which, in its origin, is only a little brook.

DONAVRTZ, a town of Hungary, 16 miles N. N. W. of Palatza.

DONAUSTAFF, a town of Germany, in the circle of Bavaria, and biſhopric of Ratiſbon, on the Danube; 6 miles E. of Ratiſbon.

DONAWERTH, Donawert, in Latin *Donaverda Danubii inſula*, is a ſmall town of Bavaria, on the northern ſhore of the Danube, 30 miles N. of Augſburg, and 45 N. E. of Ulm. It is on the borders of Suabia, and was anciently a free imperial city. In 1805, it was occupied by the French under marſhal Soult, who reſtored the bridge which the Auſtrians had deſtroyed.

DONAX, in *Botany*, (δοναξ, a *reed*, *arrow*, or *pipe*,) is retained by Linnæus as the ſpecific name of the great reed of the ſouth of Europe, *Arundo Donax*, ſuppoſed to be the δοναξ of Dioſcorides. See Arundo.

Donax, Loureiro Cochinch. 11, is applied by that author to the *Arundaſtrum* of Rumph. Amboin. v. 4. 22. t. 7. which Loureiro ſuppoſes a new genus; the characters of *Maranta*, to which it appears to belong, not having been clearly defined when he wrote.

DONAX, in *Conchology*, a genus of bivalves, the animal of which is conſidered as a Tethys. Theſe have the anterior part very obtuſe, and the margin in general crenulated; the hinge is furniſhed with two teeth, and a ſingle marginal one placed rather behind. Some ſpecies are deſtitute of this marginal tooth, others have two, or ſometimes even three.

Species.

Scortum. Shell triangular-heart-ſhaped, with a flat frontal margin. Linn. &c.

The colour of this ſhell is cinereous, mixed with violet; within ſnowy, at the hinge violet; marginal teeth double in each valve, with an intermediate cavity. Inhabits the Indian ocean.

Pubescens. Shell ciliated with ſpines on the anterior margin. Linn.

Native of the Indian ocean. The outſide of this ſhell is whitiſh with fine decuſſating ſtriæ; the anterior margin flat with an ovate gape, and behind the beaks an ovate oblong depreſſion. Inſide as in the former.

Rugosa. Shell wrinkled and gibbous before; margin crenated. Linn. *Paman*, Adanſon.

A ſmall ſpecies found in the Mediterranean, Atlantic, and American ſeas; the colours various and uſually diſpoſed in bands on the outſide, within violet and white. This kind has no marginal tooth.

Striata. Shell ſtriated, with denticulated margin; anterior part obtuſe. Knorr.

Inhabits the ſouthern ſeas of Europe. The colour is white, and the ſhell in general is rather gibbous.

Trunculus. Shell at the anterior part ſmooth, with crenated margins; with violet. Linn. Donov. Brit. Shells, &c.

Found in plenty on many of the ſea coaſts of Europe; the ground colour is moſt commonly whitiſh or tinged with yellow, and marked in the direction of the ſtriæ from the beaks downwards, with broader or narrower ſtripes, or lines of rich purple. Length about three quarters of an inch.

Denticulata. Shell at the anterior part very obtuſe; lips tranſverſely wrinkled, finely ſtriated longitudinally, and denticulated at the margin. Gmel. Donov. Brit. Shells, &c.

Very abundant in the European and American ſeas, and is rather larger than the laſt. This ſhell is wedge-formed, and is in general whitiſh, ſtreaked or ſtriped with brown or purple from the beaks to the margin.

Cuneata. Shell wedge-ſhaped, the margins very entire. Chemn, &c.

Inhabits Tranquebar, and meaſures about an inch in length. The ſpecies varies from yellow to rufous, and has the margin violet; the anterior part tranſverſely wrinkled in front, with perpendicular lines croſſing the wrinkles; colour within violet and white.

Faba. Shell gibbous, very finely ſtriated tranſverſely, ſpotted with yellow; tip of the beak, and band at the margin blueiſh, the former intercepted with a white ray. Chemn. Native place unknown.

Scripta. Shell ovate compreſſed, ſmooth, marked with purple waved lines, margins crenulated. Linn.

Inhabits the coaſt of Malabar, and reſembles the laſt, but is thinner; the outſide is elegantly painted with angular reddiſh or brown lines, and the hinge ſomewhat reſembles that of a Venus.

Muricata. Shell ovate, with muricated ſtriæ, the margin denticulated. Linn.

Native of the Indian ſea. This ſhell is gibbous and of a reddiſh colour, with the frontal margin gaping, and ending each ſide in a compreſſed tooth.

Irus. Shell oval, with tranſverſe waved erect ſtriate membranaceous wrinkles or foliations. Gualt. Donov. Brit. Shells, &c.

Inhabits the Mediterranean, and is uſually found buried in clay on the ſea-ſhore. Its ſize is that of a ſmall kidney bean.

Lævigata. Shell obtuſe before, obſoletely ſtriated at the ſides, yellowiſh green within, and violet at the beaks; margin very entire; hinge without marginal teeth. Chemn.

Native of Tranquebar, the length from the beak to the margin about an inch and a half, and its breadth two inches and a quarter; margin near the beak ſomewhat incumbent. This is a rare ſpecies.

Spinosa. Shell ſnowy, within blueiſh; poſterior part ſmooth and perpendicularly ſtriated; anterior part truncated, and very finely cancellated; the angles ſpinous. Chemn.

A very ſcarce ſpecies found in Tranquebar.

Incarnata. Shell carnation; anterior part truncated, wrinkled and marked with reticulated ſtriæ; poſterior part cuneated and furrowed with fine perpendicular ſtriæ. Chemn.

Inhabits Tranquebar. Shell ſometimes banded with yellowiſh.

Argentea. Shell oval ſmooth, olive-green, within ſilvery; margin with more elevated acute teeth near the hinge. Gualt.

Bicolor. Shell ovate, with elevated ſtriæ croſſing a few tranſverſe lines; rufous with a white ray each ſide. Gualt.

The native place of this and the preceding ſpecies is unknown.

Radiata. Shell brown with hyaline ſpots; the outſide with crowded arched tranſverſe ſtriæ; inſide with perpendicular ones; the anterior part wrinkled. Schroet.

Inhabits Tranquebar. Length about an inch; the anterior part not very obtuſe, and marked with two white rays; poſterior part rounded with a white border.

Straminea. Shell with very thin perpendicular ſtriæ croſſing the tranſverſe ribs on the forepart; ſtraw colour with darker tranſverſe bands; margin tawny, and very entire behind. Schroet.

Leſs than the laſt. Within fleſh colour, towards the rim violet. Native country unknown.

Candida. Shell entirely white, with a few thin arched tranſverſe ſtriæ, turned obliquely towards the rim; hinge with three oblique middle teeth; margin very entire. Schroet.

Native of Tranquebar. This ſhell is thin, brittle, and about an inch in length.

DONAZ, in *Geography*, a ſmall town of France, in the department of Doire, which was formerly a part of Piedmont in Italy. It is the chief place of a canton in the diſtrict of Aoſte, and has a population of 1097 individuals. The canton contains 5410 inhabitants, diſperſed in ſix communes.

DONCASTER, a large, reſpectable, and ancient town in the Weſt Riding of Yorkſhire, England, was a Roman ſtation, and, according to ſome authors, was the place where the province of Maxima Cæſarienſis commenced. It was called by Nennius *Caer-Daun*; by Antoninus, *Danum*; in the Saxon annals it is written *Dona Cercen*; and in the firſt charter granted to the town by king Richard I. it is called *Danecaſtre*. The ancient Itineraries concur in inſerting Doncaſter as a Roman ſtation, and a Roman votive altar of exquiſite workmanſhip diſcovered in this town in 1781, infallibly proves, by its ſculpture and inſcription, the truth of the aſſertion and fact. This altar, which was found in digging a cellar in St. Sepulchre's gate, is conſidered as the third of the kind ever diſcovered in any part of the world: one of the other two having been found at Bincheſter in the county of Durham, and the other at Ribcheſter in Lancaſhire. In the hiſtory of Doncaſter the moſt remarkable events were—the deſtruction of the town by lightning about the year 759, when, Camden ſays, "it was ſo buried in its own ruins, that it has hardly yet recovered itſelf." The battle of Towton-field, in this vicinity, took place on Palm Sunday 1460, between the armies of the contending houſes of York and Lancaſter, when nearly 37,000 men were left dead on the field, a greater number than is ſuppoſed to have been ſlain in any battle in this kingdom. And of Aſke's rebellion in 1536, this town and its vicinity were the principal ſcenes.

Doncaſter has obtained a variety of charters from ſucceſſive kings from Richard I. to James II. The corporation is compoſed of a mayor, recorder, town-clerk, twelve aldermen, and twenty-four common council men. The revenue of the corporation amounts to nearly 6000*l.* *per annum*; which is chiefly expended for the comfort and emolument of the inhabitants; by large contributions to all charitable inſtitutions; by ready aſſiſtance to the poor in times of ſcarcity; by the erection of elegant edifices for public amuſement; and by defraying the expences of lighting and paving the ſtreets, and the conveyance of river water: ſo that the inhabitants enjoy privileges rarely to be found in any country town. Doncaſter has never been, what is uſually called, a trading town: it was formerly, in ſome degree, noted for knitted ſtockings; and of late ſome attempts have been made to eſtabliſh manufactories of various kinds, but without ſucceſs. The ſhopkeepers and mechanics chiefly depend for ſupport on the perſons of fortune in the town and neighbourhood, on the corporation, and on travellers, of whom, it being on the great road from London to Edinburgh, there is a conſtant ſucceſſion paſſing through the town. The houſes in Doncaſter are in general well built; the High-ſtreet, in particular, which is about a mile in length, is, for length, width, and beauty, allowed to be the beſt on the great northern road. The church (for there is but one, which in ſuch a conſiderable town is rather ſingular) is a large handſome ſtructure. It ſtands on the area of the old caſtle, which, with the lordſhip, was in the poſſeſſion of Nigell de Foſſard, at the time of the conqueſt; and was probably built of the old materials of the caſtle; but the preciſe period of its erection it is now difficult to aſcertain. In a recent repair of the church a ſtone was taken out of the wall at the eaſt end, on which was the date 1071: whence it may be inferred that the eaſtern part was built at that time: but the ſeveral joinings in the ſtone-work clearly denote that one part was built at a different time from the other. The preſent elegant tower is of a later date, and from the peculiar ſpecies of its architecture appears to have been erected in the reign of Henry III., a period when many of our preſent churches derive their origin. The font, in which children are yet baptized, is of free ſtone, and was made in the reign of Edward the Confeſſor, it bearing date 1061. The principal public buildings of the town are, the manſion-houſe, the town-hall, a grammar-ſchool, St. Thomas's hoſpital, erected and endowed by Thomas Ellis in 1588, a diſpenſary, a workhouſe, a theatre, and four meeting-houſes or chapels for diſſenters of different denominations. Horſe races are held here in September; a grand ſtand has been built by the corporation for the accommodation of the company who reſort to this town on that occaſion. Doncaſter is ſituated 158 miles N. from London; has a well ſupplied market on Saturdays, and two annual fairs; was returned to parliament in 1801, as containing 1186 houſes, and 5697 inhabitants, of whom 1043 were employed in various trades and manufactures, particularly in ſpinning wool and cotton. Over the river Don, on which the town is ſeated, are two handſome bridges; in the vicinity of which were formerly two convents of White and Grey Friars. Miller's Hiſtory of Doncaſter, 4to. 1804.

DONCHERY, a ſmall but neat town of France, in the department of the Ardenne, near the river Meuſe, 3 miles W. of Sedan.

DONDANGA, a town of the duchy of Courland, 24 miles N. E. of Piltyn.

DONDE, James De, ſurnamed the *Aggregator*, on account of the large number of compoſitions he contrived for the cure of various diſeaſes, in *Biography*, was of a reſpectable family at Padua, and was himſelf in great repute for his profeſſional abilities. He flouriſhed about the middle of the fourteenth century. His principal work is called "Promptuarium Medicinæ, in quo non ſolum facultates ſimplicium et compoſitorum Medicam. declarantur, verum etiam, quæ, quibuſvis Morbis medicamenta ſint accomodata, ex veteribus Medicis monſtrantur," printed 1481, but written, as we learn from the preface, in 1355. It is principally, as the title informs us, taken from the works of the ancient phyſicians; and to tranſlate, or tranſcribe, from the works of the ancients, was the principal labour of the literati of that age. Donde alſo became famous for his ſkill in the mathematics; and in mechanics he contrived a clock, which not only ſhewed the hours of the day and night, but the paſſage of the ſun through the twelve ſigns of the zodiac, the place of the moon, &c.; but this, on good authority, is ſaid to have been the performance of his ſon, who acquired conſiderable reputation for his philoſophical acumen; that made by the father was more ſimply conſtructed. Donde taught the art of obtaining the ſalt from the waters of Albano; about one pound of ſalt from a thouſand pounds of water. His account of the method of obtaining it was printed at Venice, with his "Treatiſe de fluxu, et refluxu Maris," in 1571. He left two ſons, John, who, beſides inheriting his father's talents for mechanical purſuits, was well inſtructed in every other branch of literature. Petrarch, with whom he was cloſely connected, left him a legacy to purchaſe a ring, to be worn in memory of him. The other ſon, Gabriel, practiſed medicine with great ſucceſs at Venice, where he is ſaid to have acquired an ample fortune. Haller Bib. Eloy. Dict. Hiſt. General Biog.

DONDON, in *Geography*, one of the thirty-three cantons of the department of the North, in the iſland of St. Domingo, in the Weſt Indies, now Hayti.

DONDRE Head, the moſt ſouthern point of the iſland of Ceylon, about 4 miles from Matura; called by the natives Dewullum, Dewunder Head, or Divi-noor. Within half a mile of this point ſtands a Cingleſe temple of a circular ſhape, about 150 feet in circumference, and 12 feet high. From the centre riſes a bell-ſhaped ſpire, with a ſmall cone on a ſquare pedeſtal, the whole about 30 feet high. The Cingleſe repair hither daily to perform their devotions. A granite pillar, to receive a lamp, is placed at the front of the temple, which is moſtly cut out of ſolid rock. This temple contains a figure of Buddou, and in the ſhrine is ſaid to be buried one of the teeth of the ſacred elephant. Cloſe to the coaſt is a building deſigned for the uſe of devotees, who perform their laſt ablution in the ſea. This building is encircled by rows of pillars of granite, about 10 feet high. Beyond this is the inner portal of an Hindoo temple, conſiſting of two upright ſtones ſupporting a croſs one, all covered on one ſide with ornaments, ſimilar to thoſe on the Coromandel coaſt. To the left are the ruins of more temples. "On narrowly inveſtigating theſe remains of antiquity," ſays Percival (Account of the Iſland of Ceylon, p. 155.), "and comparing them with the religion and works made in the preſent and laſt centuries by the Ceyloneſe, they do not appear to belong originally to the preſent inhabitants of Ceylon, but altogether correſpond with the opinions and workmanſhip of the Hindoos." Cingleſe temples appear to have been erected at a much later period, on the ſcites of thoſe originally conſtructed by the Hindoos. Dondre-head lies in N. lat. 5° 51′. E. long. 80° 11′.

DONDUCCI, Gio. Andrea, called Il Mantelетta, from the trade of his father, who was a pail-maker, in *Biography* a painter of hiſtory and landſcape, was a Bologneſe, and born in 1575. Inclined to painting by a powerful propenſity of nature, he became a diſciple of Caracci; and acquired diſtinguiſhed reputation by a great ſpirit of deſign, in which he imitated Parmigiano, and a native facility, which enabled him to colour much canvas in a little time. In his firſt performances he diſregarded drawing, and contrived to catch the eye by ſurrounding a ſplendid centre with impenetrable darkneſs, which abſorbed every trace of outline. His ſucceſs in this way is ſaid to have encouraged thoſe painters called "Tenebroſi," ſhell painters, who became numerous in the Venetian and Lombard ſchools. But failing to change his manner as he grew older, light, no longer ſupported by obſcurity, ſerved only to expoſe his weakneſs; and the miracles of St. Domenico, in the church of that ſaint, which had been conſidered as his maſterpieces, became by alteration the meaneſt of his works. The ſame diverſity of manner, ſays M. Fuſeli, is obſervable in his ſmaller pictures. Thoſe of the firſt, ſuch as the miracle of the Manna, in the Spado palace, are as highly valuable as his landſcapes, which in many galleries would be taken for the works of Caracci, were they not diſcriminated by that original ſhade that ſtamps the genuine ſtyle of Mantelletta. Pilkington's Dict. by Fuſeli.

DONE Sur, *grant and render*, in *Law*, a double fine, comprehending the fine "ſur cognizance de droit comme ceo," and the fine "ſur conceſſit," which may be uſed to create particular limitations of eſtates. See Fine.

DONEGAL, in *Geography*, the name of a county in the province of Ulſter, Ireland, ſituated in the north-weſt extremity of the iſland, and bounded on the eaſt by Londonderry and Tyrone, on the ſouth by Fermanagh and Leitrim, and on the weſt and north by the Atlantic ocean. It was formerly called *Tyrconnel*, and was a ſeparate principality, the chieftains of which were very powerful, even as late as the time of queen Elizabeth. It extends 57 Iriſh miles (72 Engliſh) from north to ſouth; and 40 Iriſh miles (51 Engliſh) from eaſt to weſt. It contains 679,550 acres, or 1061 ſquare miles, Iriſh meaſure; which are equal to 1,091,736 Engliſh acres, or 1704 ſquare Engliſh miles. The number of houſes, in 1790, was 23,521, which at ſix to a houſe, would give a population of about 140,000, which is very trifling for ſuch an extent of country. The number of pariſhes is only forty-two, in which are forty-ſix churches: they are in the dioceſes of Raphoe and Derry. The only members which are returned to the imperial parliament, are the two repreſentatives of the county. Donegal is a very rugged country, in many places rendered leſs habitable by bogs, and almoſt every where rough with mountains. It is not, however, deſtitute of good land in the vallies between theſe rocky maſſes, and along the banks of many rivers. To enumerate the mountains of this county would be as difficult as it would be uſeleſs. The principal cluſters are the Slieble-league mountains, which occupy the peninſula weſt of Killybegs, and form part of a chain extending round the weſt to Lough Foyle; and the Barneſmore mountains adjoining the county of Tyrone, on the north of Lough Derg, which are connected with the mountains of Fermanagh. The champaign country is chiefly between Ballyſhannon and Donegal, and the tract adjoining the county of Tyrone. Agriculture is in the former of theſe at a very low ebb, and the natural advantages are by no means improved. Near Ballyſhannon there is an extenſive tract of limeſtone, with a thin ſurface of light brown gravelly ſoil, though in the reclaimed parts the ſoil is deep and rich. The eaſtern part adjoining Tyrone, comprehending ſixteeen or ſeventeen miles long, by eight or nine broad, is the moſt improved part of the county; being thickly inhabited, and the ſoil being tolerably good for potatoes, oats, barley, and flax. The mineral treaſures of this mountainous diſtrict are probably great, but are yet very little known. The mountains near the ſea are moſtly granite, but they are interſected occaſionally by limeſtone and ſlate. Lead ore, in ſome places appearing very rich, is found in great abundance, and ſome mines have been worked, but not with ſpirit or to advantage. Iron ore and manganeſe are alſo found in many places, and there are ſome indications of coal. Silicious ſand, found near Sheephaven, is carried to Belfaſt for the glaſs manufactory, and is found to be of excellent quality for this purpoſe. It may be added here that the linen manufacture extends to this county. In the peninſula of Iniſhowen, and the parts adjoining Derry and Tyrone, and alſo about Ballyſhannon, cloth is woven; and yarn is ſpun in every part of it. A great deal of flax is imported at Derry, as the county does not raiſe enough for its own manufacture. The principal rivers of this county are the Fin, the Dale, the Erne, the Guibarra, and the Swilly. The Fin riſes in a lake at no great diſtance from the ocean, and croſſing from weſt to eaſt, meets the Derg near Lifford, and thence under the name of Foyle, flows into Lough Foyle. The Dale purſuing a ſimilar courſe, flows into the Foyle a few miles north of Lifford. The Erne diſcharges the waters of Lough Erne into the bay of Donegal, a little below Ballyſhannon. Though its courſe is ſhorter, it is of conſiderable breadth, but the navigation is impeded by ſeveral rocks in the bed of the river. The Guibarra is alſo noted for its extraordinary breadth and depth, in proportion to the ſhortneſs of its courſe, which extends ſcarcely twenty miles from its ſource to the ocean. The Swilly is only remarkable for giving name to a great lough or inlet of the ſea, which forms the weſtern boundary of the peninſula of Iniſhowen. Lough Swilly runs ſixteen miles into the land, but never exceeds ſix, whilſt it is ſeldom more than two miles in breadth. Though a ſafe harbour, it is little frequented. The harbour of Mubray has not even a village on its ſhores. The country on the north weſtern coaſt appears to be not only very barren, but to have ſuffered from a change of climate. The effects of drifting ſands are very ſtriking. The peninſula of Hornhead, in 1787, contained veſtiges of encloſures ſo ſmall and ſo numerous, as to mark the reſidence of a number of families in a ſpot which then exhibited nothing but

"A deſert, ſalt and bare,
"The haunt of ſeals and orcs and ſea-mew's clang."

About a century ago an elegant edifice, according to the taſte of that age, was built on the peninſula between the harbours of Sheephaven and Mubray, which in 1794 ſtood "like Tadmor of the eaſt, the ſolitary wonder of a ſurrounding deſert." The gardens are totally denuded of trees and ſhrubs by the fury of the weſtern winds: their walls, unable to ſuſtain the maſs of overbearing ſands, have ſunk before the accumulated preſſure, and overthrown in numberleſs places, have given free paſſage to this reſtleſs enemy of all fertility. The courts, the flights of ſteps, the terraces, are all involved in equal ruin; and their limits only diſcoverable by tops of embattled walls, viſible amid hills of ſand. The manſion itſelf, yielding to the unconquerable fury of the tempeſt, approaches faſt to deſtruction: the freighted whirlwind, howling inceſſantly through every avenue and crevice, bears along with it its drifted burden, which has already filled the lower apartments of the building, and begins now to riſe above the once elevated threſhold. Fields, fences, villages, involved in common deſolation, are reduced to one undiſtinguiſhable ſcene of ſterile uniformity, and twelve hundred acres of land are ſaid thus to have been buried, within a ſhort period, in irrecoverable ruin. This account was given by a man of integrity and obſervation, the late Rev. Dr. W. Hamilton, author of the account of Antrim, whoſe premature death, in conſequence of the rebellion, was a conſiderable loſs to his country. There is a curious phenomenon near Hornhead, which may alſo deſerve notice. By decompoſition of part of the rock, the waves have perforated a cave many yards in diameter, which extends about ſixty feet into a rock, making part of the main land, and nearly horizontal with the level of the ſea at high and low water marks. When the wind blows due north, and the tide is half in, this perforation, called *M'Swine's Gun,* is ſeen to ſpout ſea water far higher than the eye can reach, into the air, whilſt the noiſe can be heard at the diſtance of 20 or 30 miles. On the weſtern coaſt, between the river Guydore and the ocean, lies a tract of country called the *Roſſes,* part of which is very marſhy. Oppoſite to this tract is a large cluſter of iſlands, called the north iſles of Arran, on one of which the town of Rutland was built, with parliamentary aid for carrying on the herring-fiſhery. (See RUTLAND.) On the ſouth are the harbours of Killybegs and Donegal, which are of little conſequence. There is no town of importance from its ſize or manufactures in the county. Lifford, which is on the borders of the county of Tyrone, and within a mile of Strabane, ſeems to have been fixed upon merely to accommodate the judges and barriſters, to the great inconvenience of the inhabitants. Donegal was one of the counties forfeited to the crown in the beginning of the reign of James I., and which were colonized by that monarch. Beaufort's Memoir. A. Young's Tour in Ireland. Statiſtical Survey of Donegal. Hamilton on Iriſh Tranſactions, vol. 6.

DONEGAL, a ſmall poſt and market town in the county of Donegal, Ireland, which ſtands on a fine bay, but is a place of little trade. It was formerly a borough, but loſt its privilege of being repreſented in parliament by the union. It is 112 miles N.W. of Dublin. Long. 7° 57′ W. Lat. 54° 39′ N.

DONEGAL, the name of three townſhips of America, in the ſtate of Pennſylvania; one in Lancaſter county, containing 2476, one in Weſtmoreland county, containing 1411, and one in Waſhington county, containing 1762 inhabitants.

DONEMARIE, or DONNEMARIE, a ſmall town of France, in the department of Seine and Marne, chief place of a canton, in the diſtrict of Provins; nine miles S.W. of Provins, with a population of 1250 individuals. The canton has a territorial extent of 187½ kiliometres, and contains 21 communes and 9627 inhabitants.

DONESCHINGEN. See DONAUESCHINGEN.

DONERAILE, a poſt town of the county of Cork, Ireland, and before the union a borough, ſending two members to parliament. It is a ſmall town, and in no way remarkable. Spenſer, the poet, reſided at Kilcolemen caſtle, in its neighbourhood. It is 21 miles N. from Cork, and 126 miles S.W. from Dublin. W. long. 8° 34′. N. lat. 52° 13′.

DONETZ, the moſt conſiderable of thoſe rivers in eaſtern Ruſſia, which fall into the Don. It has its ſource in the government of Kurſk, flows as far as the Caucaſus through a fertile and very populous country; is navigable from the Iſum, and has nearly the ſame water and the ſame kinds of fiſh with the Don. Tooke's View of the Ruſſian Empire.

DONETZK, a town of Ruſſia, and one of the fourteen diſtricts of Catherinenſlaf, or Ecaterrinenſlaf; ſituated on the river Donetz. N. lat. 48° 30′. E. long. 38° 29′.

DONGA, a diſtrict of Abyſſinia, ſaid to be the ſource of the Bahr-el-Abiad. It is the reſidence of a chief or king of an idolatrous nation. The country is very mountainous, and in the ſpot where the river riſes, are ſaid to be 40 diſtinct hills, which are called Kumri. From them a great number of ſprings iſſue, which uniting into one great channel, form the Bahr-el-Abiad. The people of Bergoo go thither ſometimes to ſeize captives, but no trade ſubſiſts between them and the natives. The people are quite naked, black, and idolaters. The place is ſaid to be 20 days removal from the confines of Bornou, the whole road thither being mountainous. From Donga to Shilluk is a diſtance of 30 days.

DONGES, a town of France, in the department of the Lower Seine; ſeven leagues W.N.W. of Nantes.

DONGO. See ANGOLA.

DONGOLA, the chief town of a diſtrict of the ſame name, and the capital of Nubia, in Africa; ſituated on the eaſtern bank of the Nile, in N. lat. 19° 30′. E. long. 32°.

DONGON, in *Natural Hiſtory,* a name given by the people of the Philippine iſlands to a peculiar ſpecies of crane, which has a large body like a gooſe, and a ſhorter neck than the common kind; it has a long and very broad beak, and is of a grey colour; they have, beſides this, another ſpecies of crane, which they call tipul or tihol; as remarkable for the length of its neck and legs, as this for the breadth of its beak. This tipul can ſtand erect, and look over a tall man's head.

DONI, ANTON FRANCISCO, in *Biography,* an Italian muſician and poet of the middle of the 16th century, author of a book, entitled "Dialoghi della Muſica," which was publiſhed at Venice 1544. It is now among the *libri rari;* we have never ſeen it, except in the library of Padre Martini, where we tranſcribed a conſiderable part of it. The author, a whimſical and eccentric character, tinctured with buffoonery, was not only a practical muſician and compoſer by profeſſion, but connected and in correſpondence with the principal writers and artiſts of his time. His "Libraria" muſt have been an uſeful publication when it firſt appeared; as it not only contains a catalogue and character of all the Italian books then in print, but of all the MSS. that he had ſeen, with a liſt of the academies then ſubſiſting, their inſtitution, mottos, and employment; but what rendered this little work particularly uſeful to our inquiries after early muſical publications, is the catalogue it contains of all the muſic which had been publiſhed at Venice ſince the invention of printing.

This author publiſhed a collection of his letters, and the anſwers to them; and a wild ſatirical rhapſody, which he calls "La Zucca," or the Pumpkin.

In all his writings, of which he gives a liſt of more than twenty, he aſpires at ſingularity, and the reputation of a comical fellow; in the firſt he generally ſucceeds, and if he fail in the ſecond, it is not for want of great and conſtant efforts to become ſo.

At the beginning of his "Dialogue on Muſic," this author gives a liſt of compoſers then living at Venice, amounting to ſeventeen, of whom ſeven are Netherlanders; the reſt chiefly Italian. In the courſe of the dialogue, compoſitions by moſt of them are performed. In the firſt converſation the interlocutors are Michele, Hoſte, Bargo, and Grullone, all performers, who ſing madrigals and ſongs by Claudio Veggio and Vincenzo Ruffo. In the ſecond converſation, inſtruments are joined to the voices: Anton. da Lucca firſt playing a voluntary on the lute, "Fà coſe divine;" then Buzzino, il violone; Lod. Boſſo, S. G. Battiſta, Pre Michele, Pre Bartolomeo, and Doni himſelf, play on viols; theſe all perform in pieces of Riccio da Padua, Girolamo Paraboſco, Berchem, Archadelt, &c. Here Doni ſpeaks with triumph and exultation of the ſuperior ſtate of muſic in his time, compared with that of any former period: for, ſays he, "there are muſicians now, who, if Joſquin were to return to this world, would make him croſs himſelf. In former times people uſed to dance with their hands in their pockets; and if one could give another a fall, he was thought a wit, and a dextrous fellow. Yſach (Henry Iſaac, 'detto Arrigo Tedeſco), then ſet the ſongs, and was thought a maſter; at preſent he would hardly be a ſcholar."

"Hannibal," ſays Capt. Bluff, "was a very pretty fellow in thoſe days, it muſt be granted.—But alas, ſir!

were he alive now, he would be nothing, nothing in the earth."

Apoſtolo Zeno, in his notes on the "Bibl. della Eloq. Ital." of Fontanini, ſeems to give a very juſt character of this whimſical writer, when he ſays, "Il Doni ſolito ſempre tener dubbioſo il lettore ne' moi fantaſtici ſcritti tia la verita e la falrita, falche non ſi ſcuopre quando da ſinno, e quando da burla egli parli," to. ii. p. 180. edit. de Veuezia, 1743. "It is ſo much the practice of Doni, in all his fantaſtical writings, to blend truth with falſehood, that the reader is unable to diſcover when he is ludicrous, or when ſerious."

Doni, John Babtista, a Florentine nobleman, who flouriſhed in the laſt century, ſpent the greateſt part of his life in the ſtudy and defence of ancient muſic. His writings and opinions were very much reſpected by the learned, though but little attended to by practical muſicians; on which account moſt of his treatiſes, which are very numerous, are filled with complaints of the ignorance and degeneracy of the moderns, with reſpect to every branch of muſic, both in theory and practice.

It is no uncommon thing for philoſophers, mathematicians, and men of letters, abſorbed in mere ſpeculation, to condemn in their cloſets, unheard and unſeen, the productions and performances of practical muſicians; who in their turn, contemn whatever theory ſuggeſts as viſionary, and inadmiſſible in practice, without giving themſelves the trouble to conſider, or even to read, the principles upon which an hypotheſis may be founded.

It ſeems as if theory and practice were ever to be at ſtrife; for the man of ſcience, who *never hears muſic*, and the muſician, who *never reads books*, muſt be equally averſe to each other, and unlikely to be brought to a right underſtanding.

That Doni was but little acquainted with the muſic which delighted the ears of his cotemporaries, appears in many parts of his works; and as to his belief that the ancients knew and practiſed counterpoint, and that their muſic was ſuperior to the modern in every particular, it ſeems to have been founded upon no better grounds than that of his predeceſſors, Gaffurio and Zarlino: but if it was ſuch as Doni has imagined, and given in example, the ears of mankind, to have been delighted with it, muſt have been differently conſtructed formerly, from thoſe of the preſent times, which are pleaſed with modern harmony.

This writer ſeems full of inconſiſtencies, with reſpect to ancient counterpoint. He is unwilling that the Greeks and Romans ſhould be deprived of it; and yet, in ſpeaking of its uſe among the moderns, he calls it "nemico della muſica." His reaſons for allowing it to the ancients are chiefly drawn, from their vocal notes being different from the inſtrumental; from the early invention of the hydraulic, and other organs; from the numerous ſtrings upon ſome of their inſtruments; and from a ſtriking paſſage in Plutarch, which he thinks deciſive, as it proves, that though the moſt ancient muſicians uſed but few ſtrings, yet theſe were tuned in conſonance, and diſpoſed with as much art as in our inſtruments at preſent.

Doni left behind him at his death, about 1650, many printed works upon ancient muſic, as "Compend. del. Trat. de' Generi e de' Modi della Muſica. De præſtantiâ Muſicæ Veteris," and particularly his "Diſcorſo ſopra le Conſonanze," with a great number of unfiniſhed eſſays and tracts relative to that ſubject, and the titles of many more. Few men had indeed conſidered the ſubject with greater attention. He ſaw the difficulties, though he was unable to ſolve them. The titles of his chapters, as well as many of thoſe of father Merſennus, and others, are often the moſt intereſting and ſeducing imaginable. But they are falſe lights, which like *ignes fatui*, lead us into new and greater obſcurity; or like thoſe ſpecimens of fruit brought from the "Land of Promiſe," which thoſe in whom they excited the ſtrongeſt deſire, never lived to ſee.

The treatiſes which he publiſhed both in Latin and Italian on the muſic of the Greeks, being well written in point of language, obtained him the favour and eulogies of men of the higheſt claſs in literature. He has been much extolled by Heinſius, Gaſſendi, Pietro della Valle, and others. Apoſtolo Zeno, in his learned notes to the Biblioteca Italiana of Fontanini, ſpeaks of him in the following terms. "We had reaſon to hope, that the works of Doni would have completed our knowledge of the muſical ſyſtem of the ancients; as he united in himſelf a vaſt erudition, a profound knowledge in the Greek language, in mathematics, in the theory of modern muſic, in poetry, and hiſtory, with acceſs to all the precious MSS. and treaſures of antiquity."

He invented an inſtrument which he denominated the "Lyra Barberini," or "Amphichordon," which he has deſcribed in an expreſs treatiſe, but we hear of it no where elſe. He was a declared foe to learned muſic, particularly vocal in fugue, where the ſeveral performers are uttering different words at the ſame time, which certainly manifeſt good taſte, and enlarged views, with reſpect to theatrical muſic and the improvement of the muſical drama or opera; but his objections to modern muſic, and propoſals of reform, not only manifeſt his ignorance of the laws of harmony, but a bad ear, as he recommends ſuch wild, impracticable and intolerable expedients of improvement, as no ear well conſtructed, however uncultivated, can bear.

In 1763, ſignior Bandini, librarian to the ci-devant grand duke of Tuſcany, publiſhed, in 2 vols. folio, not only the muſical tracts of Doni which had appeared during his life, but others that were found among his MS. papers after his deceaſe, ſome finiſhed, ſome unfiniſhed, and the mere titles of others which he had in meditation.

DONI, in *Ancient Geography*, a river of Greece, in Moloſſia, a country of Epirus.

DONJEUX, in *Geography*, a ſmall town of France, in the department of the Upper Marne, chief place of a canton, in the diſtrict of Waſſy, with only 361 inhabitants: but the canton compriſes a population of 6265 individuals, diſperſed in 19 communes, upon a territorial extent of 217½ kiliometres.

DONJOHN, in *Fortification*, generally denotes a large ſtrong tower, or redoubt, of a fortreſs, where the garriſon may retreat in caſe of neceſſity, and capitulate with greater advantage. See Dungeon.

DONJON, Le, the *Dungeon*, in *Geography*, which, during the ſhort exiſtence of the French republic, was called *Le Val Libre*, the Free Valley, or Valley of Liberty, in oppoſition to its original name, is a ſmall town of France, in the department of the Allier, chief place of a canton, in the diſtrict of La Paliſſe; 12 miles W. of Digoin, 27 miles S.E. of Moulins, and 240 S. of Paris. It contains 1421 individuals, and the canton, which has an extent of 312½ kiliometres, and 13 communes, reckons 10,068 inhabitants.

DONIS Conditionalibus, *ſtatute de*, in *Law*, is the ſtatute of Weſtminſter 2. *viz.* 13 Edw. I. cap. 1. which revived in ſome ſort the ancient feodal reſtraints, that were originally laid on alienations, by enacting, that from thenceforth the will of the donor be obſerved; that the tenements ſo given, to a man, and the heirs of his body, ſhould, at all events, go to the iſſue, if there were any; or, if none, ſhould revert to the donor. Blackſt. Com. vol. ii. p. 112.

DONKEY, in *Agriculture*, a term often uſed to ſignify a dampiſh, or wettiſh, ſtate of the atmoſphere.

DONKOF, or Dankof, in *Geography*, a town of Ruſſia, and one of the 12 diſtricts of the government of Reſan, ſituated on the Don, near its ſource; 60 miles S. of Reſan, and 480 S.S.E. of Peterſburgh.

DONKY, in *Rural Economy*, a name often provincially applied to the aſs.

DON Martinde Majoria, in *Geography*, a cluſter of iſlands in the Great South Sea. S. lat. 18° 36′. E. long. 179° 52′ from Paris. The inhabitants, who are numerous, live in eaſe and plenty. Cocoa, banana, and lime-trees, potatoes, and other eatable roots, grow ſpontaneouſly in great abundance. They cultivate their grounds, weave cloth from the bark of certain ſhrubs, and are decently clothed. They are hoſpitable and friendly, have apparently no kind of religion, and are great thieves.

DONNDORF, a ſmall town of the kingdom of Saxony, in the circle of Thuringia; 12 miles from Sangerhauſen, with an ancient convent, which, in the year 1561, was converted into a free-ſchool for twelve boys.

DONNE, John, D.D. in *Biography*, who excelled as a poet and divine, was born in London 1573. He ſtudied at Oxford at a very early period, and was eſteemed a prodigy of abilities. Here he remained three years, and then paſſed the ſame period at Cambridge. He next ſettled at Lincoln's Inn, with a view of ſtudying the law: this did not accord with his views, and he exchanged the law for divinity. Having been educated a Catholic, he was reſolved to try his religious creed by the teſts of reaſon and ſcripture. The reſult of this examination was a firm perſuaſion of the truth of Proteſtantiſm. He now ſeems to have embarked in more active life, and attended the earl of Eſſex in his naval expeditions: he then ſpent ſome years in Italy and Spain, and upon his return became ſecretary to lord chancellor Egerton, and continued in that employment five years, when he was diſmiſſed for having contracted a clandeſtine marriage with the chancellor's niece. The newly married couple had to ſtruggle with many and grievous difficulties. till a relation, ſir Francis Wooley, afforded them a houſe in Surrey, where Donne applied with the greateſt earneſtneſs to the ſtudy of the civil and canon law. At this period, he was earneſtly ſolicited to enter the church, but feeling himſelf not properly qualified, he declined the propoſal, notwithſtanding his circumſtances were extremely narrow. He afterwards came to London, and was admitted into the houſe of ſir Robert Drury, whom, in 1612, he accompanied to Paris: on his return, many of the nobility urged the king, (James I.) to confer ſome civil employment upon him, but the monarch had determined he ſhould, if poſſible, be inducted into the church. Donne had already drawn up a treatiſe at the requeſt of James, concerning the oaths of allegiance and ſupremacy required from the Roman Catholics, and now he complied with the wiſh of the ſovereign, and was ordained deacon and prieſt, and, almoſt immediately, was appointed one of the king's chaplains; and likewiſe preſented with the degree of D.D. by the univerſity of Cambridge. So generally was he beloved, and highly eſteemed by people of rank and influence, that he received offers of fourteen benefices in the courſe of the firſt year after he entered into orders: but, preferring London, he was made preacher of Lincoln's Inn. He had not long ſettled in the metropolis before he loſt his wife, who left him with ſeven young children. In 1619, he accompanied the earl of Doncaſter on an embaſſy to the German princes; and upon his return, the king conferred upon him the deanery of St. Paul's, with which he held the living of St. Dunſtan in the Weſt. He was choſen prolocutor of the convocation in 1623-4, and about the ſame time appointed to preach ſome occaſional ſermons at Paul's croſs, and other places. A dangerous illneſs led him to compoſe a book, entitled, "Devotions upon emergent Occaſions," in which much fervour and ſeriouſneſs are expreſſed. He recovered, and lived in good health till he was ſeized with a fever in 1630, after which he never more enjoyed a ſtrong conſtitution. He felt that his end was approaching, and prepared to meet it with reſignation and tranquillity, though not without ſome peculiarities that belonged to his character. Having cauſed himſelf to be wrapt up in a winding-ſheet, like a dead body, and ſtanding with his eyes ſhut, and with ſo much of the ſheet put aſide as might diſcover his thin and death-like face, he cauſed a ſkilful painter to take his picture, which was placed by his bed-ſide, and there remained as his conſtant remembrancer to the hour of his death. During Lent, 1631, he preached in his turn at court, and his diſcourſe on this occaſion was termed by the houſhold "the doctor's own funeral ſermon." He died March 31ſt of the ſame year, and was buried in St. Paul's cathedral. Dr. Donne was an Engliſh poet, but his works are now little known; he may, however, be regarded among thoſe who wrote Latin verſe with elegance. A collection was publiſhed in 1633, entitled, "Faſciculus Poematum, et Epigrammatum Miſcellaneorum," which contains a book of epigrams by him. Of his proſe works, the moſt remarkable is that entitled "Biathanatos, or a Declaration of that Paradox, or Theſis, that Self-Homicide is not ſo naturally a Sin, that it may not be otherwiſe." It does not appear that he intended this work for the public eye, but it found its way to the preſs after his death. He wrote "Eſſays on Divinity;" "Sermons," &c. 3 vols. fol. Biog. Brit.

DONNEMARIE, in *Geography*. See Donemarie.

DONNERBERG, a mountain of Bohemia, ſuppoſed to be the higheſt in that country.

DONNERSMARK, a town of Hungary; ſeven miles N. N. W. of Kapſdorf.

DONNINGTON, or Donington, is a ſmall market town of Lincolnſhire, England. It is ſeated in that part of the county called the Fens, acroſs which a new road, named Bridgend-cauſeway, has been made to facilitate the communication between this town and that of Folkingham. Previous to this improvement, the place was ſcarcely acceſſible in bad weather. A free ſchool was erected here and endowed in 1718, by Thomas Cowley, eſq. who bequeathed all his eſtates to be applied to the poor of each pariſh, in which his poſſeſſions were ſituate: in this diviſion, the poor of Donnington acquired 400 *l. per annum.* In digging for foundations behind the ſchool-houſe, a vault was diſcovered, four feet ſquare, conſtructed of hewn ſtone, and containing an urn filled with red earth. Amongſt the ruins of ſome ancient buildings, ſome glazed earthen veſſels were found, ſuppoſed to be ſpecimens of pottery very early manufactured at Bolingbroke. Donnington is diſtant 106 miles N. from London: has a market on Saturdays, and two annual fairs. The living is a vicarage. In the return to parliament in 1801, the number of houſes in this town was 216, inhabited by 1321 perſons, of whom many are employed in the cultivation of hemp, which is carried on to a conſiderable extent for the ſupply of the London market. Beauties of England and Wales, vol. ix.

DONNOE, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 66° 5′. E. long. 17° 14′.

DONON, one of the mountains called Voſges, in the department of the Voſges, in France, in the diſtrict of St. Dié. It is remarkable for its iron mine; and at its foot is the ſource of a ſmall river called La Plaine.

DONOR, in *Law*, he who gives lands or tenements, to another, in tail. As donee, is he to whom the ſame are given.

DONSHAL, in *Geography*, a town of Egypt; 10 miles N. W. of Faoué.

DONSKAIA, a fortreſs of Ruſſia, in the government of Caucaſus; 116 miles W. N. W. of Ekaterinograd.

DONUCA, in *Ancient Geography*, a very high mountain of Thrace, mentioned by Livy, and called *Dunax* by Strabo.

DONUSA, an iſland of the Icarian ſea, one of the Sporades. It lay S. W. of Icaria, W. of Patmos, and E. of Mycone. The marble obtained from this iſland was green. Virgil and Mela call it *Donyſa*, and it is now known by the name of *Donuſſa*.

DONZENAC, in *Geography*, a ſmall town of France, in the department of the Correze, chief place of a canton, in the diſtrict of Brives, with a population of 2012 individuals, and ſituated ſix miles N. of Brives. The canton has an extent of 165 kiliometres, ſeven communes, and 9973 inhabitants.

DONZERE, a ſmall town of France, on the Rhône, in the department of the Drôme, ſouth of Montelimart.

DONZY, in Latin *Domiciacum*, a ſmall town of France, in the department of the Nievre, chief place of a canton, in the diſtrict of Coſne, ſituated on the river Nonain, nine miles E. of Coſne, and 27 miles N. of Nevers. It contains 3600 inhabitants. The canton has 10 communes, upon a territorial extent of 282 kiliometres and a half, with a population of 10,327 individuals.—Alſo, a ſmall town of France, in the department of the Loire, ſix miles E. of Feurs.

DOOAB, a tract of fertile land in Hindooſtan, formed by the Ganges and Jumnah rivers, belonging to the nabob of Oude: dooab, or doabah, ſignifying any tract of land formed by the approximation and junction of two rivers.

DOOBANT Lake, lies in the weſt part of N. America, S. E. of the head of Cheſterfield inlet, in New South Wales: it is about 60 or 70 miles long, and 20 or 30 broad. N. lat. 63° 5′. W. long. 100° 30′.

DOOLS, a term uſed in ſeveral parts of the kingdom for balks or ſlips of paſture, left between the furrows of ploughed lands.

DOON, in *Geography*, a river of Scotland, which has its riſe from loch Doon, on the confines between Galloway and Carrick, and running northerly paſſes the ancient village of Dalmellington, in its progreſs takes a N. W. direction, and diſcharges itſelf into the Frith of Clyde about three miles from Ayr.

Doon, or *Down*, a province of Hindooſtan, which occupies the ſpace at the foot of the mountains that extend from the Ganges to the Jumnah, in length 20 coſſes, or $2\frac{3}{4}$ Britiſh miles each. The Dooab in this place is about 40 or 41 geographical miles in breadth, but it becomes wider farther towards the ſouth.

DOOR, in *Maſonry*, is the aperture for the entrance into a building, or through a partition for paſſing from one apartment to another. The apertures of doors are regulated by the ſize of a man, ſo that they are ſeldom leſs then two feet nine inches in width by ſix feet ſix inches in height, except in confined ſituations, where utility is beyond every other conſideration. Doors of entrance vary in their dimenſions according to the height of the ſtory, or according to the magnitude of the building, in which they are placed. In private houſes four feet may be the greateſt width, and in moſt caſes three feet will be ſufficient, except under the circumſtances as ſtated in the following.

A good proportion of doors, is that in which their dimenſions are in the ratio of three to ſeven in ſmall doors, and one to two in large doors. In the entrance doors of public edifices, where there is a frequent ingreſs and egreſs of people, and often crowded, their width may be from ſix to twelve feet. Inſide doors ſhould, in ſome meaſure, be regulated by the height of the ſtories: this, however, has its limit, as there is a certain dimenſion which ought not to be exceeded; for the difficulty of ſhutting the door will be increaſed by its weight; therefore doors for private edifices, which are intended to be ſhut with one cloſure, ſhould never exceed three feet ſix inches in breadth. In palaces, and in noblemen's houſes, where much company reſort, all the doors are frequently thrown open. Theſe may be made much larger than thoſe of inferior edifices; the width may therefore be from four to ſix feet. In modern houſes it is common to have a large door for throwing two rooms into one. In ſuch caſes, the proportion of the aperture will often be of a leſs height than that of twice the breadth, as the doors in the ſame ſtory are generally one height throughout. The lintels of doors ſhould range with thoſe of the windows, and their breadth ſhould never be leſs than that of the windows. In the fourth book of Vitruvius, rules are laid down for Doric, Ionic, and Attic doors, all of which have their apertures narrower at the top than at the bottom, in conformity to the apertures which are to be ſeen in the ruins of ancient Greek and Roman edifices, as in the temple of Minerva Polias at Athens, and the temple of Veſta at Tivoli. Doors of this form have the property of ſhutting themſelves; this perhaps occaſioned their introduction. In modern times they may be employed with advantage in riſing from a floor in the act of opening to clear a carpet. They have been introduced by a few modern architects, particularly Mr. Soane, in the bank of England.

With regard to the ſituation of the principal entrance, it is evident that the door ſhould be in the middle, as it will not only conſtitute better ſymmetry, but will communicate more readily with all other parts of the building. The doors of principal rooms ſhould at leaſt be two feet diſtant from the wall, if poſſible, that furniture may be placed cloſe to the door-ſide of the room.

The apertures of exterior doors, placed in blank arcades, are generally placed at the ſame height as the ſpringing of the arch; or if they have dreſſings, the top of the dreſſing, whether it be the architrave or cornice, is generally placed on the ſame level with the impoſt.

The moſt common method of adorning the aperture of a door is with an architrave ſurrounding it, or with a cornice ſurmounting the architrave, or with a complete entablature; ſometimes conſoles are introduced flanking the architrave jambs, and ſuſtaining the ends of the cornice. Sometimes the architrave jambs are flanked with pilaſters of the orders or of ſome analogical form: in this caſe the projections of their baſes and capitals are always leſs than that of the ſurrounding architrave, and then the architrave over the capitals of the pilaſters is the ſame with that of the head of the door. Sometimes the door is adorned with one of the five orders. The entrance doors of the grand houſes are frequently adorned with porticoes in the manner of Grecian temples.

Door, in *Joinery*, is the wooden cloſure or cloſures which ſhut or open the communication at pleaſure.

Doors are either framed, battened, or ledged.

Framed doors are employed in all deſcriptions of buildings; they are made either ſingle, or folding, or double margin, or in double doors. All framed doors conſiſt of ſtyles, rails, and pannels. Moſt ſingle framed doors have munnions beſides the other parts of the framing. The framing is the part which is put together by mortiſe and tenon, and includes all the parts except the pannels. The ſtyles are the vertical parts of the framing upon the margins; the rails are the horizontal parts of the framing, tenoned into the ſtyles. The munnions are parts of the framing tenoned into the rails. Folding doors are thoſe which are made in two breadths, and conſequently have four ſtyles, one pair to each part. Double margin doors are thoſe made to imitate folding doors, and have a vertical piece running up the middle called the ſtaff ſtyle, made in form of the two middle ſtyles of folding doors when ſhut. Double doors are thoſe which cloſe the breadth of the aperture in two different places, in order to keep the apartment warm Doors are generally framed in rectangular compartments: however lozenges, circles, ellipſeſſes, and other fanciful forms, are ſometimes indulged. Framed doors are either ſquare or moulded. Square framing is only uſed in common houſes. The mouldings uſed in doors are of a variety of forms, ſome altogether within the framing, and ſome made to project beyond it. The mouldings and form of the pannels of the door generally regulate the framing of the ſhutters and the joinery of the windows. When doors are made double margin or folding, the whole of the other doors on the floor muſt be ſo alſo, if the ſymmetry is intended to be preſerved. This happens in conſequence of the apartments having a communication with each other.

Batten door, is one conſtructed of a board glued together of a ſize equal to the dimenſions of the aperture: then ſtyles, rails, and munnions made of battens, with proper mouldings, are fixed to the ſurface: ſo that the whole has the appearance of a framed door, though in reality it is not. This kind of door is ſaid to be either ſingle or double, accordingly as it is battened on one or both ſides. Batten doors were much uſed in former times, but now they are ſeldom employed, except in Gothic work, where all the vertical joints may be hid by the munnions of the framing, which are bolted through, to a reticulated framing on the back; the boards forming the pannelling ſhould not be glued together, as the framing bolted together will be abundantly ſtrong. Batten doors are employed in this kind of work with advantage. The large gates and doors of our ancient Britiſh edifices are made in this manner. It is certainly, however, a very ineligible method, to imitate the framing of Grecian or Roman doors, particularly where no bolts are employed: for it is evident, that a door made in this manner, however well ſeaſoned the ſtuff may be, is liable to be affected by dry and damp weather, and much more ſo muſt this be the caſe, when the parts of which it is compoſed are made of unſeaſoned ſtuff.

The materials of which doors are conſtructed are either metal or wood. The ancients conſtructed the doors of their temples frequently of gold, ſilver, bronze, and ivory. We uſe iron doors in apartments where treaſure or other valuable things are depoſited. Doors of common houſes, and moſt frequently in good houſes, are made of deal. In noblemen's houſes they are often made of mahogany, either ſolid or veneered. Doors of the pointed ſtyle are frequently made of wainſcote.

Doors are ſometimes made double, in order to keep the apartments warm.

Fig. 1. *Plate* A B, a door made in the ancient manner, ſhewing only munnions on the front.

Figs. 2 and 3, different methods of reticulating the back of *fig.* 1. The munnions of *fig.* 2. are croſſed obliquely, in order to give ſtrength; a method ſometimes uſed when the upper part is fixed and the lower part made to open. In *fig.* 3, the reticulations are at right angles in the lower part; and the bars of the upper part croſs the munnions diagonally. This manner is ſometimes uſed when the whole half door opens at once.

Fig. 4. No 1. ſhews the reticulations to a large ſcale, with the manner of dovetailing the tranſverſe pieces into the ſtyles.

Fig. 4. No. 2. part of the ſection of a door. The tranſverſe pieces are notched half their thickneſſes into the munnions, and firmly bolted with ſcrew bolts or rivetted ends.

Fig 5. No. 1. a door firſt put together with ſtyles and rails; the ſtyles are made thick in order to receive boarding upon each ſide, which finiſhes fluſh with the ſtyles. *Fig.* 5. No. 2. the ſame door boarded and bolted. The core is filled in tightly with diagonal pieces, as ſhewn at No. 1.

An account of modern doors will be ſeen in the article JOINERY.

DOOR, *ſcenography of a.* See SCENOGRAPHY.

DOORS, *architrave.* See ARCHITRAVE.

DOOR, is ſometimes applied to the gates of locks or ſluices.

DOPONEN, in *Geography*, a town of Pruſſian Lithuania; 4 miles S. S. E. of Stalluponen.

DOPPELMAIER, JOHN GABRIEL, in *Biography*, a celebrated mathematician at Nuremberg, was born in 1667, in that city, where his father was a merchant. Having obtained the elements of learning, he ſtudied the law at Altdorf in 1696, and, at the ſame time, attended the lectures of the celebrated profeſſor Sturm on philoſophy and the mathematics. The firſt diſputation he maintained was in 1698, "De Sole:" and in the following year he maintained another, "De Viſione ſenſu nobiliſſimo, ex cameræ obſcuræ illuſtrata." He then went to Halle, and in a few years his ſtrong attachment to philoſophy and the mathematics induced him to quit the purſuit of the law altogether, that he might devote his whole time to the ſciences. In connection with theſe, he ſtudied the Engliſh and other modern languages; and in the ſpring of 1701, he viſited Leyden, and during his ſtay there exerciſed himſelf in the art of poliſhing optical glaſſes, and in practical aſtronomy. From Leyden he proceeded to Rotterdam, and thence to England, where he formed an acquaintance with the moſt celebrated mathematicians of the age, and particularly with Mr. Flamſtead, the aſtronomer royal at Greenwich, and the doctors Wallis and Gregory at Oxford. In 1702, he returned to his native city, and in 1704 was elected profeſſor of mathematics in the college of Nuremberg, the duties of which office he performed forty years with much credit and reputation. In 1715, he was admitted into the Imperial Academy of the Searchers into Nature, under the name of Conon, and a ſimilar honour was conferred upon him by the Academy of Sciences at Berlin. He was likewiſe elected a fellow of the Royal Society of London: and in 1741 the Imperial Academy of Peterſburgh ſent him a diploma of aſſociate. Towards the cloſe of life, he attracted great notice by his electrical experiments, which then engaged the attention of the whole philoſophical world. He died on the 1ſt of December 1750. His works are numerous and reſpectable; they are all connected with the ſciences which were the delight of his life. Gen. Biog.

DOR, the Engliſh name for the common black beetle. Some alſo apply it to the duſty beetle, that flies about hedges in the evening. See SCARABÆUS.

DORA, in *Botany*, is the Arabian name of a large ſpecies of *Holcus*, the Milium arundinaceum, plano alboque ſemine; Bauh. Pin. 26, figured in Rauwolf, t. 198, which by the Mantiſſa altera of Linnæus, p. 500, ſeems what he finally determined to be his *H. Sorghum*, and it agrees with the ſpecimen in his herbarium. S.

DORA, or DOR, according to its eaſtern name, in *Ancient Geography*, a town of Phœnicia, ſituated in a kind of peninſula at the paſs where mount Carmel commences, according to Artemidorus cited by Steph. Byz., who adds that it was at firſt inhabited by the Phœnicians, who eſtabliſhed themſelves in this plain, on account of the fiſh which furniſhes the purple dye. This town was 11 miles S. of Sycaminas, according to Jerome, who ſays that it was left altogether deſolate, and that its ancient magnificence could only be conjectured from its ruins. According to Joſhua it ſubſiſted under the name of Dor before the Iſraelites entered into the land of Canaan. Joſhua having conquered it and killed its king, gave it to the half tribe of Manaſſeh, on this ſide of Jordan. (Joſh. xii. 23. xvii. 11.) Dora became ſubject to the kings of Egypt, the ſucceſſors of Alexander. Antiochus Epiphanes took it, after having gained a victory over the troops of Ptolemy Philometor, king of Egypt, according to Polybius (l. v.) It was one of the towns poſſeſſed by the Jews when Pompey entered Syria; and when this whole country was reduced into a Roman province, Pompey gave it the privilege of independence in the year of Rome 690.

Dora, an iſland of the Perſian gulph, according to Strabo. —Alſo, a fountain placed by Pliny in Arabia Felix.

DORAB, in *Ichthyology*, a ſpecies of *Clupea*, which ſee.

DORAC, or Durac, in *Ancient Geography*, a town of Africa, mentioned by Ptolemy, and placed by him in 31° 15′ lat.; the ruins of which are viſible on the ſummit of the mountain called Dédez.

Dorac, in *Geography*, a town of Perſia, in the province of Chuſiſtan; 75 miles S. of Suſa.

DORADO, in *Aſtronomy*, a ſouthern conſtellation, not viſible in our latitude; it is alſo called Xiphias. The ſtars of this conſtellation, in Sharp's Catalogue, are ſix.

Dorado, in *Geography*, a name given by the Dutch to a part of the chain of mountains of Parima in S. America, ſignifying mountain of gold. It is compoſed of bright micaceous ſchiſtus, which has given ſimilar reputation to a ſmall iſland in the lake of Parima.

Dorado, in *Ichthyology*, the name of a large ſea-fiſh, called by the Brazilians, *guaracapema*; the Coryphæna *equiſelis*, which ſee.

DORÆNA, in *Botany*, Thunb. Nov. Pl. Gen. faſc. 3. 59. Fl. Jap. 6. Schreb. 108. Willd. Sp. Pl. v. 1. 812. Juſſ. 420. Mart. Mill. Dict. v. 2. Claſs and order, *Pentandria Monogynia*. Nat. Ord. uncertain; Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, five-cleft, ſhorter than the corolla; its ſegments ovate, concave, ſmooth, *Cor.* of one petal, wheel-ſhaped, ſomewhat cylindrical; its limb in five ovate, obtuſe, upright ſegments. *Stam.* Filaments five, extremely ſhort, inſerted into the tube of the corolla; anthers oblong, nearly ſquare, included in the tube. *Piſt.* Germen ſuperior, conical, ſmooth; ſtyle thread-ſhaped, the length of the corolla; ſtigma abrupt, notched. *Peric.* Capſule ovate, acute. ſmooth, the ſize of a pepper-corn, of one valve and one cell, with many ſeeds. Thunb.

Eſſ. Ch. Capſule ſuperior, of one cell, with many ſeeds. Corolla five-cleft. Stigma cloven.

1. D. *japonica*. (Tuſukaki, Fitatſi, or Senrjo, of the Japaneſe.) A ſhrub, native of Japan, about ſix feet high, with alternate, round, ſmooth, aſh-coloured, ſpreading *branches*. *Leaves* alternate, ſtalked, ſpreading, oblong, pointed, diſtantly and ſlightly ſerrated, ribbed, ſmooth, about a finger's length. *Foot-ſtalks* an inch long, ſemicylindrical, furrowed above, ſmooth. *Flowers* minute, white, in axillary cluſters ſcarcely an inch long. Such is Thunberg's account, from which alone we have any knowledge of this plant. We have never ſeen even a dried ſpecimen, nor is there any figure of it extant.

DORAN, in *Geography*, a very ancient town of Arabia, in that part of the country of Yemen, which comprehends the Imam's dominions, ſituated on the declivity of a mountain, not far from the roads between Sana and Damar, and the reſidence of ſeveral Imams. The diſtrict is under the government of a particular ſchiech, as is alſo Djebbel Scherki, a great mountain in its vicinity. N. lat. 14° 55′. E. long. 44° 4′.

DORANA, or Darano, in *Ancient Geography*, a town of Aſia, in Galatia. Itin. Antonin.

DORAT, or Daurat, John in *Biography*, a man of letters, was born of an ancient family in the Limoſin, about the beginning of the ſixteenth century. He ſtudied at Paris, where he obtained ſo high a reputation for learning, that he was made royal profeſſor of the Greek language. He had many ſcholars who became very diſtinguiſhed for application and talents. He was in high favour with Charles IX, who took much pleaſure in converſing with him, but he never obtained much of the royal patronage, and paſſed the latter part of his life in great poverty. He was a moſt ready writer of verſes, which iſſued from his pen on almoſt every occaſion, yet he obtained a conſiderable ſhare of reputation by his earlier productions, and acquired the title of royal poet, and it is to the diſgrace of his ſovereign, that he obtained nothing more ſubſtantial than the title. He was highly eſteemed as a critic, and was ſuppoſed to excel in explaining the ſenſe of obſcure ancient authors. He died in 1588, having completed his eightieth year. He had been twice married, the ſecond time when he was very old, to a handſome young woman; being cenſured for the inequality of the connection, he replied that it was better to die by a bright than by a ruſty ſword. Moreri. Bayle.

Dorat, in *Geography*, a ſmall town of France, in the department of the Upper Vienne, chief place of a canton, in the diſtrict of Bellac, with a population of 3096 individuals. It is ſituated on the river Scurre, 30 miles N. of Limoges, and nine miles N. of Bellac. The extent of the canton is 335 kiliometres; it comprizes 14 communes, and 11,496 inhabitants.

DORATH, in *Ancient Geography*, a town of Africa, in Mauritania Tingitana.

DORBETA, a town of Aſia, in Meſopotamia, on the bank of the Tigris.

DORCAS, in *Zoology*, a ſpecies of *Antelope*. (which ſee,) called alſo Capra *Dorcas*, *hircus* Africanus, or Gazella Africana, Tzebi of the Bible, and Barbary Antelope, has its horns, which are about 12 inches long, and ſurrounded by about 13 prominent rings, bent in form of a lyre; the upper parts of the body reddiſh brown, the under parts and buttocks white, and both divided by a duſky line along the ſides, the knees furniſhed with a long bruſh or tuft of hair, the tail ſhort, covered with long blackiſh hairs and white underneath. This animal, which inhabits Barbary, Egypt, Arabia, and Syria, is about half the ſize of a fallow-deer; and is ſuppoſed by Gmelin to be the diſchon of Moſes; perhaps the animal mentioned by Solomon, and named in our verſion, roe of the mountains. It goes in large flocks, is eaſily tamed, though naturally very timid, and its fleſh is reckoned excellent food.

DORCHESTER, in *Geography*, the county, and principal town of Dorſetſhire, England, is a place of remote antiquity, and its hiſtory is replete with intereſt. It was a Roman ſtation of conſiderable extent, and from the veſtiges of the Romans in and near it was a principal ſettlement of that people in Britain. Its Roman name, Durnovaria, or, the paſſage of the river, is of Britiſh extraction. Richard of Cirenceſter calls it reſpectively by this name, and that of Durinnum; but Antoninus by the former only. Ptolemy calls it Dunium, which ſome copies erroneouſly read Durnium. Both are probably only corruptions from Durinum. Dunim meant, according to Mr. Baxter, Maiden-caſtle, (the name of a large encampment in the vicinity;) and Durnovaria, the town. This is, however, againſt the expreſs teſtimony of Ptolemy, who calls Dunium the town of the Durotriges. Theſe, therefore, are only different names aſſigned to the ſame place in different ages. Dorcheſter was by the Saxons called Dornceaſter, from the Britiſh Dwr, and the Saxon Cheſter, a corruption from the Roman Caſtrum, a camp or town: hence the Latin name Dorceſtria, in ancient records, and the modern name Dorcheſter, is clearly derived. In the Itineraries of Antoninus and Richard of Cirenceſter, Dorcheſter appears as a Roman ſtation; and, indeed, the ancient walls, the Via-Iceniana, on which it ſtands, the ſeveral vicinal roads that iſſue hence, coins, and other pieces of antiquity found here, Maiden-caſtle, the amphitheatre, and camp at Poundbury, near it, ſhew it to have been then a place of great importance. It was fortified by the Romans with a wall and foſs, which extended quite round it, and two exterior ramparts to the ſouth and weſt, which are ſtill viſible; though they are in many places levelled by the plough. The high ground on the north rendered any advanced works there unneceſſary. On the weſt ſide part of the old Roman wall was ſtanding till the ſummer of 1802; this was ſix feet thick, and in ſome places twelve feet high. The foundation was laid on the ſolid chalk, and the wall formed of rag-ſtones, laid ſide by ſide, in an oblique direction, and then covered over with very ſtrong mortar. The next courſe was generally carried the contrary way, and occaſionally three horizontal ones for binding; much flint was alſo uſed. Conſiderably more of the wall remained within memory, and ſome of the foundations appear in other places; on the eaſt a ſmall lane is built upon it, and the ditch filled up; though it is ſtill called the walls. Great part of the remains was levelled or deſtroyed in making the walks round the town. About the year 1764, eighty-five feet of the wall were pulled down, and only ſeventy-ſeven left ſtanding. The area incloſed by the walls was about eighty acres. Numerous Roman coins of the different metals, formerly called by the vulgar Dorn's pennies, have been dug up in different parts of Dorcheſter; and in 1750, a gold ring, half an inch thick, valued at *3l. 17s. 6d.*, was diſcovered in the river Frome. But the moſt perfect and curious relic of antiquity, was a bronze image of a Roman Mercury, ſeated on a fragment of a rock, about four inches and a half high, diſcovered in the back garden of the principal free-ſchool; and a large fragment of a teſſelated pavement. Dorcheſter was of conſiderable importance under the Saxons, and had, from Athelſtan, the grant of two mints; a privilege he only extended to cities and walled towns. In 1003, Sweyn, king of Denmark, having landed in Cornwall, to revenge the maſſacre of his countrymen, after ravaging that county and Devon, directed his march to this town, which he beſieged, and burnt, and afterwards threw down the walls, probably for the obſtinate defence they enabled the beſieged to make. Camden mentions many of the burying-places, or tumuli, of theſe Danes, as being ſcattered round the town. The devaſtation they committed appears from the Domeſday book, which ſtates that, in the time of Edward the Confeſſor, "there were 172 houſes, which defended themſelves for all the kings ſervices, but which were then reduced to eighty-eight, a 100 having been totally demoliſhed from the time of Hugh, the high ſheriff." In the year 1595 Dorcheſter was viſited by the plague, which proved ſo deſtructive, that the living were not ſufficient to bury the dead. In Auguſt 1613, the town was partly deſtroyed by a fire, which conſumed 300 houſes, and the two churches of the Holy Trinity and All Saints; the loſs was eſtimated at 200,000 *l.* Another conflagration, of which no particulars are recorded, is ſaid to have happened in 1662. Dorcheſter is recorded, by the hiſtorian of the civil wars, as having been particularly diſaffected to the royal cauſe, more ſo than any place in England. He terms it "the magazine whence the other places were ſupplied with the principles of rebellion; and a ſeat of great malignity." It was one of the firſt towns fortified againſt the king; and though neither ſtrong by nature, nor hardly capable of being made ſo by art, theſe diſadvantages were ſuppoſed to be more than counterbalanced by the ſpirit and obſtinacy of its inhabitants. In the time of Edward III. the government of this town was veſted in bailiffs and burgeſſes. James I. increaſed the number of burgeſſes to fifteen, with permiſſion to chuſe a recorder and other officers. By Charles I. it was incorporated under a mayor, two bailiffs, ſix aldermen, ſix capital burgeſſes, a governor, and twenty-four common-councilmen. This borough has returned members to parliament ever ſince 23 Edw. I. The right of election was formerly claimed by the inhabitanss paying ſcot and lot; but this right has, by a late determination, been adjudged to be equally veſted in non-reſidents, provided they are poſſeſſed of real eſtates within the borough, and have paid the church and poor rates. The electors are at preſent about two hundred; the mayor is the returning officer.

Dorcheſter is delightfully ſituated on an aſcent above the river Frome, which bounds it on the north ſide; on the ſouth and weſt it opens on pleaſant downs, intermixed with corn fields. The town forms an irregular ſquare; though in former times, as appears from obſervation, it moſt probably made a complete one. It conſiſts principally of three ſpacious ſtreets, which join each other about the middle; theſe, with others ſubordinate, are well paved, and, in general, adorned with handſome buildings of brick and ſtone. Thoſe of moſt eminence are, the three churches of St. Peter, Trinity, and All-Saints; the town-hall, the county-hall, and the new-gaol. St. Peter's church is a large handſome ſtructure, ſtanding near the centre of the town, and conſiſting of a chancel, nave, and ſide aiſles; the tower, which riſes to the height of ninety feet, is ornamented with pinnacles and battlements. Though only a chapel of eaſe to the Holy Trinity, this is eſteemed the principal church in the town. It contains a few monuments commemorative of diſtinguiſhed perſons, and ſome inſcriptions, curious on account of their antiquity. The town-hall is ſituated at a ſmall diſtance from St. Peter's church. It was erected by the corporation in the year 1791, and is a ſpacious and handſome edifice, having a market place under it; and behind it, two rows of convenient ſhops for the uſe of the town butchers. The ſhire-hall is a plain neat building, having a front of Portland-ſtone, and a pediment in the centre. The courts are well contrived, and commodiouſly fitted up; and the building is appropriately ſuited to the purpoſes for which it was erected. The new-gaol is on the north ſide of the town: the old one, being ſmall and inconvenient, was ſold by auction for 1220 *l.* In the preſent ſtructure are united the county-gaol, penitentiary-houſe, and houſe of correction. The plan adopted is that recommended by Mr. Howard. The expence of the erection was 16,179*l.* 10*s.* 6*d.* This edifice, in its external appearance, is handſome and characteriſtic; and the interior poſſeſſes every convenience appropriate to its deſtination. The buildings conſiſt of a lodge, keeper's houſe, chapel, debtors' day rooms, female fines, and female debtors' rooms, viſiting rooms for male debtors, fines, felons' infirmaries, &c., and of four wings, detached from, but communicating with, the centre building on each ſtory, by means of caſt iron bridges from the ſeveral galleries. There are ſeparate ſleeping cells for eighty-eight priſoners, which are diſtributed in the ſeveral buildings; and two airy dormitories for male debtors, each containing four beds, to be uſed in caſe the number exceeds that which can be accommodated in the debtors' wing; beſides four cells for condemned priſoners, four over theſe perfectly dark, yet airy, for the refractory; and ſix reception cells, which are fitted up in the lodge. The diſtribution is ſuch, that not only the male priſoners are ſeparated from the female, and the felons from the debtors, &c. but thoſe of each deſcription are ſubdivided into claſſes; and for each claſs, by means of diſtinct ſtaircaſes, ſeparate ſubdiviſions are appropriated, with courts, work-rooms, &c., to each. The female fines, and female debtors, have each a commodious room, with every poſſible convenience, over the male debtor's dormitories, and under the two infirmaries, ſeparate and detached from every part of the building, except the keeper's houſe and court, to which they have acceſs through the chapel.

The environs of Dorcheſter are extremely pleaſant; being almoſt ſurrounded by agreeable walks planted with rows of limes and ſycamores; the view of the town, with the tower of St. Peter's church, and that of Fordington, a neighbouring village, appear on every quarter with advantage. Dorcheſter is ſituated 120 miles S.W. from London; has weekly markets on Wedneſday and Saturday, with four annual fairs; and was returned to parliament in 1801, as containing 353 houſes and 2042 inhabitants.

The vicinity of Dorcheſter preſents ſeveral objects of hiſtorical reſearch, and highly intereſting to the curious enquirer. "Theſe extended plains," remarks Mr. Gilpin, in his obſervations on the weſtern parts of England, "however deſolate they now appear, have once been buſy ſcenes: the antiquary finds rich employment among them for his curioſity. To follow him in queſt of every heaving hillock, and to hear a diſcuſſion of conjectures about the traces of a Daniſh or a Roman mattock, where the eye of common obſervation perceives no traces at all, might be tedious, but he ſhews us ſeveral fragments of antiquity on theſe plains, which are truly curious; and convinces us that few places in England have been more conſiderable in Roman times than Dorcheſter. Poundbury and Maiden-caſtle are both extraordinary remains of Roman ſtations. Numberleſs tumuli alſo are thrown up over the downs: theſe were antiquities even in the times of the Romans themſelves. But the moſt valuable fragment on theſe plains is a Roman amphitheatre, which retains its complete form to this day." This ſtructure, allowed to be the moſt perfect of its kind remaining in England, was firſt publicly noticed by ſir Chriſtopher Wren, who had obſerved it in his journies to the Iſle of Portland. It was afterwards examined by the indefatigable Dr. Stukeley, who inſerted a particular deſcription of it, with five engravings, in his "Itinerarium Curioſum:" but his relation is in ſeveral places more fanciful than juſt. This amphitheatre, which has acquired, from its component parts, the name of Maumbury, is ſituated on a plain in the open fields, about a quarter of a mile ſouth-weſt from Dorcheſter, cloſe by the Roman road which runs thence to Weymouth. It is raiſed upon, and was probably framed of, ſolid chalk, cemented by mortar made of burnt chalk, and covered with turf. It is computed to conſiſt of about an acre of ground; and by an accurate admeaſurement it was found that the greateſt perpendicular height of the rampart, above the level of the arena, was 30 feet; the external longeſt diameter 343 feet 6 inches; the external ſhorteſt diameter 339 feet 6 inches; the internal longeſt diameter 218 feet; the internal ſhorteſt diameter 163 feet 6 inches. The number of ſpectators which it was capable of accommodating is computed to be 12,960. Poundbury camp is ſituated about half a mile weſt of Dorcheſter, on the bank of the river Frome, having a very abrupt deſcent on that ſide. The breadth of the area is 147 paces, and its length 378: towards the middle, the ground is conſiderably elevated; and near the ſouth ſide is a barrow, which Dr. Stukeley imagined to be Celtic, and extant before the camp was made. This gentleman was induced, from the ſituation, ſize, and form, of this fortification, ſo much reſembling that near Ameſbury in Wiltſhire, to ſuppoſe that it was made by Veſpaſian, when employed in the conqueſt of the Belgæ. But Camden, Speed, and ſome other antiquaries, aſcribe it to the Danes, who beſieged Dorcheſter under king Sweyn. Maiden-caſtle, one of the ſtrongeſt and moſt extenſive encampments in England, occupies the entire apex of a hill, about one mile ſouth-weſt of Dorcheſter, to which garriſon, in the time of the Romans, this is ſuppoſed to have been the caſtra æſtiva, or ſummer ſtation. Its form is an irregular ellipſis, ſurrounded by treble ditches and ramparts; the former are of prodigious depth; and the latter extremely high and ſteep. The entrances to the eaſt and weſt are ſtrengthened by additional works; the ends of the ramparts lapping over each other, and rendering the outlets very winding and intricate. The inner rampart includes an area of about 44 acres, and is nearly a mile and a quarter in circumference. The area is divided into two parts by a low ditch and bank, extending from north to ſouth; and near the ſouth ſide, where the ramparts are low, there appears to have been another entrance. Here alſo is the mouth of a cave, or ſubterraneous paſſage, ſaid, by tradition, to be of conſiderable length, though it is now choaked up and impaſſable. The whole extent of the works is 1194 yards by 544; of the area 760 yards by 275. This great and commanding fortreſs, though commonly ſuppoſed to be a Roman work, is, by Mr. King, aſcribed to the Britons. This gentleman has given a particular deſcription of it in his "Munimenta Antiqua," vol. i. "Beauties of England and Wales," vol. iv. "Hutchins's Hiſtory of Dorſetſhire," 2 vols. folio.

DORCHESTER, a county of America, in the ſtate of Maryland, lying on the E. ſide of Cheſapeak-bay, and on the S. ſide of Choptank river, which ſeparates it from Talbot county. On its coaſt are ſeveral iſlands, the chief of which, from the mouth of Hudſon's river, are, James, Taylor's, Barren, Hooper's, and Goldſborough's, the laſt lying between Hungary river and Fiſhing bay. The length of the county from E. to W. is about 33 miles, and its breadth from N. to S. 27 miles. The number of its inhabitants is 12,346, of whom 4566 are ſlaves. The lands in the northern parts are ſomewhat elevated, but in the ſouthern parts low and marſhy, particularly along Fiſhing-bay, and up its waters Tranſquaking, Blackwater, and Fearim creek, and along Hungary river, an arm of the Cheſapeak. The produce is chiefly wheat, corn, and lumber. Its chief town is Cambridge. Morſe.

DORCHESTER, a townſhip of America, in Grafton county, New Hampſhire, incorporated in 1761, and containing 349 inhabitants. It lies N. E. of Dartmouth college about 17 miles.—Alſo, an ancient and thriving town in Norfolk county, Maſſachuſetts, ſettled as early as 1630. It is 2 miles S. by E. diſtant from Boſton, and is now about 6 miles long, and 3½ broad. Its chief manufactures are paper, chocolate, ſnuff, leather, and ſhoes. It has a handſome church, and contains 2347 inhabitants. The N. E. point of the peninſula, called "Dorcheſter-neck," approaches within half a mile of Caſtle iſland, and its N. W. point within half a mile of the S. part of Boſton.—Alſo, a town in Cumberland county, New Jerſey, lying on the E. ſide of Morris river, about 5 miles from its mouth in the bay, and 17 eaſtward of Fairfield.—Alſo, a ſmall town of Charleſton diſtrict, South Carolina, on the N. E. bank of Aſhley river, 18 miles W. N. W. of Charleſton city. This place was ſettled and named in the year 1700, by a colony from Dorcheſter and its vicinity, in Maſſachuſetts; and ſome of its inhabitants, about the year 1750, left it, and ſettled midway, in Georgia. Morſe.

Dorchester *Mount*, a ridge of mountains in America, running through the county of Lincoln, in Upper Canada, parallel to Ontario, and ſuppoſed to be a ſpur of the Alleghany.

Dorchester *Townſhip* lies in the county of Norfolk, Upper Canada, W. of and adjoining to Dereham, fronting the river Thames.

DORDOGNE, La, in Latin *Dordonia*, is a conſiderable river of France, which has its ſource in the eaſt, in the department of the Cantal, at the foot of a mountain called *le Mont d'Or*, and is properly formed of two ſtreamlets, the Dore and the Dogne, from which it derives its name. The Dordogne flows firſt towards the north, then towards the weſt, and afterwards to the ſouth, as far as Bort; from thence it takes a ſouth-weſt direction as far as Beaulieu, and it is only to the north of Roçamadour that it begins to purſue a ſteady courſe weſtwards, when it paſſes by Souillac, St. Cyprien, Limeuil, la Linde, Bergerac, where it receives the river Vezere, St. Foy, Genſac, Caſtillon, Branne, Libourne, to the right of which it receives the river l'Ille, and then flows to Bourg ſur Gironde, and laſtly diſcharges itſelf at Bec d'Ambez into the river Garonne, which, after having taken up the Dordogne, is called the Gironde.

The Dordogne is navigable ſome time before it reaches Libourne, where its navigation is ſtill more facilitated by the tide. It gives its name to a department, and divides the department of the Correze from thoſe of the Puy-de-Dôme and the Cantal.

Dordogne, *The department of the*, is the ſecond department of the ſeventh region, or ſouth-weſt part of France, which compriſes nine departments, and is alſo known by the appellation of the Region of the Garonne. It derives its name from the river Dordogne, which runs through it in its ſouthern part from eaſt to weſt, and is compoſed of that part of the former province of Guienne which was called Périgord. Its chief place is Périgueux.

The department of the Dordogne is bounded on the north-eaſt by the department of the Upper Vienne, on the eaſt by that of the Correze, on the ſouth-eaſt by that of the Lot, on the ſouth by that of Lot and Garonne, on the ſouth-weſt by that of the Gironde, on the weſt by that of the Lower Charente, and on the north-weſt by the department of the Charente.

The principal rivers of this department are the Dordogne and the Ille; the leſſer ones are the Houe, the Upper Vezere, the Baudiat, the Dronne, the Vezere, and the Céon. Its climate is ſalubrious, but rather cold, on account of the mountains by which this department is ſurrounded. There are, however, ſome extenſive plains, and very fine valleys. The ſoil is generally ſtony. Corn is grown on the banks of the Ille and of the Dordogne; but the reſt of the department is without it; to ſupply the want of wheat, the inhabitants live moſtly upon cheſnuts, which grow in abundance, and which ſerve as food for both the country people and their cattle. Some cantons produce wine, others a little rye, barley, truffles, walnuts, &c. There are ſome good meadows and a few graziers: but the induſtry of the country people is chiefly directed towards the rearing of poultry. The turkeys of the Périgord are famous all over France.

Agriculture has made little progreſs in the department of the Dordogne; ſcarcely one-third of the ground is cultivated. Moſt of the land wants draining, and artificial meadows would be of immenſe benefit: but the antiquated prejudices of the inhabitants reſiſt every ſort of improvement. There are many extenſive foreſts, but moſt of them in a ſtate of decay. Game is abundant.

There are ſome iron mines in the department of the Dordogne which yield excellent iron; it is uſed in the cannon founderies, and the guns which are made of it are reckoned nearly as good as braſs cannons. This department has alſo ſeveral mineral ſprings. The principal articles of trade are poultry, pigs, cattle, cheſnuts, brandy, timber, iron, knitted hoſiery, earthen-ware, and paper.

The territorial extent of the department of the Dordogne is 8982 kiliometres and a half, or 1,135.322 arpens, equal to 451 ſquare leagues. The foreſts occupy 133.339 arpens. Its population amounts to 410,350 individuals, or about 910 inhabitants *per* ſquare league. The principal towns are Perigueux, Nontron, Excideuil, Sarlat, Monpaſier, Bergerac, Muſſidan, and Riberac. It is divided into five diſtricts; *viz.* Nontron, Perigueux, Sarlat, Bergerac, and Riberac; 47 cantons, and 642 communes. The average contribution of every individual to the expences of the ſtate amounts to ſeven livres, 77 centimes, 10 onziemes, or nearly *6s. 6d.* ſterling. (Herbin. Statiſtique de la France.)

DORDOMANA, in *Ancient Geography*, a town of Aſia, in Parthia. Ptolemy.

DORDRECHT, Dortrecht, or *Dort*, in Latin *Dordracum*, or rather *Dortrechtum*, in *Geography*, is a conſiderable town of the kingdom of Holland, in the department of the Maas, celebrated for the Proteſtant ſynod which was held here in 1618, (ſee Dort) and for being the place where the ancient counts of Holland uſed to be inaugurated. It is ſituated in an iſland called the Merwe; the harbour is commodious; it has a good ſalmon-fiſhery, and traded chiefly with timber, which in ſummer-time is floated down the Rhine and the Waal, and cut in the ſawing-mills, of which there is a great number in the neighbourhood of this town. Dordrecht is 12 miles S. E. of Rotterdam, 18 N. W. of Breda, and 45 S. by W. of Amſterdam. Long. E. from Ferro, 22° 11′ 30″. Lat. 51° 48′.

DORE, a ſmall river of France, in the department of the Puy-de-Dôme, has its ſource near Saint Amand, Roche Savine, from whence it runs ſouthwards, paſſes by St. Bonnet and Arlant, thence flowing to the north, it paſſes by Ambert, Olliergue, Courpiere, Puy Guillaume, and falls into the Allier near Ris.

Dore-l'Eglise, a ſmall town of France, in the department of the Puy-de-Dôme, 21 miles E. of Iſſoire.

DOREBAT, a town of Arabia, in the country of Yemen, 10 miles diſtant from Mocha, the capital of the territories of Schiech-Ibn-Aklan. Its ſituation on the ſummit of a hill renders it naturally ſtrong. At the foot of the hill ſtands a tower, the public priſon, which is ſaid to be the moſt diſmal in Yemen.

DOREE, or John Doree, in *Ichthyology*, a name given by us to a fiſh, called by authors the faber and gallus marinus. We have borrowed the name Doree from the French; and, as to the word John, by ſome writers prefixed to it, it ſeems only a corruption of the French word jaune, yellow; they expreſſing the colour of the ſides of this fiſh, which is a gold yellow, by the phraſe Jaune Dorée; this has given us the words John Dorée, or by thoſe who ſpell yet worſe, John Dory, as we ſee it in ſome authors. This is the Zeus *Faber*, which ſee.

The fleſh is well taſted, and by many preferred to that of the turbot. It is caught in the Mediterranean and other ſeas, and is not uncommon on the Cornwall coaſt, and other of the Engliſh ſhores.

The Indian Doreé is a fiſh caught in many parts of the Eaſt Indies, and called by the Dutch there the meerhaen, the ſame with the abacatuia of Marcgrave, caught in the Braſilian ſeas. See Abacatuaia and Zeus *Gallus*.

DORENBERG, or Duirenberg, in *Geography*, a town of Germany, in Weſtphalia, and county of Ravenſberg; three miles N. W. of Bielefield.

DORENHAGEN, a town of Germany, in Weſtphalia, and biſhopric of Paderborn; five miles S. S. E. of Paderborn.

DORENTHAL, or Dorotheenthal, a town of Germany, in the circle of Upper Saxony, and circle of Erzgeberg; 13 miles S. of Freyburg.

DORETTE, a river of France, which runs into the Dive, near Troan, in the department of the Calvados.

DORFF, a town of Germany, in the archduchy of Auſtria, on the Danube; 11 miles N. W. of Bruck.

DORFFEN, or Dorfen, a market-town of the kingdom of Bavaria, in Lower Bavaria, ſituated on the Iſer, in the diſtrict of Landſhut.

DORFFTIS, a town of Germany, in the archduchy of Auſtria, ſeven miles S. of Ziſtertorff.

DORFMARK, a town of Germany, in the circle of Lower Saxony, and principality of Luneburg; 20 miles N. W. of Zelle.

DORGAMANES, in *Ancient Geography*, a river of the Paropamiſus, Ptolemy.

DORGIO, in *Geography*, a ſmall town of Switzerland, in the canton of Uri, with a mineral ſpring, the water of which is reſorted to purify the blood.

DORHOBUS, a town of Poland, in the palatinate of Volhynia; 60 miles E of Lucko.

DORIA, Andrew, in *Biography*, a very extraordinary character, was born at Oneglia in the year 1466, or 1468; of which his father, a noble Genoeſe, was feudatory lord. At an early period he exhibited a ſtrong inclination for a military life, which was checked and diſcouraged by his parents. At their death he entered into the ſervice of the pope as a man at arms. He next engaged in the ſervice of the kings of Naples. In Venice he undertook the guardianſhip of Francis-Maria, whom he ſecured againſt the attempts of Cæſar-Borgia; and then repaired to his own country, Genoa. Twice he ſubdued, and brought to their allegiance, the revolted Corſicans. His enterprizing ſpirit by land obtained for him the office of captain-general of the Genoeſe gallies, about the year 1513. His firſt eſſays on the new element were upon the African pirates, with whom he engaged, and by the conqueſt of whom he was ſo far enriched as to become maſter of four gallies in his own pay. At this period Genoa was the prey to contending factions, and the city had, by one of them, been put into the hands of Louis XII. of France, from whom it afterwards revolted. Doria attempted to compoſe the diſtractions of the republic, but, finding his efforts ineffectual, he entered into the ſervice of Francis I. of France, to which country he was exceedingly uſeful, but being neglected by the miniſters, he joined himſelf to pope Clement VII. and became admiral of his gallies. In this ſituation he did not remain very long, for upon the capture of Rome under the conſtable Bourbon, Doria was perſuaded to return to the ſervice of Francis, who received him with open arms, and appointed him his admiral in the ſeas of the Levant. Doria had at that time eight gallies of his own, and notwithſtanding his engagements to a foreign prince, he ſtill maintained the independence of his mind; and when the French attempted to render Savona, long the object of jealouſy of Genoa, its rival in trade, Doria remonſtrated againſt the meaſure in a high and animated tone, which ſo irritated Francis, that he ordered his admiral to ſail inſtantly to Genoa, then in the hands of the French troops, to arreſt Doria, and to ſeize his gallies. Doria was apprized of their intentions, retired with all his veſſels to a place of ſafety; and, while his reſentment was thus raiſed, he cloſed with the offers of the emperor Charles V., returned his commiſſion, with the collar of St. Michael, to Francis, and, hoiſting the Imperial colours, ſailed with his gallies towards Naples, not to block up the harbour of that unfortunate city, but to bring it protection and deliverance.

The ruin of the French army before Naples was the immediate conſequence of this change. This was an important object, but Doria's higheſt ambition was to deliver his country from the power and dominion of foreign ſovereigns. The moment favourable to this project ſeemed to have arrived: Genoa was afflicted with a grievous peſtilence, the city was, in a manner, deſerted, and the French garriſon was greatly reduced and very ill paid. Doria ſeized the opportunity; ſailed with thirteen galleys to the Genoeſe coaſt, landed a body of 500 men, and took poſſeſſion of Genoa itſelf without the loſs of a ſingle man on either ſide. The French garriſon retired to the citadel, where they were ſoon glad to capitulate; and upon their departure, the people ruſhed to the fortreſs, and levelled it with the ground, as a monument and inſtrument of their ſervitude. To the honour of the hero let it be mentioned, that he ſcorned to take the advantage which his ſituation gave him, by making himſelf the maſter of the country: he nobly aſſembled the body of citizens, diſclaimed all pre-eminence, and reſtored into their hands the right of eſtabliſhing ſuch a form of government as they ſhould think beſt. Twelve perſons were appointed to new model the conſtitution, which was ſettled nearly in the form in which it exiſted till within theſe few years. Doria was greeted by the titles of the deliverer and father of his country; and the higheſt honours were conferred upon him. He was exempted from all public burdens, and a palace aſſigned him for his habitation, purchaſed at the charge of the ſtate. A marble ſtatue was erected in his honour, on which was a Latin inſcription proclaiming him the founder of public liberty. He lived to the advanced age of 92 or 94, leaving behind him a name that can never die, while a ſpark of public ſpirit and public liberty ſurvives. For farther particulars of this great man ſee the article Genoa. Robertſon. Univer. Hiſt.

Doria, in *Botany*. See Senecio Doria.

Doria, or *Duria*, in *Ancient Geography*, a river of Spain, in Luſitania; now the *Douro*.

Doria *Baltea*, or *Grand Doria*, in *Geography*, a river of Piedmont, which riſes in the Alps, on the borders of the Valais, and after winding through the valley of Aoſta, &c. diſcharges itſelf into the Po by two branches, between Chivazzo and Creſcentino.

Doria *Ripuaria*, or *Little* Doria, a river of Piedmont, which riſes in the Alps, on the borders of France, paſſes through the valley of Suſa, &c. and runs into the Po, a little to the N. E. of Turin.

DORIAN, *adj.* as the Dorian mode in Greek muſic; it was the loweſt of thoſe which have ſince, in eccleſiaſtical muſic, been called authentic. (See Modes, and Canto Fermo.) The characters of this mode were gravity, ſolemnity, and its fitneſs for tragedy, ſubjects of war, and religious rites. Pluto regards the majeſty of the Dorian mode as efficacious in preſerving order and decorum ; for which reaſon he has permitted its uſe in his republic. It was called Dorian from having been firſt uſed by that people. Its invention is aſcribed to Thamyris of Thrace ; who having raſhly challenged the muſes, and been defeated, loſt at once his lyre and his ſight.

It is agreed that the ancient modes or keys are all minor. Some place the Dorian mode in D ; but Ptolemy, who reformed the Greek modes, has placed it in E. Sir Francis Eyles Stiles, who wrote an ingenious paper on the ſubject of the modes or tones of the Greeks, which was read at the Royal Society, and is printed in the Tranſactions for 1761, ſuppoſes the modes to be only different ſpecies of octave of the ſounds in C or A natural ; but how ſuch different and powerful effects could be produced by tranſpoſitions of the ſame ſounds is not eaſy to conceive. See *Ancient Greek* Music and Modes.

DORIAS, or Dorius, in *Ancient Geography*, a river of India, on the other ſide of the Ganges, according to Ptolemy ; the modern Zançan, the mouth of which is in the kingdom of Tonquin.

DORIC Order, in *Architecture*, is that peculiar form of a column and its entablature, which was originally formed in imitation of a wooden fabric ſupported with poſts or the trunks of trees. It therefore lays claim to a more remote origin than either the Ionic or Corinthian. The antiquities which yet remain of this ancient order are to be ſeen in Greece, the place of its nativity, and in its colonies, in Sicily and Paeſtum in Italy, and a few fragments in Ionia. The examples which are found in theſe remains are of ſuch uniform character as to denote its peculiar ſtyle or ſpecies. Though the Egyptian buildings and thoſe of other anterior nations, bear ſo much reſemblance to an order, as to have entablatures ſupported by circular pillars, yet theſe pillars have no ſpecific form, and are in character ſo different from any of the Grecian orders, as to entitle the Greeks to be the inventors of that ſtyle of building, which is no where to be traced but in their own edifices. We are informed by Vitruvius, that the Doric order was firſt practiſed in the temple of Juno, in the ancient city of Argos, in the time and territories of Dorus, who reigned over Achaia and Peleponneſus; but its ſymmetry was not fixed till an Athenian colony led by Ion eſtabliſhed itſelf in that part of Aſia now called Ionia, after their leader Ion, and built a temple in the manner in which they had obſerved it practiſed in the Dorian ſtates. In this building they made the columns ſix diameters in height, taking the proportion from the ratio which the foot of a man bears to his altitude.

The columns of the Doric order were imitated from the poſts which ſupported the wooden ſtructure, and were fluted to hold the ſpears or ſtaves which the early Greeks always carried along with them. The capital was formed of a large convex moulding, repreſenting a bow and a ſquare ſtone, in order to protect the ſhaft from rain. The architrave conſiſted of a maſſy ſtone, or marble, repreſenting the wooden beam. The frize was formed in imitation of the ends of the joiſts with open ſpaces between: however, in proceſs of time, theſe were cloſed, and formed into receding pannels, and the projecting parts, repreſenting the ends of the joiſts, were cut into vertical channels to conduct the rain from the ſurface : the tablets thus cut, were called triglyphs, from having two angular channels in the middle, and two half channels at the angles of the triglyphs. The glyphs or channels were each formed by two planes, making a right angle with each other internally, and an angle of 135 degrees with the face of the triglyphs externally, as alſo the half channels on each extreme of a triglyph. The cornice was formed in imitation of the projecting timbers of the roof, and ſmall conical or cylindrical bodies were ſculptured on the under ſides of the rafters, to repreſent the drops of the rain which adhered to them. Theſe drops were called guttæ, and conſiſted of three rows under each rafter, each row containing ſix. The parts which at firſt reſulted from the primitive habitation, were afterwards carved into mouldings. The ſpaces or pannels between the triglyphs were called metopes, and were generally of a ſquare figure. The firſt triglyphs always began at the angle of the building. The ends of the joiſts were called mutules, and were ſo diſpoſed, that one was placed immediately over each triglyph, and one over the middle of each metope. The architrave had a projecting band, which covered the maſſy face below : under this band, and under each triglyph, was placed a fillet, with ſix pending guttæ, coinciding at the ends with the vertical ſides of the triglyphs. The faces of the triglyphs are generally in the ſame ſurface or plane with the face of the epiſtylium, or architrave, and conſequently the metopes are receſſed. The Doric portico at Athens, the portico of Philip king of Macedon, and the temple of Apollo in the iſland of Delos, are inſtances where this is otherwiſe. This is the general character of the Grecian Doric, which is almoſt uniformly placed on three ſteps not proportioned to the human ſtep, but to the magnitude of the edifice. The columns either diminiſh in a curve or right line from the inferior to the ſuperior ends of the ſhaft. The ſhafts are almoſt conſtantly fluted : the temple of Apollo in the iſland of Delos, and the temple at Segeſta, are inſtances to the contrary. The flutes are generally twenty in number, without fillets, and terminate under the annulets of the echinus of the capital.

The Doric order was the only order known in Greece, or its colonies, anterior to the Macedonian conqueſt. The examples which yet remain are of various proportions, as may be ſeen by the following examples, which are taken from the fragments of the edifices which yet remain of this order. However, as the proportions of the members of the entablature are very uniform, we ſhall venture to give the reſult which ariſes from the agregate or number of them. For public edifices, the columns may be five or five diameters and an half in height, and for private buildings ſix ; and may diminiſh one-fourth of the inferior diameter of the ſhaft. The height of the capital may be two-fifths of the lower diameter, and may be divided into two equal parts, giving the upper one to the abacus: the lower one to the echinus and annulets : divide the lower one into five equal parts, giving one to the annulet, and four to the echinus. Divide the height of the entablature into four equal parts, giving one to the cornice: divide the three lower equally into two, giving one to the epiſtylium, and one to the zophorus or frize.

The following four plates contain a comparative view of the proportions of all the Dorics that have been aſcertained by meaſurement.

Plate XV. *fig*. 1, (*Architecture*) from the temple of Apollo in the iſland of Delos. This is one of the two ſingular examples where the ſhaft of the column is not fluted except at the necking and a ſmall part at the lower end. *Fig*. 2, from the portico of Philip, king of Macedon, alſo in the iſland of Delos : the moulding which occupies the place of the echinus is ſingular, being a conic fruſtum inverted : the proportions are very light, and may be uſed in private buildings or in works of gaiety. *Fig*. 3, from the temple at Ægeſta : this is the other example where the ſhafts are not fluted : the necking is formed by making it recede within the ſurface of the upper part of the ſhaft ; a receſs alſo obtains at the lower end of the ſhaft, but theſe receding annular ſurfaces are ſmooth, and not ſculptured into flutes, as in the temple of Apollo, in the iſland of Delos. *Fig.* 4, from the temple of Jupiter, at Selinus: this is the largeſt example of this order: the height of the column is 48 feet 7 inches, and the diameter of the lower end of the ſhaft 10 feet 7 inches and five-tenths of an inch: the fluting of the ſhafts is ſingular, and unlike every other example of this order, the flutes being ſeparated by fillets, as in the Ionic and Corinthian orders. *Fig.* 5. greater hexaſtyle temple at Selinus.

Plate XVI. *fig.* 1, temple at Corinth: the ſhaft is diminiſhed in a convex curve from the bottom to its termination under the annulets: this column is that which has the feweſt diameters in height; from this circumſtance, it is probable, that the temple exhibits one of the moſt ancient examples of the Doric order. *Fig.* 2, from the interior periſtyle of the hypaethral temple at Paeſtum, ſhewing a double range of columns one above the other. Here it may be obſerved, that the inferior diameters of the ſuperior range are not equal to the ſuperior diameter of the inferior range, but the ſides of both ranges are in continued ſtraight lines, and conſequently may be eſteemed as parts of the ſame cone wanting the intermediate fruſtum, which is occupied by the podeum: the ſhafts of the columns have only ſixteen flutes. *Fig.* 3, from the exterior periſtyle of the ſame temple. This example is almoſt ſimilar to that of the temple of Corinth with a low ſhaft and a bold projecting echinus; ſo that if we are to judge of the antiquity of an order by the proportion of the column, this example will rank next to the temple of Corinth. *Fig.* 4, from the temple of Minerva at Sunium, a light beautiful proportion of the Doric order, well adapted to works of gaiety or private buildings. *Fig.* 5. from the temple of Minerva, at Syracuſe: this example is ſingular, in as much as the columns are placed upon plinths all around the exterior periſtyle: there is another ſingularity attending the columns within the pronaos, that they are not only placed upon plinths, but have mouldings above forming what has been denominated the Doric baſe; with all the ſpecific members though not of the uſual proportion; and that the capitals have an aſtragal and fillet under the echinus inſtead of the annulets which are in all other Grecian examples placed in this ſituation; in this reſpect it is ſimilar to ſome of the examples compoſed by the Italians after the reſtoration of the Roman ſtyle.

Plate XVII. *fig.* 1, from the pſeudodipteral temple at Paeſtum: here the necking of the capital is receſſed as in ſome of the foregoing examples, and contrary to the uſual ſimplicity of the Doric, has a row of leaves diſpoſed around it, bending their tops downwards under the annulets. *Fig.* 2, from the temple of Theſeus at Athens, a moſt elegant light example well adapted for the purpoſes of domeſtic habitation: this building is among the moſt perfect of the ſacred edifices at Athens, and is now converted into a church dedicated to St. George. *Fig.* 3, temple of Concord at Agrigentum. *Fig.* 4, from the temple of Jupiter Panellenius in Ægina a ſmall building. *Fig.* 5, from the Parthenon, or great temple of Minerva at Athens: this is a moſt beautiful and auguſt building, conſiſting of the moſt graceful proportions, it was built during the adminiſtration of Pericles, who employed Ictinus and Callicrates for his architects: the cella of this temple is now occupied by a Turkiſh moſque.

Plate XVIII. *fig.* 1, from the theatre of Marcellus at Rome: this example is altogether out of character; the mutules, the genuine marks of the order, are wanting, and in their places are dentils, which are peculiar to the Ionic: the middle of the triglyph is placed in a plane paſſing through the axis of the column, and at right angles to the face of the epiſtylium: the column is too ſlender, repreſenting a poſt of wood rather than a ſtrong durable marble or ſtone column; the capital is overcharged with mouldings; in a word, the whole is void of that original ſimplicity and elegance which the Grecian Doric exhibits: yet this is the only remaining example which the Romans have left us of their taſte of this order. *Fig.* 2, from the hexaſtyle temple at Paeſtum: the entablature ſeems altogether to be Roman; it is without the mutules, and the ſoffit of the corona is coffered; the columns, however, have a nearer affinity to the Grecian than the Roman; the capital has a row of leaves under the annulets, as in the pſeudodipteral temple. *Fig.* 3, from the temple of Jupiter Nemaeus, between Argos and Corinth: this is a very lofty example; but the members are too ſmall to impreſs the mind with grandeur. *Fig.* 4, from the temple of Juno Lucina at Agrigentum; an example of bold and maſſy features. *Fig.* 5, from the Doric portico at Athens; a very beautiful light example, well adapted for private edifices: this, and the temple of Minerva, are the only examples in Greece where the crowning echinus is entire.

Plate XVIII *a*, contains the various peculiarities of the triglyphs and annulets of the Doric order, which are to be found among the various examples. *Fig.* 1, Nos. 1 and 2, ſhews the forms of the heads of the glyphs, as is to be ſeen in the temple of Minerva, the propylia and the temple of Theſeus at Athens; the temple of Minerva at Syracuſe; the temple of Juno Lucina at Agrigentum; the temple of Jupiter at Selinus, and the temple of Ægeſta. The form repreſented in *fig.* 2, Nos. 1 and 2, obtains in the Doric portico at Athens; the antae within the pronaos of the temple of Concord at Agrigentum, and the tomb of Theron at the ſame place; the hexaſtyle temple at Selinus; the temple of Apollo at Cora, and in plate 18, Ionian Antiquities, vol. ii. *Fig.* 3, from vol. i. ch. 2. pl. 11, Ionian Antiquities. *Fig.* 4, from vol. ii. pl. 35, Ionian Antiquities. *Fig.* 5, from the temple of Apollo, in the iſland of Delos. *Fig.* 6, from the hexaſtyle temple at Paeſtum. *Fig.* 7, from the temple of Concord, and from the temple of Jupiter Olympius, at Agrigentum, and the hexaſtyle temple at Selinus. *Fig.* 8, from the hexaſtyle peripteral temple at Paeſtum, diſpoſed over the axis of the column, as in the Roman Doric. *Fig.* 9, from the theatre of Marcellus at Rome, where it may be obſerved that the tops of the glyphs terminate in a plane, which has the ſame inclination to the face of the triglyph, as the vertical ſides which form the glyph have. *Fig.* 10, annulets from the temple of Minerva at Athens. *Fig.* 11, from the Doric portico at Athens. *Fig.* 12, from the temple of Jupiter Olympius at Agrigentum. *Fig.* 13, from the temple of Minerva at Syracuſe. *Fig.* 14, from the theatre of Marcellus at Rome.

Doric-*cimatium* is a member mentioned by Vitruvius, b. iv. ch. 3. placed above and below the corona of the Doric cornice: from theſe ſituations it would appear to be the ſemi-inverſa.

Doric, in *Grammar*. The Doric dialect is one of the five dialects or manners of ſpeaking, which obtained among the Greeks. See Dialect.

It was firſt uſed by the Lacedæmonians, and particularly thoſe of Argos; thence it paſſed into Epirus, Libya, Sicily, the iſlands of Rhodes and Crete.

In this dialect, Archimedes and Theocritus wrote, who were both of Syracuſe; as likewiſe Pindar.

In ſtrictneſs, however, we ſhould rather define Doric, the manner of ſpeaking peculiar to the Dorians, after their receſs near Parnaſſus, and Aſopus; and which afterwards came to obtain among the Lacedæmonians, &c. Some even diſtinguiſh between the Lacedæmonian and Doric; but in reality, they were the ſame, ſetting aſide a few particularities in the language of the Lacedæmonians; as is ſhewn by Rulandus, in his excellent treatiſe, De Lingua Græca, ejuſque Dialectis, lib. v.

Beſide the authors already mentioned to have written in the Doric dialect, we might add Archytas of Tarentum, Bion, Callinus, Simonides, Bacchylides, Cypſelas, Alcman, and Sophron.

Moſt of the medals of the cities of Græcia Magna, and Sicily, favour the Doric dialect in their inſcriptions: witneſs ΑΜΒΡΑΚΙΩΤΑΝ, ΑΠΟΛΛΩΝΙΑΤΑΝ, ΑΧΕΡΟΝΤΑΝ, ΑΧΥΡΙΤΑΝ, ΗΡΑΧΛΕΩΤΑΝ, ΤΡΑΧΙΝΙΩΝ, ΟΕΡΜΤΙΑΝ, ΚΑΥΛΟΝΙΆΤΑΝ, ΚΟΠΙΤΑΝ, ΤΑΥΡΟΜΕΝΙΤΑΝ, &c. Which ſhews the countries wherein the Doric dialect was uſed.

The general rules of this dialect are thus given by the Port-royaliſts:

"*D'ε* Ητα *d'ω grand, d'ε, do & d'ȣ l'α fait le Dore.*
D'ει fait ητα; d'ȣ, ω; & d' ω αυ fait encore.
Oſte ι de l'infini: & pour le ſingulier,
Se ſert au femenin du nombre plurier."

But they are much better explained in the fourth book of Rulandus; where he even notes the minuter differences of the dialects of Sicily, Crete, Tarentum, Rhodes, Lacedæmon, Laconia, Macedonia, and Theſſaly.

The α abounds every where in the Doric; but this dialect bears ſo near conformity with the Æolic, that many reckon them but one.

This dialect was much eſteemed by the Greeks, but was preſerved moſt pure by the Meſſenians, even throughout their various tranſmigrations. It was juſtly eſteemed the moſt elegant, ſweet, and beſt adapted to Lyric poetry and muſic, of which the Dorians were very fond, and in which they were the moſt expert of all the Greeks.

Doric, in *Muſic*. The Doric mode is the firſt of the authentic modes of the ancients.

Its character is, to be ſevere, tempered with gravity and mirth: it is proper for occaſions of religion, and war. It begins with *D, Sol, Re.*

Plato admires the muſic of the Doric mode, and judges it proper to preſerve good manners, as being maſculine. And on this account he allows of it in his Commonwealth.

The ancients had likewiſe the Sub-Doric mode, which was one of their plagal modes. Its character was, to be very grave, and ſolemn. It began with *G Ut*, a diateſſaron, lower than the Doric mode.

DORIENSES, or Dorians, in *Ancient Geography*, formed a part of the nation compriſed under the appellation of Hellenes. Under the king Deucalion, the Hellenes inhabited the Phthioide territory: under Dorus, the ſon of Hellen, they occupied the Hiſtiæotide diſtrict ſituated towards mounts Oſſa and Olympus. They were driven thence by the Cadmæans, and inhabited the town of Pindus and its territory, where they aſſumed the name of *Macednes*. Hence they diſtributed to a diſtance various colonies, one of which ſettled in the iſle of Rhodes. After the ſiege of Troy, the Dorians founded Megara on the confines of Attica, about the year 1131, before the Chriſtian era. Others migrated to the iſle of Crete, where they eſtabliſhed a colony; and ſome of them were diſperſed in the iſle of Rhodes, Halicarnaſſus, Cos, and Cnidus. In proceſs of time, other colonies of the Dorians paſſed into Sicily. But the country, which may be regarded as the principal ſeat of their power, was the Peloponneſus, of which they took poſſeſſion under the conduct of the Heraclidæ, about 80 years after the taking of Troy, 1104 B.C. In the year 1102 B.C. the Heraclidæ divided among them the territories of the Peloponneſus, reſerving ſome few towns to the Ionians upon the borders of Achaia. The Dorians of Peloponneſus made ſeveral irruptions on the territories of Attica. Herodotus reckons four of theſe expeditions. The firſt was that in which they conducted a colony to Megara; the ſecond and third, in which they expelled the Piſiſtratides; and the fourth, in which Cleomenes conducted the Peloponneſians againſt Eleuſis. Their language, according to Strabo and other writers, differed little from the Æolian. See Doric and Doris.

DORIGNY, Michael, in *Biography*, a painter and engraver, was born at St. Quentin in France, in the year 1617, and manifeſting an early inclination for the arts, was placed under Simon Vouet, a painter of great reputation, whoſe daughter he married. As a painter he copied the manner of his maſter, but he is better known as an engraver. He performed his plates chiefly with the point in a bold, powerful ſtyle; the lights are broad and maſſy, eſpecially upon the figures. But the marking of the folds of the draperies, and the ſhadows upon the outlines of the fleſh, are frequently ſo dark as to produce a harſh, diſagreeable effect, and ſometimes entirely to deſtroy the harmony of the engraving. Although he underſtood the human figure, and in ſome inſtances it was correctly drawn; yet by following the manner of Vouet inſtead of the ſimple forms of nature, his outlines were affected, and the extremities of his figures too much neglected. This artiſt was made profeſſor of the Royal Academy of Painting at Paris, where he died A. D. 1665, aged 48. His works are ſaid to have conſiſted of 105 prints. Amongſt theſe were "the Adoration of the Magi," "the Nativity of Chriſt," "Venus at her toilet," "Venus, Hope, and Love, plucking the feathers from the wings of Time," "Mercury and the Graces," and "the Rape of Europa." all from pictures of Vouet. He alſo engraved from Le Seur, Saraſin, and other maſters. Strutt.

Dorigny, Lewis, a painter of hiſtory, ſon of the former artiſt, was born at Paris in 1654; and having been inſtructed by his father in the rudiments of his art, he became on his death, at the age of 10 years, a diſciple of Le Brun. Here he made conſiderable progreſs; but diſappointed in his expectations of obtaining the firſt prize at the Academy, he travelled to Italy, and ſtudied for ſeveral years at Rome, Venice, and Verona. He was highly commended for the fertility of his invention, the grandeur of his compoſition, and the harmony of his colouring; but diſguſted by the unfavourable judgment pronounced on a cieling at Paris, repreſenting the fall of Phaeton, he returned to Verona and there ended his days, in 1742. His principal work is the dome of the great church at Trent. By the hand of this maſter we have ſeveral etchings. Pilkington and Strutt.

Dorigny, *Sir* Nicholas, *Knight*, an eminent engraver, the brother of the preceding Lewis, was born at Paris in 1657, and in conſequence of the death of his father, whilſt he was young, was brought up to the law. But at the age of 30 he quitted that profeſſion, devoted himſelf to the arts, and went to his brother at Rome to ſtudy the principles of painting. By his brother's advice, he took up the point, and produced ſeveral etchings. He afterwards reſumed the pencil. But again laying this aſide, he began again to engrave, and his firſt productions are ſaid to have been the ſeven planets from Raphael; and he alſo finiſhed the transfiguration, from the ſame maſter. Advanced in reputation, he was invited to England in order to engrave the cartoons, then at Hampton-court. He arrived in June 1711; but as he demanded the ſum of four or five thouſand pounds, this plan was rendered abortive. Afterwards he undertook to execute it by ſubſcription; and having apartments aſſigned him at Hampton-court, he ſent for Dupuis and Duboſc from Paris to aſſiſt him; but from ſome diſagreement that occurred, they left him, before the work was half completed. In 1719, he preſented two complete ſets to king George I. and a ſet a-piece to the prince and princeſs; for which the king gave him 100 guineas, and the prince a gold medal. The duke of Devonſhire, who had aſſiſted him, procured for him, in 1720, the honour of knighthood. His eyes afterwards failing him, he returned to Paris, where, in 1725, he was made a member of the Royal Academy of Painting, and died in 1746, aged 89.

His drawing was incorrect and affected; the naked parts of his figures are often falſely marked, and the extremities are defective. His draperies are coarſe, the folds ſtiff and hard; and a *manner* of his own prevades all his prints, ſo that the ſtyle of the painter is conſtantly loſt in that of the engraver. Nor did he ever fail more than in working from the paintings of Raphael. Baſan, with an excuſable partiality for his countryman, ſays of him, "we have many excellent prints by his hand, in which one juſtly admires the good taſte of his drawing, and the intelligent picturesque manner, which he acquired by the judicious reflections he made upon the works of the great maſters, during the reſidence of 22 years in Italy." We have of his prints the following, *viz.* "St. Peter curing the lame man at the gate of the temple," from Civoli; "the transfiguration" from Raphael; "the deſcent from the croſs," from Daniello da Volterra; "the martyrdom of St. Sebaſtian," from Dominichino, which two laſt are ſaid to be his beſt prints; "the Trinity" from Guido, "the hiſtory of Cupid and Pſyche," from Raphael's pictures in the Vatican; "the Cartoons," ſeven very large plates from the pictures of Raphael. He alſo engraved from Annibale Caracci, Lanfranche, Louis Dorigny, and other maſters. Strutt.

DORING, or Daring, among the *Sportſmen*, a term uſed to expreſs a method of taking larks, by means of a clap-net and a looking-glaſs. For this ſport there muſt be provided four ſticks, very ſtraight and light, about the bigneſs of a pike; two of theſe are to be four feet nine inches long, and all notched at the edges, or at the end. At one end of each of thoſe ſticks there is to be faſtened another of about a foot long on one ſide; and on the other ſide a ſmall wooden peg, about three inches long. Then four more ſticks are to be prepared, each of one foot length; and each of theſe muſt have a cord of nine feet long faſtened to it at the end. Every one ſhould have a buckle for the commodious faſtening on to the reſpective ſticks when the net is to be ſpread.

A cord muſt alſo be provided, which muſt have two branches. The one muſt be nine feet and a half, and the other ten feet long, with a buckle at the end of each; the reſt or body of the cord muſt be twenty-four yards long. All theſe cords, as well the long ones, as thoſe about the ſticks, muſt be well twiſted, and of the bigneſs of one's little finger. The next thing to be provided is a ſtaff of four feet long, pointed at one end, and with a ball of wood on the other, for carrying theſe convienences in a ſack or wallet.

There ſhould alſo be carried, on this occaſion, a ſpade to level the ground where there may be any little irregularities; and two ſmall rods, each eighteen inches long, and having a ſmall rod, fixed with a packthread at the larger end of the other. To theſe are to be tied ſome packthread loops, which are to faſten the legs of ſome larks; and there are to be reels to theſe, that theſe birds may fly a little way up and down.

When all this is done, the looking glaſs is to be prepared in the following manner. Take a piece of wood, about an inch and a half thick, and cut it in form of a bow, ſo that there may be about nine inches ſpace between the two ends; and let it have its full thickneſs at the bottom, that it may receive into it a falſe piece; in the five corners of which, there are to be let in five pieces of looking glaſs. Theſe are to be fixed, that they may part their light upwards, and the whole machine is to be ſupported on a moveable pin, with the end of a long line fixed to it; and, made in the manner of the children's play-thing of an apple and a plumbſtone; ſo that the other end of the cord being carried through a hedge, the barely pulling it may ſet the whole machine of the glaſſes a-turning. This and the other contrivances are to be placed in the middle between the two nets. The larks fixed to the place, and termed calls, and the glittering of the looking glaſſes, as they twirl round in the ſun, invite the other larks down; and the cord that communicates with the nets, and goes through the hedge, gives the perſon behind an opportunity of pulling up the nets, ſo as to meet over the whole, and take every thing that is between them. The places where this ſort of ſporting ſucceeds beſt are open fields, remote from any trees or hedges, except one by way of a ſhelter for the ſportſman, and the wind ſhould always be either in the front or back; for if it blows ſideways, it prevents the playing of the nets.

DORINGSTADT, or Durinstatt, in *Geography*, a town of Germany, in the circle of Franconia, and biſhopric of Bamberg; 14 miles N. of Bamberg.

DORINK, or Doring, Matthias, in *Biography*, a learned German monk of the Franciſcan order, was born about the year 1415 at Kiritz. In the year 1445, we find him profeſſor of theology in the univerſity of Magdeburg, diſcharging the duties of his office with great reputation. While he held this ſituation, ſtrictures and objections againſt the ſhort commentaries on the ſcriptures of Nicholas de Lyra, were publiſhed by Paul de Burgos; Dorink undertook their defence and farther illuſtration. The different pieces which he wrote on theſe ſubjects were collected together, and inſerted in an edition comprehending the works of both thoſe authors, which was publiſhed in Paris, in ſix volumes folio, in the year 1590. This work was well received, and went through ſeveral editions. To Dorink is generally aſcribed the "Miroir Hiſtorial" commonly known by the name of "The Chronicle of Nuremburg," and in this reſpect he is conſidered as the forerunner of the illuſtrious Luther, the Chronicle being written with ſpirit and energy againſt the vices of the cardinals, the biſhops, and the popes, and alſo againſt jubilees and indulgences. Moreri.

DORIS, in *Botany*, according to Pliny, is a name ſometimes given, among many others, to a kind of baſtard alkanet, *Anchuſa*, whoſe root yields a red juice. The leaves are narrow, flaccid, and very woolly, and their juice, or that of the ſeed, taken internally, is celebrated as extremely efficacious againſt the bites of ſerpents. Commentators have ſuppoſed this plant a ſpecies of *Echium*.

Doris, or the *Doride*, in *Ancient Geography*, was a country of Greece, ſituated on the ſouth of Theſſaly, and ſeparated from it by mount Oeta, and a ridge of other hills. On the ſouth it had Phocis and part of Ætolia; on the eaſt it was parted from the Locrii Epicnemidæ by the river Pindus; and on the weſt from Epirus and Acarnania by that of Achelous. The Cephiſus was the only river of note which had its ſource in this country; but its mountains were numerous and not inconſiderable, of which the moſt famous were Oeta and Pindus, which, with ſome others leſs remarkable, bounded it on the north, as the Callidromians did on the weſt.

The country, however, though mountainous, abounded with ſpacious plains, and was very fruitful. The air was ſalubrious, and the ſoil capable of agricultural improvement. Its territory was not large, extending only about 40 miles in length, that is, from 39° 10′ to 39° 50′ lat., and about 20 miles in breadth at the wideſt part, or from 23° 10′ to 23° 30′ E. long., according to Ptolemy, Strabo, Mela, Cellarius, Wells, &c. This country was called Doris, and the people Dores or Dorians, from Dorus the ſon of Hellen, and grandſon of Deucalion, who is ſaid to have firſt peopled or conquered it, at leaſt that part of it which lies below the mountains of Oeta and Pindus. It was alſo called *Tetrapolis* from its four cities, *viz.* Pindus, Erineus, Cytinium, and Boium or Boæum. The Dores, though they inhabited a mountainous tract, were very poliſhed in their manners, good orators, poets, and muſicians, and at the ſame time ſtout and warlike, and accuſtomed to wear a tuſt of horſe-hair on their helmets, from which Homer ſtyles them τριχαικες. They extended their colonies to ſeveral parts of Aſia, and among others founded the city of Chalcedon, on the Euxine ſea; and as they ſent forth ſeveral colonies, we find different countries called Doris. Thoſe that continued in their original ſettlement were driven from it by the Cadmæans, and forced for ſome time to occupy the diſtricts about Macednum and Pindus; but they returned ſoon after to *Dryopis*, (which ſee,) and the country about Oeta, where they continued till they made their deſcent into the Peloponneſus with the Heraclidæ (ſee Dorienses), and whither they carried alſo their dialect, called from them *Doric* (which ſee). They alſo gave name to the Doric muſic, in oppoſition to that of the Lydians and Phrygians, and to the Doric order in architecture. Their chief city was called Doris, from the founder of this kingdom. This metropolis is mentioned by Homer, Herodotus, and others. After theſe people made their naval deſcent into Peloponneſus, and their ſettlement, in this peninſula, with the Heraclidæ, they built a ſtately temple to Jupiter Tropæus, in memory of this great event. Such indeed it was, and anſwerable to the appellation given to this deity, from τρεπω, *verto*, ſince it almoſt overturned the whole ſtate of affairs in all the different kingdoms and ſtates of Peloponneſus, whoſe cities were now forced to receive a garriſon of Dorians, and to ſubmit to a foreign government.

On the arrival of the Dorians in Aſia, they formed themſelves into ſix independent ſtates, or ſmall republics, which were confined within the bounds of ſo many cities; theſe were Lindus, Jalyſus, Camirus, Cos, Cnidus, and Halicarnaſſus. Other cities in that tract, called from them Doris, belonged to their confederacy; but the inhabitants of theſe alone, as true and genuine Dorians, were admitted into their temple at Triope, where they exhibited ſolemn games in honour of Apollo Triopius. The prizes were tripods of braſs, which the victors were obliged to conſecrate to Apollo, and leave in the temple on an altar of gold. When Agaſicles of Halicarnaſſus won the prize, he tranſgreſſed this cuſtom, and carried the tripos to his own houſe; on which account the city of Halicarnaſſus was ever afterwards excluded from the Dorian confederacy; ſo that the Dorians were, from that time, known by the name of the five cities, or Pentapolis. Herodot. l. i. c. 144.

Doris, in *Zoology*, a genus of the Molluſca tribe of Vermes, including about thirty different ſpecies. The body is creeping, oblong, and flat beneath; mouth placed below on the anterior part; vent behind on the back, and ſurrounded by a fringe; feelers from two to four, ſeated on the upper part of the body in front, and retractile. Theſe animals are of the marine kind, and are found principally crawling on the rocks, or adhering to the zoophytes and marine plants attached to them under the ſurface of the water. It is only occaſionally that they are found at a diſtance from ſhore in the open ſea; they feed, like the greater part of the molluſca, on other worms, and when ſwimming exhibit a moſt beautiful appearance, the horns, or tentacula, and alſo the fringe ſurrounding the vent, both which are retractile at the pleaſure of the animal, being then expanded. An inconſiderable number of the ſpecies occur in warm climates, eſpecially in the Mediterranean; but according to the remarks of Dicquemere, they abound moſt in colder regions. Nearly all the ſpecies at preſent known have been obſerved by Müller in the northern ſeas.

The genus doris, as propoſed by Linnæus, is not uniformly adopted by the continental naturaliſts of the preſent time. It is diſapproved by Müller in his "Zoologia Danica." Cuvier divides them into two diſtinct genera, to one of which he retains the Linnæan name, the other he calls tritonis, a particular account of which may be ſeen in a memoir publiſhed in the "Annales du Muſeum." Lamarck alſo divides them into two genera in a ſimilar manner. Linnæus was himſelf aware of ſome objection to his genus doris, and in order to comprehend even the few ſpecies known in his time, found it neceſſary to conſtitute two families or ſections for their reception, and Gmelin adopts the like ſubdiviſions in the laſt edition of the Syſtema Naturæ. In both the body is oblong and creeping, but in the tritonis is acuminated behind, convex above, and flat beneath, with the ſpiracles prominent and diſpoſed like ſcales or tubercles along the back; the doris is flattiſh, and free from thoſe dorſal ſpiracles. The diſtinction between the two animals is well expreſſed in the ſpecies *claviger*, and *argo*, the firſt of which is a tritonis, the other a doris of thoſe authors.

Species.

Verrucosa. Body covered with tubercles above. Linn. *Limax marina verrucoſa*, Rumpf. *Mitella verrucoſa*, Seba.

The body of this ſpecies is oblong, and nearly cylindrical; the back covered with warts; lateral margin deflected; pedal limb oval, oblong, and furniſhed with a ſmooth margin. Inhabits the ſeas of Europe.

Claviger. Oval, white with ſaffron-coloured clavate pedicels on the back. Müll. *Geknootide Zee-ſlakjemet*, Bommé.

Found on fuci in the Norway ſeas. The body is gelatinous and ſub-pellucid; head with a lateral yellow truncated tubercle; feelers ſaffron colour; tail pointed, and marked with a yellow ſpot.

Quadrilineata. White with four black lines; auricles ſulphur. Müll.

Like the former inhabits the Norway ſeas, and is found adhering to fuci. The body is ſometimes marked with ſulphur ſpots, and the tentacula are white.

Fasciculata. Linear, grey brown, with ſub-ferruginous acute papillæ on the back. Gmel. *Limax marinus*, Forſk.

Inhabits the Mediterranean ſea, and is generally found adhering to fragments of timber floating in the water. The feelers are pale and pellucid.

Papillosa. Body covered above with papillæ; dorſal line ſmooth. Gmel. *Limax papilloſus*, Linn. *Doris ſpinis mollibus hirſuta*, Baſter. *Doris bodoenſis*, Act. havnienſ. Found in the European ocean.

Auriculata. White, with red dorſal faſciculate papillæ tipt with white. Müller. Diſcovered in the Norway ſeas.

Lacinulata. Whitiſh, with ſix obovate papillæ on each ſide the back. Forſk. Anim. Mar.

Inhabits the deeps of the ſea among fuci; it is a ſmall ſpecies.

MINIMA. Pale cinereous, with four rows of dorſal papillæ. Forſk.

A minute ſpecies, about the ſize of a grain of rice found on fuci floating in the Mediterranean ſea. The body is oblong, the feelers white, and placed near the head; papillæ numerous, ovate-oblong, obtuſe, and pale cinereous.

CERVINA. Reddiſh cinereous, with eight branched papillæ on the back. Gmel. *Haarts hoorn gelyk getakte Zeeſlakje*, Bommé.

Length half an inch; head and tail furniſhed with ramoſe papillæ. The ſpecies inhabits Holland, and is found adhering to the ſertularia abietina.

RADIATA. Silvery-blue, beneath white, with lateral extenſile radiated faſciculate papillæ. Du Pont Phil. Tranſ. &c.

Inhabits the Weſt Indian ocean. The length is about an inch; its colour pale blue, with a ſilvery gloſs; the margin and tips of all the papillæ rich blue, obtuſe in front, and tapering to a ſharp point behind.

CORONATA. Milk-white, beneath hyaline; back dotted with red with ſix pyramidal papillæ, tipt with red each ſide. *Gehniſde of gekroonde Zeeſlakje*, Bommé.

Leſs than an inch in length, and inhabits the ſhores of Holland.

PENNATA. Back covered with ſub-cylindrical papillæ, incumbent towards the poſterior part. *Gevederde of Zacht gedoornte Zeeſlakje*, Bommé.

Inhabits the ſhores of Holland, where it occurs on zoophytes; it varies in colour from reddiſh to cinereous, and is about the ſize of the former.

PEREGRINA. Feelers four, not retractile; body milk-white, with ten rows of blue-brown cirri or proceſſes. Cavolin. Native of the Mediterranean.

AFFINIS. Feelers four, not retractile, annulated, and tipt with white; body purple, with ſeven rows of dorſal proceſſes. Cavolin. Found in the Mediterranean.

TETRAQUETRA. Quadrangular, coriaceous, pointed behind, above flat with carunculated clefts at the angles. Pallas.

Inhabits the ſeas about the Kurile iſlands, where it is boiled and eaten by the natives.

FUSCA. Oval, and covered with a rough punctured plate. Müll. *Limax bilamellatus*, Fn. Suec. *Doris bilamellata*, Linn. Syſt.

The body of this ſpecies is glabrous, above pale brown with cinereous dots, beneath white: plate dotted with ſulphur; feelers two brown; vent tranſverſe, and ſurrounded with ſix ſulphur plumes.

OBVELATA. White; body elongated with a flexuous plate, punctured above. Müll. *Concha ſine teſta*, Plancus.

Inhabits the bays of Norway, and moves like a ſnail. The body is ſub-pellucid, beneath glabrous, plate rough, with convex dots above; feelers ſimple.

MURICATA. Body oval, and covered entirely with pale yellow tubercles. Müll. Native of the Norway ſeas.

PILOSA. Body ovate, pale yellow, and covered with ſoft white hairs; feelers ſecreted within their receptacles. Müll.

LÆVIS. Body oval and white; above flattiſh and ſmooth. Müll. Inhabits the Norway ſeas.

ARBORESCENS. Feelers ramoſe; back gibbous and branching into protuberances. Müll.

FRONDOSA. Body entirely covered with numerous branched cirri. Gmel. *Amphitrite frondoſa*, Aſcanius. Found in the Norway ſeas.

ARGO. Body oval, ſmooth, with two ſmall feelers at the mouth; vent ſurrounded by a ramified fringe. Linn. *Argo*, Bohadſch. *Lepus marinus, alter major*, Column. *Limaee a plante*, Dicquemere.

Body red with ſulphur ſpots and black dots; feelers white, dotted at the tips with red; ramified fringe of the vent ſulphur dotted with black. Inhabits European and Mediterranean ſeas.

STELLATA. Body oval, with an eight-rayed ſtar at the vent, the rays ramoſe. Gmel. *Eegeltje met eeneſter op de ſtuit*. Bommé.

Inhabits the ſhores of Zealand; body whitiſh-grey, beneath flat, and covered above with obtuſe tubercles.

DORISCI, in *Ancient Geography*, a people of Aſia, who, according to Pliny, inhabited the confines of Aria, Carmania, and Drangiana towards the weſt of Parthia.

DORISCUS, a plain of Thrace, near the Ægean ſea and the mouths of the river Hebrus, on which, according to Herodotus, was a royal fortreſs, and where Xerxes reviewed his army in bodies of 10,000 men, becauſe it could not contain a greater number. It extended to the promontory *Serrhium*.—Alſo, a promontory of Greece, in Attica, near the promontory of *Sunium*. Pliny.

DORIUM, a town of the Peloponneſus, in Meſſenia. Pauſanias.—Alſo, a town of Greece, in the iſland of Eubœa, Strabo.—Alſo, a town of the ſame name in Thrace.

DORKIAN, in *Geography*, a town of Aſiatic Turkey, in the province of Natolia; 44 miles W. of Sinope.

DORKING, a market-town and pariſh in the hundred of Wotton, in the county of Surry, England, is ſeated on the banks of the river Mole. Moſt of the houſes are built on the ſide of a hill, which conſiſts of a ſoft ſand-ſtone. This is excavated in many places for cellars, &c. The ſcenery of the country in the vicinity is diſtinguiſhed by bold eminences and fertile vales; and many gentlemen's ſeats are within a ſmall diſtance of the town. One of them, called *Deepden*, formerly belonged to the family of the Howards, dukes of Norfolk, in whom the manor is veſted. The cuſtom, called Borough-Engliſh, prevails in this manor; by which the *youngeſt* ſon becomes heir to a copyhold eſtate in caſe the parent dies inteſtate. An old Roman road, or cauſeway, called Stone-ſtreet, croſſed the country at this place, and ſome remains of it are ſaid to have been found in the church-yard. The church, a large, ancient ſtructure, was formerly connected with that of St. Mary Overy's, in Southwark, and is ſaid to have been erected and made collegiate by the founder of that building. The chief ſtreets of Dorking are paved; and beſides a commodious work-houſe, here are ſome alms-houſes. Dorking has long been noted for the ſuperior ſize and quality of the poultry that are bred and fattened here, the greater part of which is ſent to the London markets. Some of the capons weigh ſeven and eight pounds each when prepared for roaſting. Great quantities of linen are made in the vicinity of the town, and in the neighbourhood are ſeveral corn-mills. Dorking is about eight miles from Epſom, and 24 miles S. W. of London. According to the parliamentary report it contained, in 1801, 570 houſes, and 3058 inhabitants. Here is a weekly market on Thurſdays, and one annual fair.

In the vicinity of Dorking is Denbighs, a ſeat belonging to Joſeph Deniſon, eſq. It was rendered remarkable by its gardens, which were planted, laid out, &c. by Jonathan Tyers, the firſt proprietor of Vauxhall gardens, who had caves made in the ſide of the hill. One of theſe was ſingularly conſtructed and ornamented, and was called, with its accompaniments, "The Valley of the ſhadow of Death."

DORKOWKA, a town of Poland, in the palatinate of Braclaw; 44 miles S.S.E of Braclaw.

DORMAGEN, a ſmall town of France, in the department of the Roer, chief place of a canton, in the diſtrict of Cologne, with a population of 831 individuals. The canton reckons 10 516 inhabitants, diſperſed in 18 communes.

DORMANS, a ſmall town of France, in the department of the Marne, chief place of a canton, in the diſtrict of Epernay. It is ſituated on the river Marne, 12 miles E. of Epernay, and five W. of Chateau-Thierry. The number of its inhabitants amounts to 2108. The canton itſelf has a population of 8584 individuals diſperſed in 15 communes, upon a territorial extent of 187½ kiliometres.

DORMANT, from *dormio, I ſleep,* is the herald's term for the poſture of a lion, or other beaſt, borne as ſleeping in a coat of arms.

DORMANT-TREE, or *Summer,* in *Building,* a beam of timber tenoned into a girder for ſupporting the ends of joiſts on both ſides of it.

DORMANT, or *Dormar-tyles.* See TYLE.

DORMER, or DORMANT, in *Architecture,* denotes a window made in the roof of a houſe, or above the entablature; being raiſed upon the rafters.

The Latins call it *lucerna,* whence the French *lucerne,* and our *luthern.*

There are diverſe kinds; ſquare, round, &c. See LUTHERN.

DORMITORY, a gallery in convents, or religious houſes, divided into ſeveral cells, wherein the religious lodge, or lie, &c.

The word is formed from the Latin *dormitorium*; of *dormire,* to ſleep.

It is deemed a crime in a religious to lie out of the dormitory. By chap. xxii. of the rule of St. Benedict, it appears that the ancient dormitories were not divided into cells, but were a kind of large open wards, filled with beds, as in our hoſpitals.

By the rule of St. Benedict a lamp was to be kept conſtantly burning in the dormitory, and the monks were to ſleep in their full dreſs, only laying aſide the knives which they carried at their girdles, for fear of hurting themſelves in their ſleep. The proper ſituation for the dormitory, as we gather from the capitularies and from actual inſpection, was the eaſt ſide of the great cloiſter or quadrangle, upon the upper floor, from which there were ſtairs into the ſouth tranſept of the church, ſo that the monks could readily deſcend from their ſleeping room into the choir to perform their midnight and early offices.

DORMITORY is alſo uſed for a burying-place. See COEMETERIUM.

DORMOUSE, in *Zoology.* See MYOXUS.

DORMOUSE, *ſtriped.* See SCIURUS *Striatus.*

DORNABAD, in *Geography,* a town of Perſia, in the province of Choraſan; 150 miles N. W. of Herat.

DORNBERG, a town of Germany, in the circle of the Upper Rhine, and principality of Heſſe Darmſtadt; eight miles W. N. W. of Darmſtadt.

DORNBEUREN, a town of Germany, in the county of Bregentz; five miles S. of Bregentz.

DORNBURG, in French DORNBOURG, or *Dornebourg,* a ſmall town of Germany, in the duchy of Saxe-Weimar, ſituated on the Saale, upon a ſteep hill, ſurmounted with an ancient caſtle, ſix miles N. of Jena. It has but 400 inhabitants, moſtly ſtocking manufacturers and cotton ſpinners. Its name is derived from the northern pagan deity called Thor, whoſe idol was worſhipped on this hill.—Alſo, an ancient caſtle in the principality of Anhalt-Zerbſt.

DORNE, a ſmall town of France, in the department of the Niévre, diſtrict of Nevers. It contains 960 inhabitants, and is the chief place of a canton which has a population of 5572 individuals, 10 communes, and a territorial extent of 257½ kiliometres.

DORNECK, or DORNACH, a ſmall town of Switzerland, in the canton of Soleure, with a ſtrong caſtle, and the celebrated convent of Mariæ-Stein. It is ſituated in a very fertile country; and is chiefly famous for the battle which the Auſtrians loſt near this place againſt the Swiſs, on the 12th of July 1799. The Swiſs were only 5000 againſt 15,000 Auſtrians, of whom they killed 3000, whoſe bones were depoſited in a chapel built for that purpoſe. There are ſeveral pariſhes belonging to the diſtrict of Dorneck.

DORNECY, a ſmall town of France, in the department of the Niévre; ſix miles E. of Clamecy.

DORNHEIM, or DORNHAN, a ſmall town of the kingdom of Wurtemberg, in the Black Foreſt, the diſtrict of which comprizes the pariſhes of Furnſaal and Underbrandi.—Alſo, an ancient ruined caſtle, in the grand duchy of Heſſe-Darmſtadt, in Germany, near the town of Darmſtadt, where the emperor Adolphus of Naſſau was killed, in the year 1298, by Albert I. of Auſtria.

DORNUM, a town of Germany, in the circle of Weſtphalia, and county of Eaſt Friſeland; ſix miles W.S.W. of Eſens.

DORNOCK, a royal borough and county town of Sutherland, Scotland.—Alſo, the name of an extenſive pariſh, of which this town is the capital. The town ſtands on the northern coaſt of the Frith of Dornock, and was conſtituted a royal borough by charter from king Charles I.; by which its government is veſted in a provoſt, four bailies, and ten counſellors, four of whom are annually changed. It contains about 500 inhabitants. Dornock was anciently the ſeat of the biſhop of Caithneſs, and a part of the cathedral is ſtill kept in repair as the pariſh church. It is uncertain when the ſee of Caithneſs was eſtabliſhed; but it muſt have exiſted before the year 1150, as we find Andrew biſhop of Caithneſs, a witneſs to a donation by David I. to the abbey of Dumferline in that year.

DORNOCK-FRITH, ſometimes called the Frith of Tain, is that arm of the ſea which divides the ſouthern parts of Sutherland from the county of Roſs. The entrance of this frith is nearly 15 miles wide, and gradually becomes narrower, till about three miles weſt of the town of Dornock; its breadth is not above two meaſured miles. After this it increaſes in width, and forms an inner harbour or bay, where a ferry is eſtabliſhed, called the Little-ferry. Sinclair's Statiſtical Account of Scotland.

DORNOCK, in the *Manufactures,* is a ſpecies of figured linen of a very ſtout fabric, manufactured chiefly in the north of Scotland, and uſed for table cloths. It is the moſt ſimple in pattern of all the varieties of this manufacture, and therefore the fabrics are generally of the coarſeſt kinds, the finer ſorts of table linen being uſually more ornamented, and woven either as diaper, or damaſk. A large proportion of the dornocks, which are made in Scotland, are woven by thoſe who are termed cuſtomer weavers, who receive linen yarn, ſpun from flax raiſed at home, from thoſe who employ them, and return the cloth, charging a certain price for the weaving. In many diſtricts, particularly the moſt remote ones, the greater part of every ſpecies of houſehold cloth is manufactured in this way, a ſufficient quantity of yarn being ſpun in moſt country families during the intervals of their other labour, to ſupply their own wants, and frequently a ſurplus to ſell at ſome neighbouring fair, or market. This trade, however, ſeems much upon the decline.

Dornock, like every other ſpecies of fanciful twilled cloth, receives the figure by reverſing the fluſhing of the warp and woof at certain intervals, which form ſquare, or oblong figures upon the cloth. The moſt ſimple of theſe, is a ſucceſſion of alternate ſquares, forming an imitation of a checker board, or moſaic pavement. The coarſer kinds are generally wrought, as tweels of three leaves, where every thread floats over two, and is interſected by the third in ſucceſſion. Some of the finer are tweels of four and five leaves, but few of more; for the ſix and ſeven-leaf tweels are ſeldom, if ever, uſed, and the eight leaf tweel is confined almoſt excluſively to damaſk. A repreſentation of dornock, as it appears upon deſign paper, is given in *Plate* A, and the manner of mounting the loom in *Plate* C. *Plate* VIII. *Miſcellany*. See DRAUGHT and *Cording*.

DORNOLL, in *Geography*, a river of Wales, which runs into the Wye, in the ſouthern part of the county of Montgomery.

DOROBITZA, in *Ancient Geography*, a town and alſo a river of Illyria.

DOROBOI, in *Geography*, a town of European Turkey, in the province of Moldavia; 68 miles N.N.W. of Jaſſi, and 142 N.W. of Bender.

DOROG, a town of Hungary; 6 miles S.E. of Nanas.

DOROGOBUSH, a town of Ruſſia, and one of the 12 diſtricts of the government of Smolenſko, ſituated on the Dnieper; 40 miles E.N.E. of Smolenſko. See DOGOROBUSH.

DOROJAIEWICZE, a town of Lithuania, in the palatinate of Brzeſc; 90 miles E. of Brzeſc.

DORON, in *Ancient Geography*, a town of Aſia, in Cilicia. Pliny.

DORON. See DORA.

DORONICI RADIX, in the *Materia Medica*, the name of a root kept in the ſhops in ſome places, but at preſent little uſed. There are two kinds of it, the Roman and the German. The Roman is a ſmall yellow root, appearing white when broken, of a ſweet aſtringent taſte, and viſcous in the mouth. The faireſt and plumpeſt roots ſhould be choſen, and ſuch as are freſh dried, or at leaſt not worm-eaten. The root is brought from the Alps, and ſome other places. The plant which produces it is the doronicum officinarum of Gerrard, and is kept with us in the gardens of the curious. The leaves are broad, and the flower is yellow, and of the ſize of a marygold.

It is ſaid to be an alexipharmic, but is not uſed in the preſent practice. Authors are indeed not at all agreed about its nature; ſome accounting it a very valuable medicine, and others a poiſon.

The German doronicum is a native of the mountainous parts of Germany, and flowers through the ſummer. The leaves and flowers bruiſed, emit a light pungent ſmell, which provokes ſneezing. They yield their virtues by infuſion, both to water, and rectified ſpirit; the roots are more aromatic than the other parts. This plant has been eſteemed in Germany as a ſpecific for diſſolving coagulated blood, occaſioned by falls and bruiſes, and thence has been intitled lapſorum panacea. It is likewiſe recommended in various obſtinate chronical diſorders; but its operation is too violent. Lewis's Mat. Med. p. 225. See DURUNEGI.

DORONICUM, in *Botany*, (Doronigi or Durungi of the Arabians, according to Ambroſinus. Hence Linnæus in Phil. Bot. ſect. 229, enumerates it among the barbarous names, which ought to be rejected; but he nevertheleſs retained it, becauſe perhaps its ſound, if not its ſenſe, was Greek, of which he gives other inſtances in the place juſt quoted.) Linn. Gen. 427. Schreb. 559. Willd. Sp. Pl. v. 3. 2113. Mart. Mill. Dict. v. 2. Juſſ. 182. Gærtn. t. 173. Claſs and order, *Syngeneſia Polygamia ſuperflua*. Nat. Ord. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* of about twenty lancet-awl-ſhaped, equal, erect leaves, in a double row, moſtly as long as the rays of the corolla. *Cor.* compound, radiated; the united florets tubular, five-cleft, numerous, in the diſk; the female ones ligulate, three-toothed, in the radius, equal in number to the calyx-leaves. *Stam.*, in the united florets, filaments five, capillary, very ſhort; anthers in a cylinder, tubular. *Piſt.*, in the united florets, germen oblong; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma notched; in the female ones, germen and ſtyle as in the former; ſtigmas two, reflexed. *Peric.* none, except the ſlightly cloſed calyx. *Seed*, in the united florets, ſolitary, obovate, compreſſed, furrowed; down capillary; in the female ones leſs compreſſed, without any down. *Recept.* naked, flat.

Eſſ. Ch. Receptacle naked. Down ſimple. Calyx-ſcales equal, in two rows, longer than the diſk. Seeds of the radius deſtitute of down.

This genus is next akin to *Arnica*, which ſee, agreeing with it very much in habit, but differing in the want of down to the ſeeds of the radius, as well as of the five barren filaments in the radiant florets. *Doronicum Bellidiaſtrum*, Linn. Sp. Pl. 1247. Jacq. Auſtr. t. 400, a plant extremely like our Daiſy, *Bellis perennis*, but taller, is removed to *Arnica* by Villars, Gærtner, and Willdenow, becauſe all its ſeeds are furniſhed with down.

D. *Pardalianches*, Linn. Sp. Pl. 1247. Fl. Brit. 896. Engl. Bot. t. 630. Jacq. Auſtr. t. 350, (of which D. *auſtriacum*, Jacq. Auſtr. t. 130, is certainly a variety,) is found in ſome parts of England, and the lowlands of Scotland, as well as in Sweden, Germany, and Switzerland. It is not unfrequent in ruſtic gardens, and is one of the few ſyngeneſious flowers, that bloom in the ſpring. The corolla is of a light yellow, the herbage a pale green. The root, which is creeping and tuberous, has been thought poiſonous to beaſts of prey, whence the ſpecific name; while on the other hand it has, with as little reaſon probably, been ſuppoſed an antidote to poiſon. Some phyſicians of eminence have found it ſafe to adminiſter two drams at a doſe, though not in any caſe beneficial. D. *plantagineum*, Linn. Sp. Pl. 1247, (D. minus officinarum; Ger. em. 759. f. 1.) is an ambiguous ſpecies, having ſometimes down to all the ſeeds. It grows in the warmer parts of Europe, and has ovate or lanceolate, not heart ſhaped, radical leaves. Its qualities are ſuppoſed to be like thoſe of the preceding. D. *glutinoſum*, Willd. Sp. Pl. v. 3. 2115, (After glutinoſus; Cavan. Ic. t. 168.) a native of Mexico, can ſcarcely belong to this genus on account of its imbricated calyx, neither is its habit that of a *Doronicum*.

Propagation and Culture.—The genuine ſpecies of this genus are hardy perennials, encreaſing much by their roots, which may be parted in autumn, and eaſily raiſed from ſeed, which is produced in great plenty.

DORONINSK, in *Geography*, a town of Ruſſia, and one of the four diſtricts in the province of Nertchinſk, and government of Irkutſk, ſituated on the Ingoda; 280 miles E.S.E. of Irkutſk.

DORONK, a town of Egypt; 2 miles S. of Siût.

DOROSTAY, a town of Poland, in the palatinate of Volhynia; 16 miles S.E. of Lucko.

DOROSTO, in *Ancient Geography*, a town of Bulgaria, taken by Zimiſus in the year 973.

DORP ABEIT, in *Geography*, a town of Arabia, in the country of Yemen; 44 miles N. of Chamir.

DORPAT, or DORPT, a town of Ruſſia, in the province of Livonia, government of Riga, on the river Embeck, called by the Eſthonians Emma-Joggi, *i. e.* mother river, not far from the lake Peipus. It is the ſeat of an univerſity recently eſtabliſhed by the emperor Alexander. Its annual revenue granted by the inſtrument of its foundation, dated the 12th of December, 1802, old ſtyle, amounts to 126,000 roubles. The amphitheatre for anatomy is placed on a ſmall eminence, in a pleaſant airy ſituation, ſurrounded with new plantations. The library is placed in the old cathedral church, which is a fine monument of the architecture of the middle age. The univerſity of Dorpat has the direction of all the ſchools in the four provinces of Livonia, Courland, Finnia, and Eſthonia.

DORRA, a town of Perſia, in the province of Segeſtan; 18 miles E.S.E. of Kin.

DORRBERG, a ſmall town of Germany, in the duchy of Saxe-Gotha, in the Thuringian foreſt, the inhabitants of which manufacture lamp-black, and near which there is an extenſive iron-work.

DORSAL, from *dorſum*, back, any thing that belongs to the back; as dorſal glands, dorſal nerves, dorſal muſcles.

DORSANE, Anthony, in *Biography*, a French divine, who flouriſhed in the 17th and 18th centuries. During his eccleſiaſtical career he became doctor of the Sorbonne, chanter of the church of Paris, and grand vicar and official of that dioceſe, under cardinal de Noailles. He was author of "A Journal," which gives the hiſtory, and moſt intereſting circumſtances which took place at Rome and in France, during the celebrated negociation reſpecting the conſtitution, or bull unigenitus, in two volumes, 4to. Thoſe who are deſirous of ſeeing a detail of the moſt minute circumſtances connected with this negociation, will find all that they can wiſh for in the "Journal," written in ſimple but clear language. The beſt edition of this work is the ſecond, which was publiſhed in 1756.

DORSCH, or Torsk, in *Ichthyography*, the common name of a ſmall fiſh of the cod-kind, frequent in the Baltic, but more rare in other ſeas, and called by authors the aſellus varius, or ſtriatus. See Gadus *Callarias*.

DORSET, in *Geography*, a townſhip of America, in the ſtate of Vermont, and county of Bennington, having Rupert to the weſt, Mancheſter to the ſouth, and Danby to the north, containing 958 inhabitants; 27 miles N. by E. from Bennington.

Dorset *and Somerſet Canal*, is the parliamentary name of a navigable canal in Wiltſhire, Somerſetſhire, and Dorſetſhire, intended to be about 40 miles long; it commences in the Kennet and Avon canal near Bradford, and is to terminate in the Chriſtchurch Stour river, in Shilling-ſtone, Okeford. A branch of this canal extends to Nettlebridge collieries, in Midſummer-Norton. See Canal.

DORSETSHIRE, a maritime county on the ſouthern coaſt of England, is bounded on the north by Wiltſhire and Somerſetſhire: on the eaſt by Hampſhire: on the weſt by Devonſhire, and part of Somerſetſhire; and on the ſouth by the Britiſh Channel. It is of a very irregular form: its long northern ſide has a conſiderable angular projection in the middle; the ſea-ſhore on the ſouth runs out into numerous points and head-lands, till it ſtretches to the iſle or promontory of Portland; thence weſtward the coaſt is not ſo deeply indented, but inclines obliquely towards Devonſhire. Its extent, from north to ſouth, is about thirty-five miles; from eaſt to weſt, about fifty-five: the circumference being nearly 160. The area includes about 775,000 acres; and has five grand diviſions, ſubdivided into 34 hundreds, containing upwards of 390 pariſhes, 22 towns, about 22,260 houſes, and 115,320 inhabitants. Before the invaſion of the Romans, Dorſetſhire, according to Ptolemy, and ſome other writers, was inhabited by the Durotriges, or Morini. On the diviſion of the iſland into Roman provinces, this diſtrict became part of Britannia Prima; and on the eſtabliſhment of the Saxons, was included in the kingdom of Weſſex, to which it continued attached till the union of the different ſtates under Egbert. Many of the Saxon ſovereigns appear to have lived in this county; and Kingſton-hall, and Corfe-caſtle, are pointed out by tradition as their places of reſidence. The general appearance of Dorſetſhire is uneven, and in many parts very hilly. Its moſt ſtriking features are the open and uninclosed parts, or downs, which are covered with numerous flocks of ſheep. In the natural diviſion of the lands, the larger proportion is appropriated to paſture; the arable is eſtimated at one-third, and the waſte at about a ninth part: the principal ſheep country is round Dorcheſter. Great numbers of ſheep and oxen are fed in the vale of Blackmore, which is diſtinguiſhed for the richneſs of its paſturage, and extends from north to ſouth about nineteen miles, and from eaſt to weſt about fourteen: here are alſo ſome orchards. Many of the other vales, on the ſouth-weſtern ſide, are uncommonly luxuriant. From the mildneſs of the air, and the beauty of its ſituation, Dorcheſter has been termed the garden of England. The ſoils are various. About Bridport the lower lands are moſtly deep rich loams; on the higher parts, throughout the weſtern diſtrict, the ſoil is a ſandy loam, intermixed with a baſe kind of flint, and well adapted to the growth of beech. To the north of Sherborne, which affords ſome of the beſt arable land in the county, it is a ſtone brack, which is the caſe in the iſle of Portland, and moſt parts of the iſle of Purbeck. The tillage in the open parts of the country is very much upon a chalk bottom, and all the land towards Abbotſbury and Weymouth is of an inferior quality. In the centre of the county the ſoil is good, and the land well managed. The growth of flax and hemp, particularly the former, is of great agricultural importance, eſpecially about Bridport, the village of Bradpole, and towards Beminſter, where it is chiefly cultivated. The beſt ſeed is annually imported from Riga. The land is frequently let to a middle man, called a flax-jobber, who pays the farmer a net ſum of four or five pounds *per* acre, manages the crop, finds the ſeed and labour, and expects nothing from the farmer but ploughing, and the diſcharge of the parochial taxes. The chief products of Dorſetſhire are corn, cattle, butter, ſheep, wool, timber, flax, and hemp. The cattle, and particularly the ſheep, have long been celebrated. Dyer has enumerated this tract among the moſt favourite ſpots for the breeding of this uſeful animal:

> ———— "Such Dorcheſtrian fields,
> Whoſe *flocks innumerous* whiten all the land."

The number of ſheep conſtantly kept in this county is eſtimated at 800,000, of which upwards of 150,000 are annually fold, and ſent away. They are highly eſteemed for the fineneſs, ſhortneſs, and cloſe texture of their wool, which is much uſed in the manufacture of broad cloth. The annual produce of this wool is reckoned to be 90,000 weighs, or weights, of thirty-one pounds each. Within eight miles round Dorcheſter, nearly 170 000 ſheep and lambs are ſuppoſed to be kept. The iſle of Purbeck is famous for its ſtone quarries; ſome of the ſtone taking a poliſh nearly equal to marble, is uſed for chimney-pieces, hearths, &c. and the coarſer kinds for paving. The iſle of Portland produces excellent free-ſtone, which has been uſed in building Whitehall, in London; alſo St. Paul's, Weſtminſter and Blackfriars bridge, with many other public ſtructures.

The principal manufacture of this county is that of flax and hemp, which is chiefly carried on in the vicinity of Bridport and Beminſter: and, on a ſmaller ſcale, in the iſle of Purbeck. At Shafteſbury is a manufactory for all kinds of ſhirt-buttons, which employs great numbers of women and children: a ſort of flannel or coarſe white woollen cloth, called ſwan-ſkin, is alſo made in this town; but the chief trade in this branch is carried on at Sherminſter. A large manufactory of ſhirt-buttons is alſo carried on at Blandford. At Stalbridge is an eſtabliſhment for ſpinning ſilk; and at Sherborne another on a larger ſcale. At Wimborne, conſiderable buſineſs is tranſacted in the worſted ſtocking branch; and upwards of 1000 women and children are employed in knitting.

Dorſetſhire was anciently a biſhop's ſee, but was afterwards connected at different periods, with the ſees of Oxford, Wincheſter, Sherborne, and Sarum: it was ſeparated from the latter in the thirty-firſt year of Henry VIII., when it was conſtituted part of the newly erected biſhopric of Briſtol, to which it ſtill belongs. It pays nine parts of the land-tax; ſupplies the militia with 640 men; and ſends 20 members to parliament, *viz.* two for the county, and two for each of the boroughs of Dorcheſter, Poole, Lyme-Regis, Weymouth, Melcombe-Regis, Bridport, Shafteſbury, Wareham, and Corfe-caſtle.

The Roman ſtations in Dorſetſhire appear, according to the beſt authorities, to have been *Londinis*, Lyme-Regis; *Canca Arixa*, Charmouth; *Durnovaria*, Dorcheſter; *Vindogladia*, Wimborne-Minſter; *Clavinio*, Weymouth; *Morinio*, Wareham; *Bolelaunio*, Poole.

The principal rivers of Dorſetſhire are the Frome, the Stour, the Piddle, and the Ivel. The Frome riſes in the north-weſtern part of the county, near Everſhot, and having received ſome ſmaller ſtreams from the vicinity of Hook-park, flows by Catſtock, Maiden Newton, Frampton, and Bradford Peveril to Dorcheſter. Thence paſſing to the ſouth-eaſt, it receives the waters of the Winterbourne, at Frome Belet, and flowing onward, paſſes Moreton, Bindon, and Wareham, about three miles from which it falls into Poole bay. The Stour enters this county from Wiltſhire, near Gillingham, below which it gives name to ſeveral villages. For ſome miles its courſe is nearly ſouth, but having reached Sturminſter, it proceeds in a ſouth-eaſtwardly direction towards Blandford, Sturminſter-Marſhall Wimborne, and Parley, at a little diſtance from which it enters Hampſhire. Several rivulets flow into it during its progreſs through this county. The Piddle, called Trent by Aſſer, riſes northward of Piddle Trenthyde-church, and flowing to the ſouth-eaſt, gives name to ſeveral ſmall villages and hamlets: near Keyſworth, it unites with the waters of Poole bay. The Ivel, anciently named Yoo, has its origin from ſeveral ſprings, at a place called Horethorn, in a hill north-eaſt from Sherborne; from which town it flows into Somerſetſhire, and falls into the Parret. Beauties of England and Wales, vol. iv. Hutchins's Hiſtory of Dorſetſhire; new edition by Gough. Agricultural Report for Dorſetſhire.

DORSI Latiſſimus, in *Anatomy*, (terſor ani, ſcalptor ani, le grand dorſal,) is one of the muſcles which move the humerus on the ſcapula, ſo named from its great breadth, as it covers the lower half of the poſterior ſurface of the trunk, immediately under the integuments. It ariſes by a thin and flat tendon from the ſpinous proceſſes of the five, ſix, or ſeven loweſt dorſal vertebræ; from the ſpinous proceſſes of all the lumbar vertebræ, and of the ſacrum; from the oblique proceſſes of the ſacrum; from the margin of the glutens maximus, with which it is united; and from the outer margin of the back part of the criſta of the ileum; by fleſhy ſlips from the outer ſurface of the four lower ribs, the portion derived from the twelfth rib being the broadeſt, and that from the ninth the narroweſt. Theſe portions meet with the origins of the obliquus externus abdominis. Its tendinous origin is thin and broad; narrower at the upper part, but expanding to a breadth of three or four inches below, and cloſely connected to the tendons of the ſerratus inferior poſticus and obliquus internus abdominis. Its fibres all converge towards one point, hence they follow different directions according to their origins; but the greater part paſſes obliquely upwards and outwards. The ſuperior fibres are nearly tranſverſe; they become more and more oblique as we deſcend; and thoſe ariſing from the ribs aſcend almoſt in a ſtraight direction. As the muſcle proceeds towards its inſertion, it becomes narrower but thicker; it goes over the inferior angle of the ſcapula, from which it ſometimes derives a faſciculus of fibres, and lying on the teres major, forms a flattened but ſtrong tendon, united to that muſcle. It then turns ſo as to get in front of the teres, and is inſerted either together with that muſcle, or immediately in front of it, into the rough line that runs along the humerus from the ſmaller tubercle of the bone. The tendon has a twiſted appearance; the ſuperior fibres of the muſcle joining its inferior edge, and *vice verſâ*. It joins that of the pectoralis in the bicipital groove, and its lower edge is connected with the faſcia. The latiſſimus dorſi is covered externally by the ſkin, except at its origin from the dorſal vertebræ, where the trapezins lies on it, and at its inſertion where the teres major covers it. It covers a ſmall portion of the rhomboideus major, the ſacrolumbalis and longiſſimus dorſi, the ſerratus poſticus inferior, a very ſmall portion of the obliquus externus abdominis, and a larger part of the obliquus internus, the outer ſurface of the ſix or ſeven laſt ribs, and the correſponding intercoſtal muſcles, the inferior angle of the ſcapula, the ſerratus magnus, and the teres major.

This muſcle will move the arm, cheſt, pelvis, and at the ſame time the whole trunk. Its action on the former depends on the poſition of the limb. If that hangs by the ſide, it will be carried backwards, and hence the names of ſcalptor and terſor ani formerly given to the muſcle; if it has been previouſly elevated, the latiſſimus dorſi will draw it down, if rotated outwards it will turn it in the oppoſite direction. The cheſt is affected by its coſtal fibres, which are exerted particularly when reſpiration is laborious; and hence we obſerve aſthmatics ſeizing ſome fixed object, in order to render the humerus a fixed point to which the ribs may be elevated. The latiſſimus dorſi elevates the trunk to the upper limbs when the latter are fixed to any object above the head, as to the branch of a tree in climbing, and carries the body forwards upon the ſame limbs when we walk with crutches, or when we make an impreſſion with a ſeal. In this claſs of actions it concurs with the pectoralis major. It may alſo be regarded as a tenſor of the aponeuroſis which covers the lumbar muſcles.

Dorsi *Longiſſimus*, (le long dorſal) one of the muſcles of the back, ſo called from its great length. A common maſs of muſcular and tendinous fibres filling the hollow at the ſide of the loins and ſacrum, gives origin to the longiſſimus dorſi and ſacrolumbalis muſcles. This maſs, which is very thick and flattened on its ſurface, extends from the lower part of the ſacrum nearly to the laſt rib, and is covered by a broad and ſtrong aponeuroſis, from which all the muſcular fibres proceed. The aponeuroſis is attached to the back end of the criſta ilii, and to the lower extremity of the ſacrum, being connected between theſe points to the gluteus magnus. It is fixed to the whole of the ſpinous proceſſes of the ſacrum and of the lumbar vertebræ. It covers on the ſacrum the whole of the common origin of the two muſcles, but in the loins leaves the ſacrolumbalis, and is continued throughout the whole length of the longiſſimus dorſi. The latter muſcle has an elongated form, thick below, and gradually tapering to a point above, and extends in a line parallel to the ſpine from the end of the ſacrum to the firſt dorſal vertebra. Its fibres are derived from the anterior ſurface of the aponeuroſis juſt deſcribed; they paſs obliquely upwards, and detach, as they aſcend, ſeven or eight flattened fleſhy heads, which are inſerted into the lower margin of the ſame number of ribs; on the oppoſite ſide it ſends a tendinous attachment to the tranſverſe proceſs of each lumbar and dorſal vertebra.

The multifidus ſpinæ, complexus, and tranſverſalis colli lie along its inner edge, the ſacrolumbalis on its outer. Its poſterior ſurface is covered by the aponeuroſis of the obliquus internus and tranſverſalis abdominis, by the poſterior ſerrati, and the vertebral faſcia; while it lies in front on the levatores coſtarum and ribs. It extends the ſpine, reſtoring the vertebral column to its erect ſtate after it has been bent forwards, and being in a ſtate of conſtant action, in order to maintain the erect poſition of the trunk, which naturally tends to fall forwards.

Dorsi *ſemiſpinalis*, (*demi-epineux*, or *tranſverſaire epineux du dos*), one of the muſcles of the back. It ariſes from the tranſverſe proceſſes of four vertebræ towards the lower part of the back, and is inſerted into the ſpinous proceſſes of the two or three ſuperior dorſal, and the laſt cervical vertebræ. It is ſo connected to the multifidus ſpinæ on which it lies, and to the ſemiſpinalis colli, that it can with difficulty be made out ſeparately. It extends the dorſal region of the ſpine.

Dorsi *ſpinalis*, is a ſmall muſcle of the back, moſt intimately connected with the longiſſimus dorſi, of which it may be conſidered to form a part. It ariſes from the ſpines of the lower, and is inſerted into thoſe of the upper vertebræ of the back, and adheres cloſely to the inner edge of the tendon of the longiſſimus, lying between it and the ſpinous proceſſes. It will extend the back, and move it to one ſide.

Dorsi *interſpinales*, and *intertranſverſarii*, are ſome ſmall muſcles, of which the former lie between the ſpinous, and the latter between the tranſverſe proceſſes of the contiguous vertebræ. They are only found in the lower part of the back, and have the office of approximating the bones to which they are connected.

DORSIFEROUS, or Dorsiparous *Plants*, from *dorſum* and *fero*, I bear, are thoſe of the capillary kind; which are without ſtem, and bear their ſeeds on the back-ſide of their leaves.

DORSTEN, in *Geography*, a ſmall town of Germany, in the circle of Weſtphalia, on the river Lippe, which formerly belonged to the elector of Cologne, and lately to the grand duchy of Berg. It is 24 miles N.E. of Duriſburg, 60 miles N. of Cologne, and 45 S.W. of Munſter.

DORSTENIA, in *Botany*, (ſo named by Plumier after Theodoric Dorſtenius, a German phyſician and botaniſt, of ſome fame and learning in his time, who publiſhed at Frankfort, in 1540, a Latin herbal in folio, with rude wooden cuts. Linnæus obſerves that the obſolete or antiquated character of this work is expreſſed by the inelegant flowers of the *Dorſtenia*.) Plum. Gen. 29. t. 8. Linn. Gen. 62. Schreb. 84. Willd. Sp. Pl. v. 1. 682. Mart. Mill. Dict. v. 2. Juſſ. 401. Lamarck t. 83. Claſs and order, *Tetrandria Monogynia?* Nat. Ord. *Scabridæ*, Linn. *Urticæ*, Juſſ.

Gen. Ch. *Common Receptacle* of one large, expanded, flat, moſtly angular leaf, covered with very numerous minute florets, occupying its diſk. Perianth quadrangular, concave imbedded in the receptacle and connected with it. *Cor.* none. *Stam.* Filaments four, filiform, very ſhort; anthers roundiſh. *Piſt.* Germen roundiſh; ſtyle ſimple; ſtigma obtuſe. *Peric.* none, except the receptacle become fleſhy. *Seeds* ſolitary to each floret, roundiſh, pointed. Linn.

Linnæus ſuſpected there might be female flowers intermixed with the united ones, as in *Parietaria*, judiciouſly remarking that *Dorſtenia* was of a nature between that genus and *Ficus*, being, as it were, a fig laid open. He, however, profeſſed that his knowledge of the ſubject was imperfect, and required to be corrected by obſervations on the living plant. Hence Jacquin was induced to amend the account above given, in his *Collectanea*, v. 3. 201. Ic. Rar. v. 3. t. 614, from the inſpection of *Dorſtenia Contrayerva*, continually flowering in the ſtoves at Vienna. He deſcribes the cells of the receptacle as covered by one common ſkin, which is elevated over each cell into a vaulted protuberance, and he believes there is no proper perianth. Each cell is either male or female. The anthers lie in pairs, without filaments, on the ſummit of the protuberance over each of the former only; while in the bottom of every female cell is a ſolitary germen on a ſhort ſtalk, with a cloven ſtyle, reaching to the cover of the cell, with ſimple ſtigmas. Each germen becomes a bivalve, very elaſtic, capſule (which perhaps is the perianth of Linnæus) of one cell, encloſing a compreſſed, rugged, ſomewhat triangular ſeed. If this deſcription ſhould be found to accord with all the ſpecies, as is moſt probable, *Dorſtenia* muſt be placed in *Monœcia Diandria*.

Eſſ. Ch. Common receptacle flat, of one leaf, fleſhy, cellular. Seeds ſolitary in each fertile cell.

Linnæus enumerates four ſpecies of *Dorſtenia*, Willdenow ten. The moſt remarkable is D. *Contrayerva* above-mentioned, whoſe acrid aromatic root has been celebrated as an antidote to the bites of poiſonous reptiles. It is kept in the ſhops, having been recommended for its diaphoretic qualities. (See Contrayerva). This ſpecies is botanically diſtinguiſhed by its quadrangular receptacle, its palmate, ſomewhat pinnatifid, ſerrated leaves, and radical flower-ſtalks. It is a native of many of the Spaniſh ſettlements in South America, and of the iſlands of Tobago, St. Vincent's, and Martinique, growing in mountainous ſhady places. Nothing can be leſs like a flower than its green leafy receptacle, beſprinkled with whitiſh ſeſſile anthers in the firſt inſtance, and then with prominent ſeeds, which on the ſlighteſt touch, when nearly ripe, are projected to a diſtance by the elaſtic capſule. In order to collect them for ſowing Jacquin found it neceſſary to cover the whole receptacle with a piece of linen cloth.

Dorstenia *Contrayerva*, in the *Materia Medica*. See Contrayerva.

DORSUM, in *Anatomy*, a name applied to the back of the hand and foot; alſo to the outer or back ſurfaces of ſome bones, as the ſcapula and ileum.

DORSZYU, in *Geography*, a town of Lithuania, in the palatinate of Minſk; 46 miles N.N.E. of Minſk.

DORT. See Dordrecht.

DORT, *ſynod of*, in *Eccleſiaſtical Hiſtory*, a national ſynod, ſummoned by authority of the ſtates-general, the provinces of Holland, Utrecht, and Overyſſel, excepted, and held at Dort in 1618, and 1619.

This ſynod was convened in conſequence of the diſputes that prevailed in Holland, between the Calviniſts and Arminians upon the *five* points, relating to election, redemption, original ſin, effectual grace, and perſeverance. Each party, in the progreſs of the controverſy, had loaded the other with reproaches, and in the ardour excited by the diſpute, charged their opinions with the moſt invidious conſequences;

inſomuch that all ſocial intercourſe was interrupted, the pulpits were become the ſtages of unprofitable and angry altercation, and as each party prevailed, the other was turned out of their churches. The magiſtrates, who at firſt exhorted the contending parties to exerciſe moderation and charity, and who enforced theſe virtues by obſerving, that, in a free ſtate, their reſpective opinions might be treated with toleration, without any detriment to the eſſential intereſts of true religion, became at length no leſs divided than the miniſters, ſo that one city and town was ready to take up arms againſt another. By degrees this controverſy grew into a ſtate faction, which endangered the diſſolution of the government. Maurice, prince of Orange, though a remonſtrant, put himſelf at the head of the Calviniſts, or contra-remonſtrants, becauſe they were for a ſtadtholder; and the magiſtrates, who were againſt a ſtadtholder, took part with the remonſtrants or Arminians, among whom the advocate of Holland, Olden Barnevelt, and the penſionaries of Leyden and Rotterdam, Hogerberts and Grotius, were the chief. Several attempts were made for an accommodation, or toleration of the two parties; but theſe proving unſucceſsful, the three leaders of the remonſtrants or Arminians were taken into cuſtody; and the magiſtrates of ſeveral cities and towns were changed by authority of the prince, which made way for the choice of ſuch a ſynod as his highneſs deſired. The claſſes of the ſeveral towns met firſt in a provincial ſynod, and theſe ſent deputies to the national one, with proper inſtructions. The remonſtrants were averſe from convoking a ſynod, becauſe their number was inferior to that of the Calviniſts; and as their leaders were in cuſtody, it was eaſy to apprehend their approaching fate. They complained of injuſtice in their ſummons to the provincial aſſemblies; and their deputies, being incenſed and diſſatisfied, abſented themſelves from their claſſes, and thus ſurrendered their power into the hands of their adverſaries, who condemned their principles, and depoſed many of their miniſters. The national ſynod of Dort conſiſted of 38 Dutch and Walloon divines, five profeſſors of the univerſities, and 21 lay-elders, amounting in the whole number to 61 perſons, of whom not above three or four were remonſtrants. Beſides theſe, there were 28 foreign divines from Great Britain, from the Palatinate, from Heſſia, Switzerland, Geneva, Bremen, Embden, Naſſau, and Witteravia; the French king not permitting his Proteſtant divines to appear. Next to the ſtate deputies ſat the Engliſh divines; the ſecond place was reſerved for the French divines; and the reſt ſat in the order above-recited. Upon the right and left hand of the chair, next to the lay deputies, ſat the Netherland profeſſors of divinity; then the miniſters and elders according to the rank of their provinces; the Walloon churches ſitting laſt. After the divines had produced their credentials, and the choice of a preſident, aſſeſſors, ſcribes, and ſecretaries, a faſt was appointed; and they then proceeded to the buſineſs of deciding the controverſy between the Gomariſts or Calviniſts and the Arminians; the latter of whom were declared corruptors of the true religion. The ſynod continued to the 29th of May, 1619, in which time there were 180 ſeſſions; in the 23d of which the members took an oath, expreſſing their purpoſe, during the whole courſe of the tranſactions of this ſynod, in which enquiry was to be made, and judgment and deciſion pronounced, concerning the *five points* and other ſorts of doctrines, not to uſe any kind of human writings, but only the word of God, as a ſure and infallible rule of faith; and to have no other object in view throughout the whole diſcuſſion, but the honour of God, the peace of the church, and above all, the preſervation of the purity of doctrine. In the 145th ſeſſion, April 30th, the Belgic confeſſion of faith was debated; to which the Engliſh divines aſſented, the articles relating to the purity of miniſters and eccleſiaſtical diſcipline excepted; declaring, that, after examination, they found it, with reſpect to faith and doctrine, conformable in the main to the word of God. They alſo added, that, upon conſideration of the exceptions of the remonſtrants or Arminians, they appeared to be ſuch which might be made againſt all the confeſſions of other reformed churches. Their own church government they maintained to be founded upon apoſtolical inſtitution. The five points of difference between the Calviniſts and Arminians were, after a long hearing, decided in favour of the former, after which the remonſtrant miniſters were diſmiſſed the aſſembly, and baniſhed the country within a limited time, unleſs they ſubmitted to the new confeſſion. However the authority of this ſynod was far from being univerſally acknowledged either in Holland or in England. The provinces of Frieſland, Zealand, Utrecht, Guelderland, and Groningen, could not be perſuaded to adopt their deciſions; and they were oppoſed by the authority of archbiſhop Laud, and king James I. in England. The reformed churches in France, though at firſt diſpoſed to give a favourable reception to the deciſions of this famous ſynod, in proceſs of time eſpouſed doctrines very different from thoſe of the Gomariſts; and the churches of Brandenburgh and Bremen would not ſuffer their doctors to be tied down to the opinions and tenets of the Dutch divines. The liberty of private judgment, with reſpect to the doctrines of PREDESTINATION and GRACE, which the ſpirit that prevailed among the divines of Dort ſeemed ſo much adapted to diſcourage and ſuppreſs, acquired new vigour, in conſequence of the arbitrary proceedings of this aſſembly. Of this ſynod very different opinions have obtained amongſt the contending parties. Several divines expreſſed their ſatisfaction with its proceedings. Mr. Baxter, ſpeaking of it, ſays, that the Chriſtian world, ſince the days of the apoſtles, never had an aſſembly of more excellent divines; and the learned Jacobus Capellus, profeſſor of Leyden, further declared, that the equity of the fathers of the ſynod was ſuch, that no inſtance can be given ſince the apoſtolick age of any other ſynod in which the heretics were heard with more patience, or which proceeded with better temper and more ſanctity. Others, however, poured contempt upon it, and burleſqued its proceedings in ſuch monkiſh lines as the following:

> "Dordrechti ſynodus, nodus; chorus integer, æger;
> Conventus, ventus, Seſſio, ſtramen, amen."

All the favourers of the Arminian doctrine, as we may naturally conceive, charge them with partiality and unjuſtifiable ſeverity. It would indeed be a difficult, nay, an unſurmountable taſk, to juſtify all the proceedings of this ſynod, how much ſoever its partiſans have extolled them; and it were much to be wiſhed that they had been more conformable to the ſpirit of Chriſtian charity, than the repreſentations of hiſtory, impartially weighed, ſhew them to have been. In England this ſynod had its advocates both in the eſtabliſhed church, and among the Puritans, although king James, who, from his propenſity towards popery, had deſerted from the Calviniſts to the Arminians, and who ſeemed inclined to bring about an union between the church of England and the church of Rome, and alſo the epiſcopal clergy under his immediate influence, diſapproved its proceedings; and its deciſions, in point of doctrine, were regarded by many, and perhaps, not without reaſon, as agreeable to the tenor of the "Book of Articles eſtabliſhed by law in the Church of England." Brandt's Ref. vol. iii. Moſheim E. H. vol. v.

DORTICUM, in *Ancient Geography*, a town of Upper Myſia. Ptol. Itin. Antonin.

DORTMANNA, in *Botany*. See Lobelia.

DORTMUND, in *Geography*, a ſmall town of Germany, in the circle of Weſtphalia, on the river Ems, 42 miles S.W. of Munſter, and 45 miles N. E. of Cologne. It was formerly a free imperial city, and anciently one of the Hanſeatic towns.

DORVALLIA, in *Botany*, See Fuchsia.

DORUM, in *Ancient Geography*, a village of Egypt, ſituated in the iſland of Meroe. Ptol.

DORY, in *Geography*, a town of Lithuania, in the palatinate of Wilna ; 68 miles E. of Lida.

Dory, a harbour in the northern part of Papua or New Guinea See Papua.

DORYANTHES, in *Botany*. (from Δορυ, *a ſpear*, and *ανθος*, *a flower*,) Correa in Tr. of L. Soc. v. 6. 211. t. 23, 24. Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Bromeliæ*, Juſſ.

Gen. Ch. *Cal.* none, except partial ſheaths, which are rather bracteas. *Cor.* of one petal, funnel ſhaped, in ſix deep diviſions, which are oblong-lanceolate, concave, keeled, the three innermoſt dilated at the baſe. *Stam.* Filaments ſix, almoſt as long as the petals and inſerted into their lower part, awl-ſhaped, their points penetrating deeply into the baſe of the anthers; anthers erect, ſomewhat cylindrical, two celled, after impregnation becoming of the ſhape of extinguiſhers. *Piſt.* Germen inferior, oblong, angular; ſtyle the length of the ſtamens, columnar, with three longitudinal furrows; ſtigma three-lobed. *Peric.* Capſule elliptic-oblong, with three furrows, crowned with the baſes of the corolla and ſtyle, of three cells and three valves. *Receptacles* central, longitudinal, two in each cell. *Seeds* ſomewhat kidney-ſhaped, depreſſed, ranged vertically in a ſingle ſeries, but alternately attached to each receptacle or line of the columella.

Eſſ Ch. Corolla ſuperior, in ſix deep ſegments, upright. Filaments ſhorter than the corolla, erect. Anthers erect. Capſule of three cells. Seeds in one row, with a double inſertion.

1. D. *excelſa*. Native of the mountains of New South Wales. *Root* perennial. *Habit* that of a *Yucca* or *Agave*, with numerous, oblong, for the moſt part radical, *leaves*. *Stalk* ſolitary, ſtraight, firm, above twenty feet high, bearing cluſters of large, beautiful, crimſon liliaceous *flowers*. A portion of the ſtalk, brought from New South Wales, was ſo tenacious of life that it produced a flower in the garden at Kew, from which Mr. Correa made the above deſcription. The genus is nearly allied to *Agave*, but the anthers are not incumbent, and the ſeeds in each cell make but one row in fact, though they are alternately inſerted along two lines of the central column. How far theſe characters are ſufficient, even in this tribe, where we muſt often be content with ſlight ones to mark very natural genera, may admit of ſome doubt; eſpecially as the anthers become extinguiſher-ſhaped only by the rolling back of their lobes after ſhedding the pollen, and the filaments are inſerted into their backs, exactly as is the caſe with incumbent anthers. S.

DORYCNIUM. See Convolvulvus n. 136, alſo Lotus Dorycnium, which Lamarck refers to *Aſpalathus*. Juſſ. 353, 356.

DORYCTELA, in *Ancient Geography*, a country of Aſia, on the coaſt of the Ægean ſea, according to Diodorus Siculus; named *Æolia* and the *Æolide* by other authors.

DORYDREPANON. See Drepanon.

DORYLÆIUM, or Dorylæum, in *Ancient Geography*, a town of Aſia, ſituated in the northern part of Phrygia Salutaris. The plain, on which this city ſtood, was watered by ſeveral rivers, which flowed into the Sangarus.

DORYPHORI, from δορυ, *ſpear*, and φερω, *I bear*, an appellation given to the life-guard-men of the Roman emperors. They were held in ſuch high eſtimation, as frequently to have the command of armies conferred on them.

It was uſual alſo for chief commanders to have their doryphori, or life-guard, to attend them.

DOSA, in *Ancient Geography*, a town of Aſſyria, placed by Ptolemy near Gaugamela.

DOSARA, a town of India, on this ſide of the Ganges. Ptol.

DOSARENI, a people of Arabia Felix. Ptol.

DOSARON, a river of India, in the peninſula on this ſide of the Ganges, which diſcharged itſelf into the ſea, N. E. of the river Tyndis.

DOSCI, a people of Aſia in Sarmatia, who are ſaid by Strabo to have occupied the coaſt of the Euxine ſea.

DOSE, in *Pharmacy*, &c. the quantity of a medicine to be taken at one time.

The word is formed from the Greek *δοσις*, which ſignifies gift, or a thing given, from *διδωμι*, *do*, *I give*.

In authors, and diſpenſatories, that deſcribe the ſame remedy, frequently the doſe is different; which occaſions a great difference in its effect.

Dr. Cockburn has given us an eſſay towards determining the doſes of purgative medicines, on mechanical principles.

Several attempts have been made to aſcertain the proportional doſes for the different ages and conſtitutions of patients; but, after all that can be ſaid on this ſubject, much muſt be left to the judgment of the perſon who adminiſters the medicine. The following general proportions may be obſerved, though by no means intended for exact rules. A patient between 20 and 14 may take two-thirds of the doſe ordered for an adult; from 14 to 9, one-half; from 9 to 6, one-third; from 6 to 4, one-fourth; from 4 to 2, one-ſixth; from 2 to 1, a tenth: and under one, a twelfth. Buchan's Dom. Med. App. p. 695.

DOSENS, ſtraight cloths, made in Devonſhire, and ſo called in Rot. Parl. 2 Hen. V. See Dowseines.

DOSITHEANS, Dosithei, an ancient ſect among the Samaritans in the firſt century of the Chriſtian era.

Mention is made in Origen, Epiphanius, Jerome, and divers other Greek and Latin fathers, of one Doſitheus, the chief of a faction among the Samaritans; but the learned are not agreed as to the time wherein he lived. St. Jerome, in his dialogue againſt the Luciferians, places him before our Saviour; wherein he is followed by Druſius, who, in his anſwer to Serrarius, places him about the time of Sennacherib, king of Aſſyria; but Scaliger will have him poſterior to our Saviour's time. And, in effect, Origen intimates him to have been contemporary with the apoſtles; where he obſerves, that he endeavoured to perſuade the Samaritans that he was the Meſſiah foretold by Moſes.

From the "Recognitions of Clement," an ancient work ſaid to be written in the ſecond century, we learn, that Doſitheus, a Jew, was at firſt a diſciple of John the Baptiſt, but aimed at being thought the Chriſt, in oppoſition to both John and Jeſus, and after the death of the former actually placed himſelf at the head of his ſect. Some ſuppoſe that the evangeliſt John refers to him, ch. iii. 25, where inſtead of Ιουδαιων, the reading Ιουδαιου τινος is introduced.

He had many followers; and his ſect was ſtill ſubſiſting at Alexandria in the time of the patriarch Eulogius; as appears from a decree of that patriarch, publiſhed by Photius. In that decree, Eulogius accuſes Doſitheus of injuriouſly treating the ancient patriarchs and prophets; and attributing to himſelf the ſpirit of prophecy. He makes him contemporary with Simon Magus; and accuſes him of corrupting the Pentateuch in divers places, and of compoſing ſeveral books, directly contrary to the law of God.

Archbiſhop Uſher takes Doſitheus to be the author of all the changes made in the Samaritan Pentateuch; which he argues from the authority of Eulogius; but all we can juſtly gather from the teſtimony of Eulogius is, that Doſitheus corrupted the Samaritan copies ſince uſed by that ſect; but that corruption did not paſs into all the copies of the Samaritan Pentateuch, now in uſe among us, which vary but little from the Jewiſh Pentateuch.

And in this ſenſe we are to underſtand that paſſage in a Samaritan chronicle, where it is ſaid, that Douſis, *i. e.* Doſitheus, altered ſeveral things in the law of Moſes.

The author of that chronicle, who was a Samaritan by religion, adds, that their high-prieſt ſent ſeveral Samaritans to ſeize Douſis, and his corrupted copy of the Pentateuch. Epiphanius takes him to have been a Jew by birth, and to have abandoned the Jewiſh party for that of the Samaritans. He imagines him likewiſe to have been the author of the ſect of the Sadducees: this is inconſiſtent with his being later than our Saviour. And yet the Jeſuit Serrarius agrees to make Doſitheus the maſter of Sadoc, from whom the Sadducees are derived.

Tertullian, making mention of the ſame Doſitheus, obſerves, that he was the firſt who dared to reject the authority of the prophets, by denying their inſpiration. But he charges that as a crime peculiar to this ſectary, which, in reality, is common to the whole ſect, who have never allowed any but the five books of Moſes for divine.

DOSOME, in *Agriculture*, a term provincially applied to ſuch beaſts as improve rapidly in fleſh. Thus a thriving beaſt is ſaid to be doſome.

DOSS, in *Rural Economy*, is a term provincially made uſe of to ſtrike with the horn, or gore in a ſlight manner, as neat cattle frequently do to each other.

DOSSE, in *Geography*, a river of Germany, in the circle of Upper Saxony, and marquiſate of Brandenburg, which runs into the Havel, 8 miles E.S.E. from Havelberg.

DOSSER, a ſort of baſket to be carried on the ſhoulders of men. It is uſed in carrying the overplus earth from one part of a fortification to another, where it is wanted. There are likewiſe ſmall carts and wheel-barrows for the ſame uſe.

DOSSIL, *Surgery*, is lint made into a cylindric form, or reſembling the ſhape of dates or olive ſtones. Doſſils are ſometimes ſecured by a thread tied round their middle.

DOSSO, Dossi, in *Biography*, a painter of hiſtory, was a native of Doſſo, in the territory of Ferrara, and from the ſchool of Coſta went to Rome, where he ſtudied ſix years, and five at Venice, forming a ſtyle compared ſometimes to that of Raphael, ſometimes to that of Titian, and ſometimes ſaid to reſemble that of Correggio. Arioſto ranks him, and alſo his brother Gio. Batiſta, with the firſt names in Italy; and Doſſo's pictures are ſaid to prove that he did not owe this high rank to the partiality of the poet. The head of his St. John at Patmos, in the church a'Lateranenſi at Ferrara, is repreſented as a prodigy of expreſſion. In the copy of his moſt celebrated picture in the church of the Dominicans at Faenza, exhibiting Chriſt among the doctors, the ſimplicity of the compoſition, the variety of the charactera, and the breadth and propriety of the drapery, deſerve admiration. Seven of his pictures are at Dreſden. The ſtyle of Doſſo is ſomewhat more obſolete than that of the great maſters with whom he is compared; but he has a novelty of invention and drapery, which are his own; together with a colour that unites with variety and boldneſs a general harmony. He died about the year 1560. Pilkington's Dict. by Fuſeli.

DOTAL Goods. See Goods.

DOTE Assignanda, in *Law*, a writ that lay for a widow, where it was found by office, that the king's tenant was ſeiſed of tenements in fee, or fee-tail, at the day of his death; and that he held of the king in chief, &c. in which caſe, the widow came into the chancery, and there made oath, that ſhe would not marry without the king's leave. Anno 15 Edw. IV. c. 4. And hereupon ſhe had this writ to the eſcheator; for which ſee Reg. of Writs, fol. 297. and Fitz. Nat. Br. fol. 263.

Theſe widows are called the king's widows.

Dote *unde nihil habet*, a writ of dower that lies for the widow againſt the tenant, who bought land of her huſband in his life-time, whereof he was ſolely ſeiſed in fee-ſimple, or fee-tail, in ſuch ſort, as the iſſue of them both might have inherited. Fitz. Nat. Br. fol. 147. See Dower.

Dote, *recto de*, ſee Recto.

DOTHAN, or Dothaim, in *Ancient Geography*, a place of Judæa, in the tribe of Zabulon, S.E. of mount Itabyrium, or Tabor, and 12 miles N. of Samaria. It was at this place that the brethren of Joſeph ſold him to the Iſhmaelite merchants of Gilead. (Gen. ch. xxxvii.) This was alſo the place where Eliſha, the prophet, was encompaſſed by the troops of Benhadad, king of Syria, who were ſent to apprehend him. 2 Kings, vi. 13.

DOTIS, in *Geography*, a ſmall town of Hungary, on the road from Vienna to Comorn. It is very agreeably ſituated in an extenſive plain, bounded by lofty hills.

Dotis *admenſuratione*. See Admeasurement, and Reg. of Writs, fol. 171.

DOTIUM, in *Ancient Geography*, a town of Greece in Theſſaly, placed by Strabo near the lake Bœbeis.

DOTKIN. See Doitkin.

DOTMATYN, in *Geography*, a town of Hungary; 6 miles N.W. of Podolicz.

DOTTEREL, in *Ornithology*, the name by which the *morinellus* is commonly known in moſt parts of England. See Charadrius *Morinellus*.

Dotterel, *Sea*, Tringa *Marinella*, in the Linnæan ſyſtem, a name given by authors to the bird, commonly known in England by the name of the *Turnſtone*; and called by Turner, cinclus. See Tringa.

DOTTO, in *Natural Hiſtory*, a name given by ſome authors to a ſpecies of the emerald, which was a good green, but not clear or fine.

DOU, in *Geography*, a river of Switzerland, in Neufchatel.

DOUADIO, a town of France, in the department of the Indre; 5 miles N. of La Blanc.

DOVAIN, a town of Savoy, in the Chablais, celebrated for its vineyards; 3 miles E.S.E. of Hermance.

DOUARNENEZ, a ſmall town of France, in the department of Finiſterre, chief place of a canton in the diſtrict of Quimper, with a ſmall harbour in the bay of the ſame name, 12 miles W. of Quimper. It has 1795 inhabitants. Its canton compriſes a population of 11,071 individuals, diſperſed in 7 communes, on a territorial extent of 167½ kiliometres.

DOUAY, or Douai, in Latin *Duacum*, a conſiderable town of France, in the department of the North, chief place of the department and of the diſtrict of Douay. It is very advantageouſly ſituated on the navigable river Scarpe, which falls into the Scheldt, and it communicates, by means of a canal, with the river Deule, which affords an eaſy and cheap intercourſe with Arras, Valenciennes, Dunkirk, and part of the department that formerly conſtituted the Auſtrian Netherlands. It is 18 miles N.W. of Cambray, 15 N.E. of Arras, and 145 miles N. of Paris.

Douay has a very handſome ſquare, a fine guildhall, a good arſenal, a ſtrong caſtle on the Scarpe, and a cannon foundery. Cloſe to the town is the village of *Lalain*, the church of which contains tombs of the middle age, remarkable for their ſculpture.

The principal manufactures of Douay are thoſe of earthenware, glaſs bottles, ſoap, oil, tin, linen cloth, cambric, cambric muſlin, thread, thread lace, gauze, flannel, and quilts. It has alſo ſome ſugar-houſes and ſalt works. Its chief trade is with oil, hops, cambric muſlin, linen cloth, and thread lace.

As chief place of a department, Douay has a prefect, two courts of juſtice, a ranger, a regiſter office, and a company of the national gens d'armes, formerly called *maré-chauſſée.* Its population amounts to 18,230 individuals; but it is divided into three cantons. The northern part of Douay, which contains 6260 inhabitants, reckons in its canton 5 communes, and 12.598 inhabitants. The weſtern part has 5830 inhabitants, and compriſes in its canton 10 communes, and 12.600 inhabitants. The ſouth part of Douay contains 6140 individuals, and its canton has 12 communes, with 12,603 inhabitants.

The diſtrict of Douay counts altogether 13 cantons, 146 communes, and 166,442 inhabitants, upon a territorial extent of 1142½ kiliometres. The ſoil produces corn of all ſorts, flax, tobacco, and hops. There are alſo coal mines in the neighbourhood of Valenciennes and Conde, now called Nord Libre.

The canal of Douay, from that place to Lille, was finiſhed in 1686, by Louis XIV. Herbin. Statiſtique de la France.

DOUAZIT, a ſmall town of France, in the department of the Landes, 6 miles ſouth of St. Sever.

DOUBLE, in the *Manege*. A horſe is ſaid to double his reins, when he leaps ſeveral times together to throw the rider. Thus we ſay, this ramingue doubles his reins, and makes pontlevis. See Ramingue, and Pontlevis.

A hare is ſaid to double when ſhe keeps the plain fields, and winds about to deceive the hounds.

Double, *Fr.* in *Muſic*, is equivalent to variation. Handel, in his two ſets of leſſons, of which the title is in French, has made uſe of the French terms throughout the two books. Variation at this time was only multiplying notes, and doubling their rapidity.

Double, is uſed in the French theatres for the ſubſtitutes of great actors and actreſſes, when a performer of an inferior order is allowed to take the part of a great performer during an indiſpoſition, real or imaginary; or when a new piece is preparing, which prevents them from appearing at the end of the run of a ſucceſsful drama. Without hearing an opera performed by ſubſtitutes, it is impoſſible, ſays Rouſſeau, to conceive how a piece is degraded, and what patience is requiſite in the audience, who deign to frequent the theatres at ſuch times. All the zeal of good French citizens is neceſſary to thoſe who have any ears, and who ever heard good performers, to bear ſuch deteſtable jargon.

Double *Aſpect*. See Aspect.

Double *Banked*, in *Sea Language*, denotes the ſituation of the oars of a boat, when two oppoſite ones are managed by rowers ſeated on the ſame bench, or thwart. The oars are alſo ſaid to be double-banked when two men row upon every ſingle one.

Double *Baſe, Contra-baſſo, Ital. Contra-baſſe, Fr.* This inſtrument has ſometimes three, and ſometimes four ſtrings with different tunings. But if it doubles the violoncello, or any baſe part, its tones will always be an octave below thoſe produced by other baſe inſtruments.

But whoever wiſhes to know of what the double-baſe is capable, ſhould hear the extraordinary performance of Sig. Dragonetti, who executes on the double-baſe all that can be played on a violin, or any other treble inſtrument; and, we believe, generally in *ſons harmoniques*.

Double *Baſtion*. See Bastion.

Double-*Bridge*, in *Geography*, a town of America in the ſtate of Virginia, and county of Luneburg, in which is a poſt-office; 225 miles from Waſhington.

Double *Caſt*, in *Huſbandry*, a term uſed by the farmers for that method of ſowing which does not diſpenſe the neceſſary quantity of ſeed for a piece of land at one bout, but requires the going over it twice. Plott. Oxf. p. 251.

Double *Children*, Double *Cats*, Double *Pears*, &c. inſtances of, are frequent in the Philoſophical Tranſactions, and elſewhere. See Monster.

Sir John Floyer, in the ſame Tranſactions, giving an account of a double turkey, furniſhes ſome reflections on the production of double animals in general. Two turkeys, he relates, were taken out of an egg of the common ſize, when the reſt were all hatched, which grew together by the fleſh of the breaſt-bone; but in all other parts were diſtinct. They ſeemed leſs than the ordinary ſize, as wanting bulk, nutriment, and room for their growth, which latter, too, was apparently the occaſion of their coheſion.

For, having two diſtinct cavities in their bodies, and two hearts, they muſt have ariſen from two cicatriculas; and conſequently, the egg had two yolks, which is no uncommon accident. He had a dried double chicken: he aſſures us, that though it had four legs, four wings, &c. it had but one cavity in the body, one heart, and one head; and that this, conſequently, was produced from one cicatricula.

So, Paræus mentions a double infant with only one heart; in which caſe, the original, or ſtamen of the infant, was one, and the veſſel regular: only the nerves and arteries towards the extremities, dividing into more branches than ordinary, produced thoſe double parts.

The ſame is the caſe in the double flowers of plants, occaſioned by the richneſs of the ſoil. So it is in the eggs of quadrupeds, &c.

There are, therefore, two reaſons of duplicity in embryos: 1. The conjoining, or connexion of two perfect animals; and, 2. An extraordinary diviſion, and ramification of the original veſſels, nerves, arteries, &c.

Double *Chorde, Fr.* double ſtops on the violin, that is, playing different parts on two ſtrings at the ſame time, as in the firſt ſix ſolos of Corelli, Geminiani, and Tartini. It is very difficult to play double ſtops on the violin in tunes, and ſtill more difficult on the violoncello; yet many great performers, with ſtrong hands and nice ears, have diſtinguiſhed themſelves by the accuracy of their performance of two parts at once. The elder Hamitz and Haydn have compoſed ſolos for one inſtrument, in which the under part is not a ſecond treble, but a real baſe, in the true character of an accompaniment of a ſolo on the violoncello or tenor, by ſlightly touching, *ſtaccato*, the under notes. Croſdil's playing the treble part and baſe of the *March in Scipio* on his violoncello, as completely as if performed by two violoncellos, will long be remembered.

DOUBLE *Concave,* and DOUBLE *Convex Glaſs.* See CONCAVE, CONVEX, and GLASS.

DOUBLE *Cone.* See CONE.

DOUBLE *Counterpoint.* See COMPOSITION, and COUNTERPOINT.

DOUBLE *Croche, Fr.* a ſemiquaver, or a note with a black head, and two hooks to the tail, or two ties.

DOUBLE *Crotchet, Fr.* a *croche,* or what we call a quaver, cut twice in abbreviation: dividing the crotchet into four ſemiquavers. See ABBREVIATION.

DOUBLE *Dancette,* in *Heraldry.* See DANCETTE.

DOUBLE *Deficient* intervals, in *Muſic,* are ſuch as are two major commas greater than a true conſonance, as double deficient THIRD, FIFTH, &c. which ſee.

DOUBLE *Deſcant.* See DESCANT.

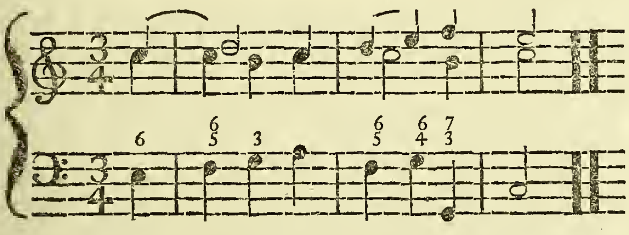
DOUBLE *Horizontal-dial,* one with a double gnomon, whereof one points out the hour on the outward circle, and the other ſhews the hour on the ſtereographic projection drawn upon it. This dial finds the meridian, hour, the ſun's place, riſing, ſetting, &c. and many other propoſitions of the globe. See DIAL.

DOUBLE *Dieſis.* See DIESIS.

DOUBLE *Diſcords,* in counterpoint, muſt be doubly prepared and reſolved.

DOUBLE *Eccentricity.* See ECCENTRICITY.

DOUBLE *Emploi,* a name given by Rameau to two different ways of treating the chord of the $\genfrac{}{}{0pt}{}{6}{5}$ to the fourth of the key, or as the French call it the *ſous-dominant;* in the one the fifth is made a diſcord by the ſixth, and reſolved by deſcending one degree upon the third to the next baſe; in the other, the ſixth is made a diſcord by the fifth, and is reſolved by *aſcending* one degree upon a ſixth to the next baſe.



This generally precedes a cloſe, when the $\genfrac{}{}{0pt}{}{6}{4}$ are played inſtead of the $\genfrac{}{}{0pt}{}{5}{4}$.

DOUBLE *Feaſt.* See FEAST.

DOUBLE *Fever.* See FEVER.

DOUBLE *Fiché,* or DOUBLE *Fichy,* in *Heraldry.* A croſs is denominated double fiché, when the extremities are pointed at each angle; that is, when each extremity has two points; in contradiſtinction to fiché, where the extremity is ſharpened away to one point.

Gibbon expreſſes it by an octagonal croſs, the two points whereof at each extremity are parted inwards by a ſmall ſpace of a line; by which it is diſtinguiſhed from the croſs of Malta, the two points whereof proceed from a third point, or acute angle between them.

DOUBLE *Fine.* See FINE.

DOUBLE *Floor,* a floor conſtructed with one or more girders, with binding joiſts tenoned into the girders, and with bridging joiſts ſupported upon the binding joiſts.

DOUBLE *Fugue,* in *Muſic,* a fugue on two ſubjects, of which the ſecond theme muſt have regular anſwers like the firſt. If theſe ſubjects or parts of them ſhould reciprocally ſerve for accompaniments to each other, they would be more eaſily worked, and confuſion avoided. The double fugue in Geminiani's ſixth concerto, opera 111, and the double fugue in Handel's third leſſon in F♯ minor, are admirable ſpecimens of this kind of fugue. In this ſpecies of ingenuity, the ſubjects ſhould come in, one after the other, and in notes of different lengths; as contraſt in the ſubjects will render them more marked and diſtinct. With more parts more ſubjects might be introduced; but confuſion is ever to be feared from a multitude of ſubjects: to treat them well is the utmoſt effect of the art. But theſe painful efforts are more calculated as exerciſes to try the ſtrength of young ſtudents than maſters. Rouſſeau compares them to the clogs and weight with which young horſes are loaded to keep them within bounds.

DOUBLE *inciſion, grafting by,* in *Gardening.* See ENGRAFTING.

DOUBLE *Iſland Point,* in *Geography,* a cape on the N.E. coaſt of New Holland, ſo called by Cook in 1770, becauſe it looked like too ſmall iſlands lying under the land; it may be known alſo by the white cliffs on the north ſide of it. S. lat. 25° 58′. W. long. 206° 48′.

DOUBLE *Leaf,* in *Botany.* See TWYBLADE.

DOUBLE *Letter,* in *Grammar,* a letter, which has the force and effect of two; as the Hebrew *Tſade,* which is equivalent to *T* and *S*; or the Greek ξ, or Latin *x,* &c.

Theſe letters are evidently equal to two; when we pronounce the Latin *axis,* or the Engliſh *axillary,* we give the *x* the ſame ſound, as if it were written with two *c c, accis, accillary;* or a *c* and *s, acſis, acſillary.* The Greeks have three, Ζ, Ξ, Ψ; the Latins only two, X and Z; and moſt of the modern languages have the ſame.

DOUBLE *Margin-door* is one conſtructed ſo as to repreſent a pair of folding doors when ſhut.

DOUBLE *Meaſure.* See MEASURE.

DOUBLE *Pedeſtal.* See PEDESTAL.

DOUBLE *Plea,* in *Law,* is where the defendant alleges for himſelf two ſeveral matters in bar of the action whereof either is ſufficient to effect his deſire, in debarring the plaintiff.

This is not admitted in common law; for which reaſon it is to be well obſerved, when a plea is double, and when not; for if a man alleges ſeveral matters, one not at all dependent on another, the plea is accounted double; but if they be mutually depending on each other, then it is accounted but ſingle, and ſhall be allowed. (Kitch. 223.)

Where there are ſeveral inducements to a plea, they ſhall not make the plea double; and double pleas are allowable in aſſizes of novel diſſeiſin, &c.; but not in other actions. (Jenk. Cent. 75.) By ſtat. 4 and 5 Ann. c. 16., a man, with leave of the court, may plead two or more diſtinct matters or ſingle pleas; as in an action of aſſault and battery, theſe three, not guilty, *ſon aſſault demeſne,* and the ſtatute of limitations. See PLEA and PLEADING.

DOUBLE *Plough.* See PLOUGH.

DOUBLE *Point,* in the *Higher Geometry.* When all the right lines tending the ſame way with the infinite leg of any curve, do cut it only in one point (as happens in the ordinates of the Carteſian and the cubical parabola,) and in the right lines which are parallel to the abſciſſes of hyperbolas, and parabolas, then you are to conceive that thoſe right lines paſs through two other points of the curve, placed, as it may be ſaid, at an infinite diſtance. Which coincident interſection, whether it be a finite or an infinite diſtance, ſir Iſaac Newton calls the double point.

DOUBLE *Poſition.* See POSITION.

DOUBLE *Quarrel, Duplex querela,* in *Law,* a complaint made by a clerk, or other, to the archbiſhop of the province, againſt an inferior ordinary, for delaying or refuſing juſtice in ſome eccleſiaſtical cauſe; as to give ſentence, inſtitute a clerk preſented, or the like. Its denomination ſeems owing to this, that it is commouly made both againſt the judge and him at whoſe ſuit juſtice is denied or delayed.

DOUBLE *Ratio*, See DUPLE.

DOUBLE *Roads*. See ROADS.

DOUBLE *Sharps*, in *Muſic*, marked ※※ or +, have the effect of riſing a note two half tones; but according to Dr. Boyce's MSS. in the library of the Royal Inſtitution, theſe half tones are not to be conſidered as ſtrictly equal, but the double, or ſecond ſharp, as raiſing the note an *apotome* ($\frac{2048}{2187}$) higher than a ſingle ſharp had elevated it. Double-flats, marked ♭♭, or $\underset{o}{\flat}$, are likewiſe ſaid to have the effect of adding an *apotome* to the flattening effect of a ſingle flat. On the contrary, Mr. Maxwell makes a double ſharp to have the effect of two ſingle ſharps in raiſing a note juſt two SEMITONES *medii*, which ſee.

DOUBLE *Star*, in *Aſtronomy*. Ever ſince the invention of teleſcopes, ſtars have been occaſionally obſerved by different aſtronomers, which, though they appear ſingle to the naked eye, yet when examined with a good teleſcope, are found to conſiſt of two or more ſtars extremely near to each other.

But little notice had been taken of theſe objects, till Dr. Herſchel directed the attention of aſtronomers by publiſhing his firſt catalogue of them in 1782 (Ph. Tranſ.), at the ſame time ſtating the probable advantages which he conceived aſtronomy might derive from a more attentive examination of theſe curious objects. In the Philoſophical Tranſactions of 1785, Dr. Herſchel publiſhed his ſecond catalogue, and notwithſtanding they are given in a very abridged form, and the words contracted and expreſſed by initials, yet it would occupy too much ſpace for the limits of our work: we are therefore obliged to give it in a ſtill father abridged ſtate, but arranged for the convenience of the practical aſtronomer in the order of the conſtellations.

Theſe double ſtars have acquired additional intereſt from the great changes which have happened in them ſince they were firſt obſerved; a very full account of which may be found in the Tranſactions for 1803 and 1804.

It was by means of theſe objects, that Dr. Herſchel propoſed to determine the parallax of the fixed ſtars, by obſerving the variation in the very ſmall angle ſubtended by them. We ſhall juſt explain the nature of this method, and refer to PARALLAX for a farther conſideration of its merits and defects. Let x and y (*Plate* IX. *Aſtronomy*, *fig.* 67.) be two ſtars ſituated in a line with the earth at A, and perpendicular to the diameter A B of the earth's orbit, and when the earth is at B, obſerve the angle Bxy. Let $P =$ the angle AxB, or the annual parallax of x; $p =$ the angle xBy found from obſervation. M and m the angles under which the diameters of x and y appear: and draw zx perpendicular to Bx. Then $p : P :: xz : AB : xy : Ay ::$ (becauſe $M : m :: Ay$ ∴ Ax) $M - m : M$; hence $P = \frac{p \cdot M}{M - m}$ the parallax of x. If x be a ſtar of the firſt magnitude, and y one of the third; and $p = 1''$, then $P = 1''\frac{1}{2}$, on theſe ſuppoſitions ſee the Philoſophical Tranſactions, 1782.

The double ſtars ſeem, of all others, the beſt adapted to enable us to judge of the power and perfection of our teleſcopes. But even with the very beſt of Dr. Herſchel's own conſtruction, it requires a very great degree of attention to all the minute circumſtances connected with diſtinctneſs of viſion, to ſucceed in ſeparating ſome of the moſt difficult of his catalogue, and ſome are ſo extremely cloſe that it may be doubted if any other obſerver beſides himſelf has ever ſeen them ſeparated. But ſuch changes have taken place in them, ſince the firſt publication of his catalogue, that many that he conſidered as moſt difficult, are now to be ſeen with much inferior inſtruments. γ Leonis for example may now be ſeen with any tolerable $3\frac{1}{2}$ feet achromatic teleſcope, ζ Herculis, on the contrary, has for ſome years ceaſed to appear as a double ſtar. The beſt method of eſtimating the diſtance of their objects is in meaſures of their own apparent diameters, as eſtimated by the eye, which will be found in many caſes much more exact than the beſt micrometer.

The following obſervations of Dr. Herſchel, as given in the Tranſactions, will be found highly uſeful to thoſe who are poſſeſſed of good inſtruments, and wiſh to examine theſe intereſting objects.

When we increaſe the power, we leſſen the light in the inverſe ratio of the ſquares of the power. And teleſcopes will in general diſcover more ſmall ſtars, the more light they collect. Yet with a power of 227, I cannot ſee the ſmall ſtar following δ Aquilæ, when, by the ſame teleſcope, it appears very plainly with the power of 460. Now in the latter caſe the power being more than double, the light is leſs than one fourth part of the former.

The experiment has been too often repeated to be doubtful, as has alſo been confirmed by others of nearly the ſame nature. For inſtance, the ſmalleſt of the two that accompany the ſtar near *k* Aquilæ, the ſmall ſtar near μ Herculis, and the ſmall ſtar near α Lyræ, are inviſible with my power of 227, and viſible with the ſame aperture when the power is 460. Alſo the ſmall ſtar near Flamſtead's 24 of Aquilæ, the ſmalleſt of two near σ Coronæ, the ſmall ſtar near the ſtar ſouth or ε Aquilæ, the ſmall ſtar near the ſecond ο Perſei, the ſmall ſtar near the ſtar which accompanies Flamſtead's 10th ſub pede et ſcapula dextra Tauri, the ſmall ſtar near β Delphini, and the ſmall ſtar near the pole ſtar, are all much brighter and ſtronger, and therefore much ſooner ſeen with 460 than with 227.

As theſe are ſome of the fineſt, moſt minute, and moſt delicate objects of viſion I ever beheld, I ſhall be happy to hear that my obſervations have been verified by other perſons, which I make no doubt the curious in aſtronomy will ſoon undertake. I ſhould obſerve, that ſince it requires no common ſtretch of power and diſtinctneſs to ſee theſe double ſtars, it will not be much amiſs to go gradually through a few preparatory ſteps of viſion, ſuch as the following. When η Coronæ Borealis (one of the moſt minute double ſtars) is propoſed to be viewed, let the teleſcope be ſome time before directed to α Geminorum, or if not in view to either of the following ſtars: ζ Aquarii, μ Draconis, ρ Herculis, α Piſcium, or the curious double ſtar ε Lyræ. Theſe ſhould be kept in view a conſiderable time, that the eye may acquire the habit of ſeeing ſuch objects well and diſtinctly. The obſerver may next proceed to ξ Urſæ majoris, and the beautiful treble ſtar in the right fore foot of Monoceros, after theſe to *i* Bootis, which is a fine miniature of α Geminorum, to the ſtar preceding α Orionis, and to η Orionis. By this time both the eye and the teleſcope will be prepared for a ſtill finer picture, which is η Coronæ borealis. It will be in vain to attempt this latter if all the former, at leaſt *i* Bootis, cannot be diſtinctly perceived to be fairly ſeparated, becauſe it is almoſt as fine a miniature of *i* Bootis, as that is of α Geminorum. If the obſerver has been ſucceſsful in all theſe, he may at the ſame time try *h* Draconis, though I queſtion if any power leſs than 4 or 500 will ſhew it to be double, but the former I have all ſeen very well with 227.

To try ſtars of unequal magnitude, they may be taken in ſome ſuch order as the following: α Herculis, ω Aurigæ, δ Geminorum, κ Cygni, ε Perſei, β Draconis, from theſe the obſerver may proceed to ε Bootis. Perſons uſing $3\frac{1}{2}$ achromatic muſt not be diſappointed if they cannot perceive the following ſtars to be double.

26	ω Leonis
31	between 41 and 39 Lyncis of Flamſtead
56	ζ Herculis
41	31 Draconis
44	4 Aquarii
46	13 Aquarii treble
47	29 Capricorni
75	26 Orionis
82	49 Serpentis
87	η Ophiuchi.

The foregoing remarks have ſuggeſted a method of ſeeing how far power and diſtinctneſs of our inſtruments will reach; I ſhall add the way of finding how much light we have. The obſerver may begin with the pole ſtar and α Lyræ, then go to the ſtar ſouth of ε Aquilæ, the treble ſtar near κ Aquilæ, and laſt of all to the ſtar following ο Aquilæ. Now if his teleſcope has not a good deal of good diſtinct light, he will not be able to ſee the ſmall ſtars that accompany them.

I have divided the double ſtars into ſeveral different claſſes. In the firſt I have placed all thoſe which require indeed a very ſuperior teleſcope, the utmoſt clearneſs of air, and every favourable circumſtance to be ſeen at all, well enough to judge of them. They ſeem to me on that account to deſerve a ſeparate place, that an obſerver might not condemn his inſtrument or his eye, if he ſhould not be ſucceſsful in diſtinguiſhing them.

In the ſecond claſs of double ſtars, I have put all thoſe that are proper for eſtimation by the eye, or very delicate meaſures by the micrometer. To compare the diſtances with the apparent diameters, the power of the teleſcope ſhould not be much leſs than 200, as they will otherwiſe be too cloſe for the purpoſe. The inſtrument ought moreover to be as much as poſſible free from rays that ſurround a ſtar, in common teleſcopes, and ſhould give the apparent diameters of a double ſtar, perfectly round and well defined, with a deep black diviſion between them. It will be neceſſary here to take notice that the eſtimations, made with one teleſcope, cannot be applied to thoſe made with another; nor can the eſtimations made with different powers, though with the ſame teleſcope, be applied to each other. Whatever may be the cauſe of the apparent diameters of the ſtars, they are certainly not of equal magnitude with the ſame powers in different teleſcopes, nor of proportional magnitudes with different powers in the ſame teleſcope.

In my inſtruments I have ever found leſs diameter in proportion the higher I was able to go in power; and never have I found ſo ſmall a proportional diameter, as when I magnified 6450 times: therefore, if we would wiſh to compare any ſuch obſervations together, with a view to ſee whether a change in the diſtance has taken place, it ſhould be done with the very ſame teleſcope and power, even with the very ſame eye-glaſs or glaſſes; for others, though of equal power and goodneſs, would moſt probably give different proportional diameters of the ſtars.

In the third claſs, I have placed all thoſe double ſtars, which are more than 5″ but leſs than 15″ aſunder, and for that reaſon, if they ſhould be uſed for obſervations on the parallax of the fixed ſtars, they ought not to be looked upon as quite free from the effects of refraction, &c. In the ſame manner that the ſtars of the firſt and ſecond claſſes will ſerve to try the goodneſs of the moſt capital inſtruments, theſe will afford objects for teleſcopes of inferior power, ſuch as magnify from 40 to 100 times. The obſerver may take them in this or the like order; ζ Urſæ majoris, γ Delphini, γ Arietis, π Bootis, γ Virginis, ι Caſſiopeiæ, μ Cygni. And if he can ſee all theſe, he may paſs over into the ſecond claſs, and direct his inſtrument to ſome of thoſe which were pointed out as objects for the very beſt teleſcopes, where, I ſuppoſe, he will ſoon find the want of ſuperior power.

The fourth, fifth, and ſixth claſſes contain double ſtars that are from 15″ to 30″, from 30″ to 1′, and from 1′ to 2′, or more aſunder. Though theſe will hardly be of any ſervice for the purpoſe of parallax, I thought it not amiſs to give an account of ſuch as I have obſerved; they may perhaps anſwer another very important end, which alſo requires a great deal of accuracy, though not quite ſo much as the inveſtigation of the parallax of the fixed ſtars. I will juſt mention it, though foreign to my preſent purpoſe. Several ſtars of the firſt magnitude have already been obſerved, and others ſuſpected to have a proper motion of their own, hence we may ſurmiſe that our ſun, with all its planets and comets, may have a motion towards ſome particular part of the heavens, on account of a greater quantity of matter, collected in a number of ſtars, and their ſurrounding planets there ſituated, which may perhaps occaſion a gravitation of our whole ſolar ſyſtem towards it. If this ſurmiſe ſhould have any foundation, it will ſhew itſelf in a ſeries of ſome years, as from that motion will ariſe another kind of hitherto unknown parallax, the inveſtigation of which may account for ſome part of the motions already obſerved in ſome of the principal ſtars: and for the purpoſe of determining the direction and quantity of ſuch a motion, accurate obſervations of the diſtance of ſtars that were near enough to be meaſured with a micrometer, and a very high power of teleſcopes, may be of conſiderable uſe, as they will undoubtedly give us the relative places of thoſe ſtars to a much greater degree of accuracy than can be had by tranſit inſtruments or ſectors, and thereby much ſooner enable us to diſcover the apparent change in their ſituation occaſioned by this new kind of ſyſtematical parallax, if I may be allowed to uſe that expreſſion, for ſignifying the change ariſing from the motion of the whole ſolar ſyſtem.

Of the changes that have taken place in the relative ſituation of the double Stars.

For a more detailed account of theſe changes, the reader is referred to Dr. Herſchel's papers in the Tranſactions of 1802, 1804. The following abridged account of them is taken from the Journals of the Royal Inſtitution.

Doctor Herſchel devotes this paper principally to the conſideration of the ſecond claſs of ſyſtems, into which he has divided the ſidereal world. After curſorily remarking with reſpect to the ſolar ſyſtem as a ſpecimen of the firſt claſs, which among the inſulated ſtars comprehends the ſun, that the affections of the newly diſcovered celeſtial bodies extend our knowledge of the conſtruction of this inſulated ſyſtem, which is beſt known to us, he proceeds to ſupport, by the evidence of obſervation, the opinion which he has before advanced of the exiſtence of binary ſidereal combinations revolving round the common centre of gravity. Dr. Herſchel firſt conſiders the apparent effect of the motion of either of the three bodies concerned, the two ſtars, and the ſun with its attendant planets, and then ſtates the arguments reſpecting the motions of a few only out of the fifty double ſtars, of which he has aſcertained the revolutions. The firſt example is Caſtor, or Alpha Geminorum; here Dr. Herſchel ſtops to ſhew how accurately the apparent diameter of a ſtar, viewed with a conſtant magnifying, may be aſſumed as a meaſure of ſmall angular diſtances, he found the ten different mirrors of ſeven feet focal length, exhibited no perceptible difference in this reſpect. In the caſe of Caſtor no change in the diſtance of the ſtars has been obſerved, but their angular ſituation appears to have varied ſomewhat more than 45°, ſince it was firſt obſerved by Dr. Bradley, in 1759, and they have been found by Dr. Herſchel in intermediate poſitions at intermediate times. Dr. Herſchel allows that it is barely poſſible that a ſeparate proper motion in each of the ſtars and in the ſun may have cauſed ſuch a change in the relative ſituation, but that the probability is very decidedly in favour of the exiſtence of a revolution. Its period muſt be a little more than 342 years, and its plane nearly perpendicular to the direction of the ſun. The revolution of Gamma Leonis is ſuppoſed to be in a plane conſiderably inclined to the line in which we view it, and to be performed in about 1200 years. Both theſe revolutions are retrograde, that of Epſilon Bootis is direct, and is ſuppoſed to occupy 1681 years, the orbit being in an oblique poſition with reſpect to the ſun. In Zeta Herculis, Dr. Herſchel obſerved in 1802 the appearance of an occultation of the ſmaller ſtar by the larger one. In 1782, he had ſeen them ſeparate; the plane of revolution therefore muſt paſs nearly through the ſun, and this is all that can at preſent be determined reſpecting it. The ſtar of Delta Serpentis appears to perform a retrograde revolution in about 375 years, their apparent diameter is invariable as well as that of the two ſtars which conſtitute Gamma Virginis, the laſt double ſtar which Dr. Herſchel mentions in this place, and to which he atrributes a periodical revolution of about 708 years.

CATALOGUE OF DOUBLE STARS.

[v. very; poſ. poſition; N. f. North following; S p. South preceding; S. ſmalleſt ſtar; L. largeſt ſtar; eq. equal.]

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
					ANDROMEDÆ.
		α	V	62	v.un. 55″ 32‴, poſ. 10° 37′ S.p.
	foll. 24′ N. 33′	6	II	47	p. uneq. poſ. 34° 24′, N. p.
5		γ	III	48	v. uneq. 9″ 15‴, poſ. 19° 37′, N. f. beautiful object.
	pre. 23′ S. 12″	50	IV	49	p. uneq. 18″ 57‴, poſ. 22 23′ N. f.
		59	IV	51	uneq. 15″ 15‴, poſ. 55° 9′ N. f. a 3d ſtar in view.
	foll. 30′	47	I	53	p. uneq. poſ. 75° 30′ S. f.
17		π	V	57	v. v. uneq. 34″ 12‴
	foll. N. 8′	δ	V	60	eq. 45″ 1‴, poſ. 32° 34′ S. p.
					AQUARII.
38		24	IV	90	v. uneq. diſt. 25″
7		ζ	II	91	equ. 4″ 34‴, poſ. 71° 39′ N. f. with 227, $1\frac{1}{4}$ diameter, wit 460, 2 diameters.
		51	V	95	v. v. uneq. N. p. two ſtars in view.
44		4	I	96	v. un. v. minute, poſ. 81° 30′ N. p. almoſt in contact, a 3d ſtar (VI) diſt. 1′ with 460, at moſt $\frac{1}{6}$ diam. of S.
		β	V	96	v. v. un. 33″ 16‴, poſ. 55° 48′
90	near	β	I		l. uneq. poſ. 77° 36′ S. f. about $4\frac{1}{2}$° from β towards ν.
	foll.	ρ	I	98	v. un. poſ. 45° N. p.
12		ψ	IV	100	uneq. 23″ 5‴
34		94	III	104	v. uneq. 13″ 45‴.
		τ	V	105	v. uneq. 36″. 47‴, poſ. 19° 54′ S. f.
24		α.4	II	109	uneq. with 227, 2 diameters.
46	near	ν	I	102	treble neareſt v. un. 62° N. p. fartheſt v. un. diſt. 1′ 24″. 36° N. f. about $1\frac{3}{4}$° foll. ν.
50	near	λ	I		conſiderable ſtar v. un. poſ. 41° 12′ N. p.
					AQUILÆ.
	foll. 1′ S. 12′	ε	II	75	v. uneq. poſ. 16° N. p. a very ſmall ſtar.
32		11	III	76	v. v. uneq. 7″
		π	I	78	. uneq. poſ. 34° 24′ S. minute and pretty.
28	foll.	ο	II	80	v. v. un. poſ. 36° 28′ p. requires a very powerf teleſcope; according to Ierſchel not viſible with 78. It has been ſeen wi an excellent achromatic th a much lower power.
		α	VI	81	v. v. un. 2′ 23″ 18‴, po 64° 44′ N. p.
29	near	τ	II	83	v. v. un. poſ. 75° N. p.
	fol. 15″ S. 20′	η	II	89	l. uneq. poſ. 29° 3′ N.
14		24	I	90	v. v. un. poſ. 72° 0′ f. a good object for trying teleſcope; ſcarcely viſibl with 227.
14		57	IV	98	un. 29″ 28‴, poſ. 81° 85 S. p.
		20	V	99	v. un. 42″ 44‴
	prec.	δ	V	87	v. un. 30″
33	prec.	7	III	93	un. 11″ 35‴
13	near	37	I		treble, two neareſt v. un hird ſtar v. ſmall.
		h	V	94	un. 33″ 53‴
44		4	I	90	minu. v. un. poſ. 81° 30 N. p.
91	prec.	γ	I	80	about $\frac{1}{3}$ deg. n. pr. γ in a line par. to γ and ζ; two that neareſt to γ: 22 ardly viſible, with 4 nebulous.
					ARIETIS.
5		33	IV	63	p. uneq. 25″ 32‴, poſ. ° 14′
		30	V	66	equal 31″ 6‴
12		λ	V	67	p. uneq. 36″ 44‴, poſ. 4 N. f.
	prec.	6	I	68	v. uneq. poſ. 77° 24′ S
9		γ	III	71	equal 10″ 10‴, poſ. 86° N. p. 2d rather largeſt.
64		π	I	73	v. v. uneq. treble poſ. ° 19′ S. f. moſt diſt. 25″, a three in a line, very diff.
	3′ prec.	β	II	70	l. uneq. poſ. 23° 12′ N .

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
					Aurigæ.
2		41	III	41	v. uneq. 8″ 31‴, poſ. 80° N. p. pretty.
		α	VI	44	v. v. un. 2′ 49″ 8‴, poſ. 61° 23′. S. f.
		β	VI	45	v. v. un.
	foll.	52	IV	49	uneq. 24″ 53‴
	foll.	λ	V	50	v. uneq. 34″ 15‴, poſ. 54° 6′ S. p.
21		τ	V	50	diſt. 30″
		ν	V	50	v. v. un. 53″ 43‴, poſ 61° 48′ S. p. ſmall ſtar not viſible at firſt.
		59	IV	50	v. un. 23″ 50‴, poſ. 50° 3′ S. p.
14		ω	II	52	v. un. poſ. 82° 37′ N. p.
45	foll.	ω	I	51	un. poſ. 47° 33′ S. p.
		ϑ	V	52	v. v. un. 35″ 18‴, poſ. 16° N. p.
19	foll.	14	IV	57	v. un. 16″ 8‴, poſ. 37° 38′ S. p.
	foll.	χ	I	57	v. un. poſ. 23″ 57‴ N. f.
		26	III	59	v. un. 13″ 25‴, poſ. 2° 26′ N. p.
22		λ	V	50	multip. two within 30″
					Bootis.
79		39	II	40	l. un. poſ. 38° 21′ N. f. pretty
15		*i*	I	41	v. un. poſ. 29° 54′ N. f. fine object to try a teleſcope; miniature of α Gem. very beautiful.
1		ε	I	62	v. un. poſ. 31° 34′ N. p. a v. beautiful object, with 227 ¾ diam. S.
11		κ	III	37	v. un. 12″ 30‴, poſ. 30° S. p.
		l	V	37	v. un. 37″ 33‴, poſ. 52° 51′ N. f.
	foll.	e	I	67	treble
18		ξ	II	70	v. un. poſ. 65° 53′ N. f.
8		π	III	72	p. un. 6″ 10‴, poſ. 6° 22′ S. f.
		ζ	I	76	equal ext. difficult. This ſtar was firſt obſerved to be double by Mr. Pond. The beſt achromatic teleſcope will but juſt elongate the ſtar. With a ſeven feet reflector, under favourable circumſtances, they may be ſeparated
		15	II		
38	S. foll.	15	II	78	v. un. 5″ 10‴, poſ. 83° 5′. S. p.
17		51	I	52	near μ. un. with 460 ¾ S.
					Camelopardali.
15			IV	5	32d Hevelii. un. 20″ 5‴
109	foll.	49	II	26	p. un. poſ. 67° 15′ N. p.
	prec.	11	I or II	31	v. v. un. poſ. 88° 33′ S. f.
	foll. little S.	29	IV	33	v. un. 22″ 26‴, poſ. 47° 36′ S. f.
		2	IV	36	p. un. 19″ 32‴, poſ. 85° S. p.
53	prec.	12	II		v. v. un. poſ. 18° 34′ S. f. 227, ſtar with a tail, 93½, plainly double

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					Cancri.
30		57	I	58	p. un. poſ. 68° 12′ N. p. beautiful
		48	IV	60	p. un. 29″ 54‴, poſ. 39° 54′ N. p.
11		11	I	61	p. un. poſ. 85° 10′ N. p.
		φ	II	62	uneq.
	foll.	μ	III	66	un. 8″ 50‴, poſ. 65° 12′
24 19		ζ	I or III	71	treble 8″, poſ. 88° N. f. difficult to be ſeen with 460 ¼ S
		θ	V	71	v. v. un. 44″ 52‴, poſ. N. f.
		54	IV	73	uneq. 17″ 14‴, poſ. 29° S. f.
					Canis.
		π	V	110	treble; neareſt v. un. fartheſt v. v. un.
	foll. 2′ N. 28′	ξ	II	112	v. un. poſ. 67° 36′ N. p.
					Canis Minoris.
23	foll.	α	I	84	moſt minute uneq 27° 21′ S. f the 2d teleſcope ſtar following α; with 278 ⅛ S. beautiful object; cloſer than η Coronæ
		14	VI	87	neareſt v. v. un.
39	near	α	II		near Procyon. 2° S. f. in a line from λ Gem. through Procyon not viſible with 278, with 460 more than three diameters, poſ. 54° 28′ S. f.
					Canum Venaticorum.
		2	III	48	v. un. 12″ 12‴, proſ. 11° S. p.
17		12	IV	50	Cor. Caroli. v. un. 20″, poſ. 41° 47′ S. p.
					Capricorni.
51	foll.	7	II	100	p. un. poſ. 61° 12′ N. p.
		ρ	II	108	v. un. poſ. 84° S. f. treble VI. It is now of the firſt claſs
		σ	V	109	v. un. 50″ 7‴, poſ. 83° 12′ S. f.
		ο	IV	109	p. uneq. 23″ 30‴, poſ. 30° 45′ S. f.
47	foll. prec.	τ α	I	105	minute, un. 84° 48′ N. p. difficult.
3		ξ	IV		v. un. 25″
					Caſioſpeiæ.
		47	V	13	50″ 58‴, poſ. 3° 33′ N. p.
16		31	IV	22	20″ or more
4 & 34		55	I & III	24	treble v. un. neareſt poſ. 22° 30′ N. p. moſt diſt. 7″ 30‴, 10′ S. f.
		35	V	26	uneq. 42″ 35‴, poſ. 85° 12′ N. f.
23		φ	III	32	v. v. un. 12″ or more.
	near	3	IV	32	v. un. 20″ or more.
39	foll.	τ	I	32	poſ. 50° 42′ N. p. v. un. a pretty conſiderable ſtar.
5		σ	I	35	v. un. poſ. 60° 28′ N. p.
	foll.	ζ	IV	37	v. v. un.

DOUBLE STARS.

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
	foll.	ξ	V	40	equal 43″ 26‴
		9	V	28	v. un. 52″ 39‴
3		η	III	33	v. un. 11″ 16‴, poſ. 27° 56′ N. f. beautiful.
18		α	V	34	v. v. un. 52″ 48‴, poſ. 40° 58′ N. p.
40	½° N. p.	25	I		v. un. poſ. 50° 30′ S. f.
39	prec.	β	I	32	v. un. poſ. 50° 42′ N. p.
					CENTAURI.
		k	III	121	p. un. 11″ 35‴, poſ. 22° S. f.
		η	V	124	p. un. 54″
					CEPHEI.
48	prec.	6	I		v. minute, poſ. 14° 9′ S. p. beautiful
70		κ	III	12	v. un. 5″ 47‴ beautiful.
	foll.	16	IV	17	v. un. 28″ 5‴, poſ. 79° 18′ N. p.
6		β	III	20	v. un. 13″ 13‴, poſ. 15° 28′ S. p.
4		δ	V	32	un. 38″ 18‴
	prec.	η	IV	28	v. uneq. 19″ 32‴
16		ξ	II	26	fine 5″, poſ. 28° 18′ N. p.
31	near	δ	IV		treble diſt. neareſt 20″
49	1¼° N. f. λ	22	I		v. un. poſ. 85° 48′ N. f.
					COMÆ BERENICIS.
		e	V	62	p. uneq. 58″ 55‴, poſ. 77° S. f.
	foll.	22	V		l. uneq. 56″ 36‴
		2	II	67	p. uneq. poſ. 27° 42′ S. p.
		35	V		v. uneq. 31″ 17‴, poſ. 36° 51′ S. f.
27		24	IV	70	p. uneq. 18″ 24‴, poſ. 3° 28′ N. p.
					CORONÆ.
8		ζ	II	52	p. un. 5″ 28‴, poſ. 25° 51′ N. p.
16		η	I	58	v. minute, uneq. poſ. 59° 19′ N. f. miniature of *i* Bootis. It appears to be now more difficult than when originally ſeen by Dr. H.
3			I	55	treble p. un. poſ. 77° 34′ N. p. 3° 24′ N. f. v. faint.
18			I		The ſmalleſt of two teleſcopic ſtars between θ and δ equal
					CORVI.
		8	IV	105	v. v. un. 23″ 30‴, poſ. 54° S. p.
					CETI.
56	2′ foll.	54	I	80	nearly equal, poſ. 87° 39′ N. f.
		26	IV	89	v. un. 17″ 2‴, poſ. 14° 36′ S. p.
		61	V	91	v. un. 37″ 43‴
25		66	IV	93	16″ 52‴
	foll.	12	IV	95	p. un. 18″ 35‴
		5	V	99	42″ 48‴
	prec.	5	V	99	19″ 6‴

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					CYGNI.
		c	V	39	nearly equal 30″
		c	V	40	v. uneq. 40″
97	foll. 9′	51	I	40	minute p. uneq. poſ. 46° N. f.
23		ω	IV	41	p. un. 30″ poſ. 7° 23′ N. p.
24		ω	IV	41	treble, all within 30″ v. poſ. brighteſt ſtar 44° N. p.
22		f	IV	43	v. v. un. 18″ 11‴
94		δ	I	45	v. uneq. poſ. 18° 21′ N. f.
	prec.	77	III	49	quadruple.
		76	V	50	uneq. 48″
	prec. 15′	σ	IV	51	v. v. uneq. 17″ 30‴, poſ. 2¼′ N. p. a 3d in view.
39	N. f.	σ	IV	51	v. v. uneq. 18″, poſ. 30° 28′ S.
18		61	IV	52	p. uneq. 16″ 17‴, poſ. 36° N. f.
	foll.	τ	V	52	v. uneq. 44″
	prec. 9′	11	II	53	uneq. poſ. 29° 12′ N. f.
				54	Between 4 Cygni and double, quadruple III. tuple and treble I.
		69	V	54	treble v. un.
	prec. 12′	η	V	55	p. un. 35″ 1‴, poſ. 57° N f. conſiderable ſtar.
11		χ	IV	56	v. un. 24″ 52‴
		49	II	58	v. un. poſ. 31° 48′ N. f.
25		k	II	60	v. v. un. poſ. 31° 3′ N. a neb. croſſes this ſtar.
	prec. 3′	ζ	II	60	treble, neareſt v. v. un. poſ. N. p. 3d diſt. 1′
5		β	V	62	p. uneq. 39″ 32‴ beautiful
15		μ	III	62	p. uneq. 6″ 55‴, poſ. 20° 5′ S. f.
	2′ foll.	β	II	62	v. uneq. poſ. 87° 48′ N. f.
15		ψ	II	38	v. un. poſ. 82° 37′ N. p.
					DELPHINI.
10		γ	III	74	near equal 11″ 49‴, poſ. 9′ N. p.
	prec.	γ	II	74	p. un. poſ. 78° 48′ N. p.
	foll.	ζ	IV	76	treble nearly equal, neareſt 1′ 33‴
35		β	IV	76	v. v. un. 25″ 54‴, poſ. 78° ſcarcely viſible with 22
16	prec.	ε	III	79	l. un. diſt. 12° 5′, poſ. 9° 2′ S. p.
					DRACONIS.
41	¾° N.	31	I	17	v. minute, v. un. poſ. 84° 1′ N. p. cannot be ſeen b in favourable circumſtance
		40	IV	10	20″ 39‴
	foll. 1′	29	I	15	v. minute, very difficult.
7		ψ	IV	17	28″ 14‴ unequal.
8		ε	I	20	v. minute, difficult, 63° p. 227. ¾ L, 932. 2 L, a lucid point.
19	near	b	I	24	a moſt minute double ſtar 30°

DOUBLE STARS.

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					S. p. extremely difficult. perhaps never ſeen out o Dr. Herſchel's garden ; it is a ſmall teleſcopic ſtar following 24.
7		*b*	I	31	v. v. uneq. 77° 8′ N. f. a 3d ſtar near minute, rather difficult the ſmall ſtar a fine lucid point.
43	near. N.	48	I	32	v. uneq. v. minute, 88° 24′ N. p.
20		*o*	IV	30	v. un. 26″ 39‴, poſ. 90° N.
11		*ν*	V	34	54″ 48‴, poſ. 44° 19′ N. p.
		c	VI	34	a rich ſpot.
4		16	I	35	p. un. poſ. 24° S. f.
	between	*β γ*	I	38	p. un. poſ. 2° 24′ S. p.
13		*μ*	II	35	eq. poſ. 37° 38′ S. p. or N. f.
31		56	II	13	l. un. 5″ 7‴
					EQUILEI.
37		*δ*	IV	80	v. v. un. 19″ 32‴, poſ. 11° 39′ N. f.
62	prec. 1′	4	I	84	p. un. poſ. 35° 9′ S. p.
61	prec. 3′ N. 15′	1	I	86	minute, v. un. 18° 24′ N. p. pretty; difficult.
21		1	III	86	p. un. 9″ 22‴, poſ. 5° 39′ N, f. a 3d ſtar following
63	½° S.	*γ*	I		q. poſ. 5° 57′ S. p.
					ERIDANI.
	foll. 12′	*ξ*	III	94	v. un. 15″ 21‴, poſ. 9° 18′ S. p. difficult.
	prec. 30′	*ω*	IV	95	v. un. 19″ 32‴, poſ. 31° 48′
	prec. 8′	55	III	99	p. un. 11″ 53‴, poſ. 16° 24′ S. p.
		55	III	99	l. un. 9″ 9‴. 44° 9′ N. p.
43		*λ*	IV	99	v. un.
	foll. 4′	49	II	89	v. un. poſ. 51° 36′ N. p.
36		32	II	93	v. un. 4″ 19‴, poſ. 73° 23′ N. p.
					GEMINORUM.
		π	IV	56	v. v. uneq. 21″ 31‴, other v. ſmall ſtars in view.
1		*α*	II	57	uneq. poſ. 32° 47′ N. p.
		15	V	69	32″ 39‴ v. un.
	prec.	*r*	III	69	l. un. 6″ 15‴, poſ. 43° 54′ N. f.
	foll.	*f*	II	71	v. un. poſ. 4° 9′ N. p.
		21	IV	72	l. un. 25″
28	30″ pre. N. 6′	*γ*	IV	73	un. 19″ 41‴, poſ. 57° S. p.
		54	IV	73	un. 17″ 14‴, poſ. 29° S. f.
27		*δ*	II	72	v. un. poſ. 85° 51′ S. p.
					HERCULIS.
		42	IV	40	v. un. 21″ 31‴, poſ. 3° 40′ S. f.
3		*ϱ*	II	52	p. un. 2″ 58‴, poſ. 30° 21′ N. p.
		23	V	57	36″ 27‴
36		*ζ*	I	58	v. un. poſ. 20° 42′ N. p. fine. No longer viſible.

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
42	Cloſe to	*ν*	IV	59	p. un. 18″ 19‴, poſ. 4° 58′ N. p.
79		46	I	61	v. v. un. poſ. 66° 36′ S. f. ſcarcely viſible; near 1 diam. L.
	near	63	III	62	v. un. 11″ 53‴, poſ. 47° 48′ N. f.
41		*μ*	IV	62	v. v. uneq. 18″. poſ. 30° S. p. ſmall ſtar ſcarcely viſible.
1		*δ*	V	64	v. v. un. 33″ 45‴, poſ. 72° 28′ S. f.
40	near	87	III	64	v. v. un. 10″ 20‴, poſ. 19° 37′ S. f.
			I	64	In the ſame zone following p. un. poſ. 79° N. p.
26		95	III	68	eq. 6″ 6‴, poſ. 4° 9′ S. p. or N. f.
19		*γ*	V	70	v. v. un. 41″ 49‴, poſ. 19° 30′ S. p.
	prec.	K	V	72	un. 37″ 59‴
8		K	V	72	un. 39″ 59‴, a 3d ſtar nearly poſ. 79° 37″ N. f.
	foll. 10′	49	IV	74	v. un. 21″ 3‴, poſ. 25° 3′ S. p.
	prec.	*ω*	II	75	v. un. poſ. 44° 45′ N. p.
2		*α*	II	75	v. un. 4″ 34‴, poſ. 30° 35′ S. f. beautiful.
	3′ prec.	41	V	83	p. un. 48″ 40‴, poſ. 19° 45′ N. p.
41		*i*	III	80	equal. 11″ 43‴, poſ. 88° 23′ N. p.
37	N. f. *φ*	11	I		v. un. poſ. 59° 48′ S. f.
					HYDRÆ.
	12′ prec.	*ε*	III	82	p. un. 12″ 30‴, poſ. 62° 48′ N. f.
	2′ foll.	*δ*	IV	83	p. un. 25″ 43‴, poſ. 59° 24′ N. f.
	1h prec.	*σ*	II	85	v. v. un. poſ. 54° 28′. S. f.
		15	V	96	v. v. un. 43″ 2‴, poſ. 70° S. f.
		α	VI	87	treble.
		10	III	114	Hyd. contin. v. un. 11″ 17‴ poſ. 38° 15′ S. f.
		θ	V	86	v. v. un. 1′ ±, poſ. 75° S. f. not eaſily ſeen.
					HYDRÆ et CRATERIS.
	22′ foll.	*ε*	VI	99	v. un.
	1′ foll.	*α*	IV	101	v. v. un. 21″ 49‴, poſ. 36° 54′ N. p.
	3′ foll.	*γ*	IV	106	equal. 26″ 15‴
					LACERTÆ.
		16	IV	49	treble, a 4th and 5th ſtar in view
		12	VI	50	1′ 0″ 10‴
		8	IV	51	quadruple, 2 largeſt uneq. 17″ 14‴
		10	V	52	v. un. 52″ 34‴, poſ. 38° 45 N. f.
17		1	III	53	p. un. 13″ 43‴, poſ. 76° 16′ S. p.
					LEONIS.
30		54	III	64	p. un. 7″ 6‴, poſ. 9° 14′ S. f.
28		*γ*	I	69	p. un. poſ. 5° 25′ N. f. two ſtars prec. beautiful; it is now very eaſy to be ſeen, being more ſeparated, 1807.

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
	2′ prec.	o	V	73	v. un. 37″ 15‴. poſ. 70° 48′ N. f.
		7	V	74	v. un. 42″ 25‴, poſ. 8° 36′ N. f.
		88	III	74	v. v. un. 14″ 38‴, poſ. 47° 33′ N. p.
		25	V	77	v. v. un. 52″ 46‴
28		b	V	79	v. un. 36″ 9‴, poſ. 12° 55′ N. f.
29	14′ foll.	44	I	80	v. v. un. poſ. 26° 32′ N. f.
13		83	IV	85	l. un. 29″ 5‴, poſ. 54° 55′ S. f.
	2′ prec.	75	V	86	treble, neareſt v. un. 54″ 37‴ fartheſt ſmaller.
		57	V	88	v. un. 33″ 16‴
26		ω	I	80	v. min. one behind the other, poſ. 20° 54′ S. f., with 227, no ſuſpicion of its being double; with 932, not quite ſeparated.
27		90	I	72	treble, two neareſt very unequal, poſ. 61° 9′ S. p.
					Leonis Minoris.
		7	V	55	v. v. uneq. 58″ 18‴
					Leporis.
		i	III	102	v. v. un. 12″ 20‴, poſ. 89° 21′ N. p. diff.
					Libræ.
27	near	ε	V	99	eq. 44″ 12‴, poſ. 40° 17′ S. f.
		18	IV	100	v. v. un. 17″ 59‴ poſ. 44° 45′ N. f.
	prec.	o	V	104	v. un. 39″ 59‴
	prec.	28	V	107	p. un. 47″ 46‴
20, 21, & 33		ξ	III		double double, two firſt v. un. 6″ 23‴, poſ. 1° 25′ N. f., two laſt ſm. and obſcure.
					Lyncis.
6 or 22		12	I	30	treble, curious, v. cloſe, 88° 37′ S. p. moſt diſt. 9″ 23‴
	foll.	24	V	30	uneq. 30″ 40‴
	12′ foll. S. 23′	9	II	33	pretty eq. poſ. 11° 0′ S. p.
		19	III	34	uneq. 14″ 11‴, poſ. 46° 54′ S. p.
9		38	I	39	v. un., poſ. 25° 51′ S. p. a very fine object.
	1′ foll.	41	IV	43	v. v. un. 15″ 52‴, poſ. 50° 48′ N. p.
	1′ prec.	43	IV	49	un. 24″ 53‴
32	45″ S. prec.	44	I		v. un. poſ. 8° 27′ S. p.
					Lyræ.
58	foll.	δ	I	53	v. v. un. poſ. 13° N. p. diff.
39		α	V	51	v. v. un. 37″ 13‴, poſ. 26° 46′ S. f.
	foll. 8′	α	III	51	v. v. uneq. 9″ 27‴, poſ. 66° 18′ N. f.

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
2		η	IV		p. un. 25″ 42‴, poſ. 31° 51′ S.
	v. near	η	V		un. 38″ 8‴, poſ. 26° 18′ N. f
5		4 ε	II	50	p. un. poſ. 56° N. f. — in the ſame field, a bea tiful object
6		5 ε	II		n. equal, poſ. 72° 57′ S. f.
	13′ foll.	do.	IV		v. v. un. 19″ 50‴
2		ζ	V	52	p. un. 41″ 58‴, poſ. 62° 18′
	v. near S. 3′	ϱ	II	52	treble.
		θ	VI		1′ 30″
	prec.	i	V	54	v. v. un. 45″ 42‴, another dou ble ſtar a little S. very fai object.
3		β	V		quadruple and variable, diſt. 1ſt and 2d 43″ 57‴, po 60° 28′ S. f.
		ι υ	V	57	treble.
60	foll.	λ	I	58	v. v. un. poſ. 16° 48″ N. p.
59	near β	18	I	54	l. un. poſ. 75° S. p. very fai
40		ν	V		treble, v. v. un. 56″ 47‴, po 28° 27′ S. f.
					Monocerotis.
14	foll.	5	V	96	multiple.
43	do.	do.	III		v. v. un. poſ. 23° 39′ N. p.
10		11	I		treble, curious, firſt larger other two equal; two neare 11° 32′ S. f.
		10			a cluſter round.
44		8	III	85	p. uneq. 12″ 30‴, poſ. 60° 1 N. f.
		12		84	a fine cluſter round it.
		15	III	79	in a cluſter of 30 p. large ſta
	9′ foll.	8	III	85	v. v. un. poſ. 61° 57′ S. p.
	51′ prec.	4	III	101	eq. 11″ 44‴, R. A. 5ʰ 8′
	4′ prec.	σ	III	106	v. v. un. 11″ 16‴, poſ. 22° 2 N. f.
					Ophiuchi.
35		54	III	76	v. v. un. 8″
30		53	V	80	v. un. 32″ 21‴
23	near	11	II	84	p. un. poſ. 46° 24′ N. p.
87		q	I	86	v. minute, p. un. poſ. 2° 4 S. p. diff. requires 460.
		λ	I	87	v. un. poſ. 14° 30′ N. f. ve beautiful.
		19	IV	87	v. un. 20″ 27‴, poſ. 3° 9′ S.
32		61	IV	87	un. 19″ 4‴
		38	I	116	v. un. poſ. 60° 48′ N. p.
4		ρ	II	87	p. un. poſ. 9° 14′ S. p.
88	foll.	τ	I	98	un. 61° 36′ N. p. one behi the other, cloſeſt of all, har ly ſuſpected with 460, quires 932.
19		g	II		p. un. poſ. 82° 10′ S. p.
83		λ	I	87	v. un. poſ. 14° 30′ N. f. wi 932.$\frac{1}{3}$ of S. a cloſe and bea tiful double ſtar.

DOUBLE STARS.

No. in Herſchel's Catalogue.		No. in Flamſtead.	Claſs.	Zone.	
					ORIONIS.
	foll.	72	V	73	40″
	foll.	ο2	V	76	treble, un. 37″. fartheſt v. un.
	foll. 40′	μ	III		
20		52	I	83	uneq. poſ. 69° 41′ S. p.
	6′ foll.	52	IV		equal 18″
25		a	I	84	p. un. poſ. 52° 10′ S. p.
	foll.	76	II		uneq. poſ. 50° 51′ N. f. one foll. do. III.
		m	IV	86	p. un. 26″ 9‴, poſ. 59° 33′ N. f.
22		n	I		p. un. poſ. 61° 23′ N. f. pretty object, eaſily ſeen.
68	near	10	I	88	un. poſ. 84° 54′ S. f.
	foll. 4′	10	III		p. un. 13″ 40‴, poſ. 37° 3′ N. f.
		59	V		v. v. un. 37″ 15‴, poſ. 65° S. f. ſmall ſtar, ſcarcely viſible, not v. diff.
	foll.	31	V	91	v. un. 30″
	do.	do.	V		v. v. un. poſ. 13° 6′ S. p.
10 11		σ	II	92	double treble, or two ſets of treble ſtars, ſimilarly ſituated, pretty.
21		ζ	IV		v. un. 25″, poſ. 83° N. f.
26	near	c	II	94	in a cluſter, v. v. un. poſ. 26° 5′ N. f.
13 14		i	III	95	multiple, two ſets, double treble and treble.
25		τ	V	97	v. un. 30″
33		β	II	98	v. v. un. 6″ 27‴, poſ. 68° 12′ S. p. beſt with ſmall power.
	foll.	e	II		v. un. poſ. 52° 24′ S. f.
		λ	II	80	un. diſt. 5″ 20‴, poſ. 45° 28′ N. f.
1		θ	III	95	quadruple, v. un. teleſcopic trapezium in the nebula, two ſtars prec. diſt. 8″, ſouthern ſtars 12″, two foll. 15″, northern ſtars 20″
12		i	III	95	treble, diſt. of neareſt 12″ 5‴, poſ. 43° 51′ f. diſt. fartheſt 48″ 51‴, poſ. 11° 19′ S. f.
		δ	V	90	v. un. diſt. 52″, poſ. 88° 10′ N. p.
52	N. f.	25	I	88	v. un. poſ. 42° 48′ N. p.
53	10′ prec.	30	I	87	v. un. poſ. 43° 24′ N. f.
54	prec.	τ	I	97	v. un. poſ. 35° 42′ N. p.
57	prec.	70 67	I	74	multiple, in a nebulous ſpot, v. un. poſ. 19° 48′ S. f.
61	near	ω	II	86	treble, v. v. un. ſmall ſtars, mere points.
					PEGASI.
		33	V	70	p. un. diſt. 45″ 3‴, poſ. 89° 12′ N. f.
20		ε	V	71	v. un. 37″ 5‴, poſ. 38° 19′ N. p.
	near	3	II	84	i. un. poſ. 88° 24′ N. p. 3 diam S.
					PÉRSEI.
4	Hevelii	η	IV	34	v. uneq. 26″, poſ. 20° 5′ N. p.
		a	V	39	un. 50″
		ϑ	III	41	v. v. un. 13″ 31‴, poſ. 20° N. p.
	prec.	e	III	49	v. un. 11″ 32‴
	near	9	IV	50	p. un. 21″ 59‴
22		ε	II	50	v. v. un. poſ. 81° 28″ S. f.
		p	III	52	v. v. uneq. 14″ 2‴, poſ. 30° 30′ S. f.
	2′ prec.	ο	II	56	eq. poſ. 8° 24′ N. p.
39		ο	III	56	v. v. un. 14″ 59‴, ſmall ſtar, ſcarcely viſible.
37 38	prec.	ο	III	58	double double ſtar.
		ζ	VI	58	treble.
		χ		33	multiple, an aſtoniſhing number of ſmall ſtars.
					PISCIUM.
		i	II	63	equal, poſ. 30° 57′ N. p.
	1′ prec.	ψ	IV	69	eq 29″, poſ. 68° 21′
9		ψ	IV	69	27″ 5‴, poſ. 80° S. f.
	prec.	103	IV	74	v. un. 15″ 49‴, poſ. 62° 15′ N. f.
	foll.	105	V	74	eq 51″ 16″
		100	IV	78	p. uneq. 15″ 52‴, poſ. 5° N. f.
49	prec.	ο	II	81	uneq. poſ. 59° 6′ N. p. third ſtar in view 1′ 45″
		35	III	82	p. un. 12″ 30‴, poſ. 58° 54′ S. f.
50		38	II	82	p. un. poſ. 25° 3′ S. p.
		51	IV	84	v. un. 24″ 29‴, poſ. 0° 36′ N. f.
		77	IV	86	l. un. 29″ 37‴, poſ. 4° 48′ N. f.
12		α	II	88	p. un. 5″ 7‴, poſ. 67° 23′ N. p.
8		ζ	IV	83	p. un. 22″ 11‴, poſ. 22° 37′ N. f.
		σ	V		v. un. diſt. 48″, poſ. 15° 28′ N. p.
					SAGITTÆ.
30		ζ	II	71	v. un. 37″ 5‴, poſ. 34° 10′ N. p.
65	foll.	α	I	72	v. un 14° N. p. largeſt and moſt ſouthern of a cluſter.
32	foll.	3	II	73	5″ 3‴
	do.	do.	V	73	v. v. un. 32″ 48‴
		χ	IV	73	treble, 23″ 2‴
91	foll.	z	II	73	v. v. un. poſ. 74° 57′ N. f.
	do.	z	II	73	v. un. fartheſt v. v. un.
	foll.	y	V	74	p. un. 38″ 36‴
24		θ	III	79	treble, two neareſt v. un. diſt. 11″ 8‴ diſt. fartheſt 1′ 7″
					SAGITTARII.
	2′ foll.	65	III	103	v. vn. 14″ 20‴, poſ. 73° 48′ N. f.
47	1′ foll.	τ cap.	I	105	minute un. poſ. 84° 48′ N. p. diff.
		μ	V		treble, diſt. neareſt 30″
					SCORPII.
7		β	III	109	v. un. 14″ 23‴, poſ. 64° 51′ N. f.
6		ν	V		v. un. diſt. 38″ 20‴, poſ. 69° 28′ N. p.

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					Serpentis.
82		49	I	75	uneq. poſ. 21° 33′ N. p. v. minute and beautiful.
	foll.	do.	II		v. v. un. poſ. 44° 45′ N. p.
	foll.	39	II	76	v. un. poſ. 53° 9′ S. f.
42		δ	I	78	p. un. poſ. 42° 48′ S. p. beautiful.
6		θ	IV	86	eq. 19″ 23‴
	9′ foll.	a	II	91	v. v. un. poſ. 46° 9′ N. p.
12		d	I	90	v. uneq. poſ. 44° 33′ N. p.
36		β	IV		v. un. 24″, poſ. 3° or 4° S. p.
29		ν	V	102	un. 35″
81	prec.	π	I	66	l. un. poſ. 49° 48′ S. p.
					Tauri.
13		φ	V	63	55″ 36‴
	2′ foll.	11	III	65	v. un. 13″ 37‴, poſ. 89° 51′ N. f.
		7	IV	66	v. un. 19″ 50‴, poſ. 23° 15′ N. f.
		o	V	68	v. v. un. 51″ 34‴, poſ. 77° 54′ S. p.
55	prec.	8	I	71	l. uneq. poſ. 82° 48′ S. f.
	foll.	do.	III	71	equal 7″ 10‴, poſ. 87° 15′
	prec. 1′ S. 10′	ε	II	71	v. v. un. poſ. 68° 42′ S. p.
	foll.	δ	IV	72	v. un. 10″ 31‴, poſ. 25° 45′ N. f.
		117	III		near eq. 12″ 12‴, poſ. 52° 27′ S. f.
	foll.	137	I	75	p. un. poſ. 19° 48′ S. f. in a cluſter of 12 or more nebulous ſtars in finder.
	foll.	48	IV	79	v. v. un.
	7′ prec.	d	IV	80	v. un. 23″ 35‴, poſ. 61° 36′ S. f.
10		χ	IV	64	18″
	prec.	ζ	I	69	the corner of a rhomboid made of this and two more, poſ. 36° 24′ S. p.
		118	II	65	l. un. 4″ 41‴, poſ. 77° 15′
					Trianguli.
42	1′ foll.	δ	III	56	un. 6″ or 7″
40		a	IV	62	un. 17″ or 19‴
					Between the triangle and neck of Taurus one of III. claſs, eq. 11″ 17‴
21		c	I	66	v. un. 60″ N. p.
					Virginis.
	foll. 2′	ξ	IV	80	un. 27″ 28‴, poſ. 56° 30′ S. f.
	10′ foll.	o	IV		v. un. 23″ 21‴, poſ. 15° 54′
		17	IV	83	p. un. 20″ 9‴, poſ. 58° 21′ N. p.
44		o	II	85	v. v. un. poſ. 29° 5′
	14′ foll.	108	I	88	equal poſ. 58° 24′ N. p.
18		γ	III	90	equal 7″ 10‴, poſ. 40° 44′ S. f
	8′ prec.	38	III	92	un. 12″ 58‴, poſ. 79° N. p.
	prec.	45	V	93	v. un. 96″ 42‴
	do.	do.	II	93	v. v. un. poſ. 52° 24′ S. f.
	foll.	i	V	101	un. 41″ 58‴
45		54	II	107	l. un. poſ. 75° N. p.
80		81	I	96	eq. poſ. 41° 12′ N. f. or S. p
					Ursæ.
		σ 2	II	22	v. un. 7″ 56‴, poſ. 13° N. p.
		87	III	24	v. un. 12″ 34‴, poſ. 87° 42 N. p.
	prec.	72	IV	33	un. 19″. poſ. 10° 12′ N. f.
2		ζ	III	33	p. un. 14″ 30‴, poſ. 56° 46 S. f.
73		21	II	35	v. un. poſ. 36° 45′ N. p.
	foll.	κ	I	42	poſ. 41° 21′ S. p. un.
72		65	I	42	v. v. un. poſ. 53° 45′ N. f.; third ſtar near, v. diff.
			III	43	AR 11^{h} 28^{m}, PD 43° 33′ un pretty.
2		ξ	I	57	un. poſ. 53° 47′ S. f. wit $222\frac{2}{3}$ diam. L, a pretty object, not very difficult.
29		h	IV	37	v. un. diſt. 19″ 14‴, poſ. 3° 14 N. p.
		c	V	36	u. un. diſt. 48″ 59″, poſ. 80 47′ S. p.
33	prec.	44	I		l. un. poſ. 2° 6′
					Ursæ Minoris.
1		α	IV	1	v. v. un. 17″ 15″, poſ. 66° 42 S. p.
		19	IV	13	26″ 24‴, poſ. 3° 12′ N. f.

DOUBLE *Superfluous*, or *redundant intervals*, in *Muſic*, are ſuch as are two major commas greater than a true conſonance, as double ſuperfluous THIRD, FIFTH, &c., which ſee.

DOUBLE *Tenaille.* See TENAILLE.

DOUBLE *Time.* See TIME.

DOUBLE *Tongue*, in *Botany*, a name ſometimes given to the butcher's broom. See RUSCUS.

DOUBLE *Tonguing*, on the *German Flute*, is articulating with the tip of the tongue and management of the breath every note of the moſt rapid diviſion. It was ſaid of Dothel Figlio, a celebrated performer on that inſtrument about the middle of the laſt century, that he ſlit his tongue in order to perform this feat better than his neighbours, as the tongues of parrots and magpies have been double pointed to help their articulation, and augment their mechanical prating powers.

DOUBLE *Truſſing*, pieces of wood bolted in pairs, one of a pair on each ſide of the principal rafters.

DOUBLE *Vault.* See VAULT.

DOUBLE *Veſſel*, in *Chemiſtry*, is when the neck of one bolt-head, or mattraſs, is put, and well luted, into the neck of another. Of theſe there are divers kinds and forms uſed in the circulation of ſpirits, in order to their being exalted and refined as high as can be. See CIRCULATION.

DOUBLE *Voucher, recovery with.* See RECOVERY.

DOUBLE *Wheeled Plough.* See PLOUGH.

DOUBLE *Winding Stairs.* See STAIRS.

DOUBLED *Column.* See COLUMN.

DOUBLER *of Electricity*, is an inſtrument capable of augmenting a very ſmall quantity of electricity ſo as render it more than ſufficiently manifeſt by means of an electrometer, or even capable of affording ſparks.

In the year 1787, the Rev. Abraham Bennet announced to the ſcientific world an ingenious contrivance of his, to which he gave the name of *a Doubler of Electricity*, and which he principally uſed for detecting very weak atmoſpherical electricities, in order to form, in an eaſier and more ſatisfactory manner, an electrico-meteorological diary. The deſcription is contained in the ſecond part of the 77th vol. of the Philoſophical Tranſactions for the above-mentioned year, and is as follows:

“ I place,” Mr. Bennet ſays, “ upon my electrometer (*viz.* the gold-leaf electrometer) a circular braſs plate, three or four inches in diameter, poliſhed and thinly varniſhed on the upper ſurface. On this I place another braſs plate, of equal diameter, poliſhed and varniſhed on both ſides, with an inſulating handle attached to one edge of it. A third plate is alſo provided, of equal diameter, poliſhed and varniſhed on the under ſide, and with a perpendicular inſulating handle from the centre of the upper ſide.”

“ The method of collecting electricity from the atmoſphere, and continually doubling it as much as required, is as follows. If the weather be dry, I carry into the open air a lighted torch, not liable to be eaſily blown out, or a ſmall lantern with a lighted candle in it, to the bottom of which is fixed, by means of a ſocket, an inſulating handle of glaſs covered with ſealing-wax; in the other hand is carried a coated phial; then elevating the flame a little higher than my head, I apply to it the knob of the phial, holding it in this ſituation about half a minute. Then returning into the houſe (where the above-deſcribed doubler is kept dry, by being placed on a table not far from the fire) I apply the knob of the phial to the under ſide of the firſt plate, which lies immediately upon the electrometer, and at the ſame time touching the ſecond plate with a finger of the other hand, (ſee *Plate* III. *Electricity, fig.* 18.) Then laying aſide the phial, I lift up the ſecond plate by its inſulating handle, and if the electricity be not now ſenſible by the electrometer, I place the third plate, by means of its inſulating handle, upon the ſecond plate thus elevated: then touching the third plate, by ſtretching a finger over the juncture of its inſulating handle, and again withdrawing the finger (*fig.* 19.) I then again ſeparate the third plate from the ſecond. In this ſituation it will be apparent to electricians that two of the plates are of one kind of electricity, and nearly of equal quantity, and one only of the other. I then apply the third plate to touch the under ſurface of the firſt plate which remains on the electrometer, and at the ſame time covering the firſt plate with the ſecond, (*fig.* 20.) I then touch the ſecond plate by ſtretching a finger over the juncture of its inſulating handle; and firſt taking away the third plate, and then withdrawing my finger from the ſecond, and lifting it up from the firſt plate, the electricity becomes doubled. If by this firſt operation the quantity of electricity does not become ſenſible by the electrometer, I repeat the proceſs to ten or twenty times, which, by doubling it every time, makes viſible the ſmalleſt conceivable quantity of electricity, ſince at the twentieth operation it is augmented to above 500,000 times. And though in deſcription the above proceſs of doubling to twenty times may appear tedious, yet when the operator can perform it with ſufficient readineſs (which is ſoon acquired) it takes leſs time than 40 ſeconds.”

“ If it be required to produce ſparks, the plates are to be placed upon an inſulating ſtand, without an electrometer, and the proceſs repeated as above till the ſparks appear.”

“ The experiment which proves that the electricity is doubled by each operation is this. If the two ſlips of pendulous leaf-gold of the electrometer be made to diverge to a certain diſtance by the above proceſs, that diſtance will be nearly doubled by repeating the operation. Another proof of this duplicate accumulation is, that, when the third plate is applied to the firſt, the divergency of the leaf-gold is apparently undiminiſhed, though in this ſituation their electricity is diffuſed over double the quantity of ſurface.”

“ It is obvious that ſome caution is neceſſary in managing experiments of ſo much nicety, ſince, by the leaſt friction of the hand on the varniſhed ſides of the plates or inſulating handles, or if the metallic ſide of one plate be accidentally rubbed againſt the varniſhed ſide of the other, ſome degree of electricity is produced, which, becoming ſenſible by the operation of doubling, may render the experiment equivocal.”

“ To obviate theſe inconveniences, I join a conducting handle, by means of an inſulating nut, to each of the plates. This handle conſiſts of turned unbaked mahogany, about three inches long, into one end of which is inſerted a nut of baked wood, about half an inch long, covered with ſealing-wax, upon the other end of which nut the braſs ſocket of the plate is fixed; by this means it is not neceſſary to touch the ſealing-wax of the inſulating nut, but occaſionally to ſtretch a finger over it to touch the plate, whilſt the mahogany handle is held in the ſame hand.”

“ Having found, by repeated experiments, that two clean metallic plates, or two equally varniſhed plates, rubbed together, produce no electricity, I varniſhed the ſecond plate on both ſides, but more thinly than when one ſide only was varniſhed, and in ſome experiments uſed thimbles on the ends of the touching fingers. In this way the inconveniences of accidental friction were in ſome meaſure obviated, but much leſs than I firſt expected; for, notwithſtanding the utmoſt care, electricity is produced without previous communication: therefore, in experiments requiring the electricity to be often doubled, its communication may yet be aſcertained by applying it to the firſt and ſecond plates alternately; ſo that poſitive electricity communicated to the firſt plate appears poſitive by the electrometer; but the ſame electricity, applied to the ſecond plate whilſt the firſt is touched, produces negative in the electrometer.”

It appears from the laſt paragraph, that Mr. Bennet was ſenſible of his doubler being capable of ſhewing an electric power when no electricity had been communicated to it; yet he flattered himſelf that the inſtrument might be uſefully employed for detecting very minute quantities of electricity, and ſuch indeed as could not be perceived by means of any other inſtrument known at that time. The account of this inſtrument was no ſooner read at the Royal Society, than the uſe of it was adopted by various able philoſophers, and eſpecially by Mr. Cavallo, who gave a full account of his experiments and obſervations relative to this inſtrument to the Royal Society. (See the Phil. Tranſ. for the year 1788, P. 1.) As theſe experiments and obſervations, beſides a thorough examination of Mr. Bennet's doubler, explain ſeveral intereſting particulars concerning the nature of ſimilar inſtruments, as well as of the natural diſperſion of the electric fluid, we ſhall now ſubjoin the account of the moſt uſeful part in Mr. Cavallo's own words.

“ As ſoon,” he ſays, “ as I underſtood the principle of this contrivance, I haſtened to conſtruct ſuch an apparatus, in order to try ſeveral experiments of a very delicate nature, eſpecially on animal and vegetable bodies, which could not have been attempted before, for want of a method of aſcertaining exceedingly ſmall quantities of electricity; but after a great deal of trouble, and many experiments, I was at laſt forced to conclude, that the doubler of electricity is not an inſtrument to be depended upon, for this principal reaſon, *viz.* becauſe it multiplies not only the electricity which is willingly communicated to it from the ſubſtance in queſtion; but it multiplies alſo that electricity which, in the courſe of the operation, is almoſt unavoidably produced by accidental friction, or that quantity of electricity, however ſmall it may be, which adheres to the plates in ſpite of every care and precaution."

"Having found, that with a doubler conſtructed in the above-deſcribed manner, after doubling 20 or 30 times, it always became ſtrongly electrified, though no electricity had been communicated to it before the operation, and though every endeavour of depriving it of any adhering electricity had been practiſed; I naturally attributed that electricity, which appeared after repeatedly doubling, to ſome friction given to the varniſh of the plates in the courſe of the operation. In order to avoid entirely this ſource of miſtake, or at leaſt of ſuſpicion, I conſtructed three plates without the leaſt varniſh, and which, of courſe, could not touch each other, but were to ſtand only within about one-eighth of an inch of each other. To effect this, each plate ſtood vertical, and was ſupported by two glaſs ſticks, which were covered with ſealing-wax. A B, *figs.* 21 and 22, is a wooden pedeſtal $7\frac{1}{4}$ inches long, $2\frac{1}{2}$ broad, and $1\frac{1}{4}$ inch thick; C and D are the two glaſs ſticks cemented into the ſtand or pedeſtal A B, and likewiſe into the piece of wood E, which is faſtened to the back of the plate. The plate itſelf is of ſtrong tin, and meaſures about eight inches in diameter. The ſtand A B projects very little before the plate, by which means, when two of thoſe plates are placed upon a table facing each other, the wooden ſtands ſtill prevent their coming into actual contact, as may be clearly perceived in *fig.* 23."

"I need not deſcribe the manner of doubling with thoſe plates, the operation being eſſentially the ſame as when the plates are conſtructed according to Mr. Bennet's original plan, excepting that inſtead of placing them one upon the other, mine are placed facing each other, and in performing the operation they are laid hold of by the wooden ſtand A B; ſo that no friction, &c. can take place."

"Having conſtructed thoſe plates, I thought that I might proceed to perform the intended experiments without any farther obſtruction; but in this I found myſelf quite miſtaken: for on trying to multiply with thoſe new plates, and when no electricity had been previouſly communicated to any of them, I found that after doubling 10 or 15, or at moſt, 20 times, they became ſo full of electricity as to afford even ſparks. All my endeavours to deprive them of electricity proved ineffectual. Neither expoſing them, and eſpecially their glaſs ſticks to the flame of burning paper, nor breathing upon them repeatedly, nor leaving them untouched for ſeveral days, and even for a whole month, during which time the plates remained connected with the ground by means of good conductors, nor any other precaution I could think of, was found capable of depriving them of every veſtige of electricity; ſo that they might ſhew none after doubling 10, or 15, or at moſt 20 times."

"The electricity produced by them was not always of the ſame ſort; for ſometimes it was negative for two or three days together; at other times it was poſitive for two or three days more; and it often changed in every operation. In ſhort, the electricity which was produced by the plates was of a fluctuating nature, even when, inſtead of touching the plates with the finger, they had been touched with a wire, which was connected with the ground, and which I managed by means of an inſulating handle."

"At laſt, after a great variety of experiments, which it is unneceſſary to deſcribe, I became fully convinced that thoſe plates did always retain a ſmall quantity of electricity, perhaps of that ſort with which they had been laſt electrified, and of which it was impoſſible to deprive them. The various quality of the electricity produced was owing to this, *viz.* that as one of thoſe plates was poſſeſſed of a ſmall quantity of poſitive electricity, and another was poſſeſſed of the negative electricity, that plate which happened to be the moſt powerful, occaſioned a contrary electricity in the other plate, and finally produced an accumulation of that particular ſort of electricity."

"As thoſe plates, after doubling only four or five times, ſhew no ſigns of electricity, none having been communicated to them before, I imagined that they might be uſeful ſo far only, *viz.* that when a ſmall quantity of electricity is communicated to any of them in the courſe of ſome experiment, one might double it with ſafety four or five times, which would even be of advantage in various caſes; but in this alſo my expectations were diſappointed. Having obſerved, after many experiments, that, *ceteris paribus*, when I began from a certain plate, for inſtance, A, the electricity which reſulted was generally poſitive; and when I began from another plate B, *viz.* conſidered this plate B as the firſt plate, the reſulting electricity was generally negative: I communicated ſome negative electricity to the plate A, with a view of deſtroying its inherent poſitive electricity. This plate A being now electrified negatively, but ſo weakly as juſt to affect an electrometer, I began doubling; but after having doubled three or four times, I found, by the help of an electrometer, that the communicated negative electricity in the plate was diminiſhed inſtead of being increaſed; ſo that ſometimes it vaniſhed entirely, though by continuing the operation it often began to increaſe again, after a certain period. This ſhews, that the quantity of electricity, which, however ſmall it may be, remains in a manner faſtened to the plates, will help either to increaſe or to diminiſh the accumulation of the communicated electricity, according as it happens to be of the ſame, or of a different nature."

"After all the above-mentioned experiments made with thoſe doubling-plates, we may come to the following concluſion, *viz.* that the invention of the doubler is very ingenious, but its uſe is by no means to be depended upon."

The obſtinate adheſion of electricity to the plates of the doubler, induced Mr. Cavallo to inquire into the electrical equilibrium of ſuch bodies as are ſaid not to be electrified, and from the experiments and computations, which are ſtated at large in the ſame above-mentioned paper, he was led to conclude, that, ſtrictly ſpeaking, every ſubſtance is always electrified, *viz.* that every ſubſtance, and even the various parts of the ſame body, are not exactly poſſeſſed of their proportionate ſhare of electric fluid; for though when much condenſed, the electric fluid eaſily paſſes from thoſe bodies which are overcharged to thoſe which are undercharged; yet when its denſity is inconſiderable, its paſſage from one body to another, or even from one part to another of the ſame body, is extremely difficult.

Mr. Bennet's original doubler not being eaſily managed on account of the three ſeparate plates, which was alſo the caſe with Mr. Cavallo's vertical plates, and the remarkable effect of the inſtrument ſtill appearing capable of uſe, ſeveral perſons endeavoured to ſimplify the conſtruction, and the management of it. A doubler was made with vertical plates, which ſtood upon an horizontal frame, and ſome of which moved backwards and forwards by means of a rack and pinion, which was moved by means of a handle; but a moſt excellent conſtruction was invented by Mr. Nicholſon, and is deſcribed in the ſecond part of the volume of the Phil. Tranſ. for the year 1788. He calls it "an inſtrument, which, by the turning of a winch, produces the two ſtates of electricity without friction or communication with the earth."

earth." But, in fact, it is a revolving doubler, in which Mr. Cavallo's improvement of placing the plates not in contact with each other, is adopted; and whoſe parts are diſpoſed ſo as to effect the neceſſary communications without any farther interference of the operator, beſides his merely turning a winch. The deſcription of this curious machine is as follows:

Fig. 24, Mr. Nicholſon ſays, repreſents the apparatus ſupported on a glaſs pillar $6\frac{1}{2}$ inches long. It conſiſts of the following parts. Two fixed plates of braſs, A and C, are ſeparately inſulated and diſpoſed in the ſame plane, ſo that a revolving plate B may paſs very near them, without touching. Each of theſe plates is two inches in diameter; and they have adjuſting pieces behind, which ſerve to place them accurately in the required poſition. D is a braſs ball, likewiſe of two inches diameter, fixed on the extremity of an axis that carries the plate B. Beſides the more eſſential purpoſe this ball is intended to anſwer, it is ſo loaded within on one ſide, that it ſerves as a counterpoiſe to the revolving plate, and enables the axis to remain at reſt in any poſition. The other parts may be diſtinctly ſeen in *fig.* 25. The ſhaded parts repreſent metal, and the white repreſent varniſhed glaſs. O N is a braſs axis, paſſing through the piece M, which laſt ſuſtains the plates A and C. At one extremity is the ball D, already mentioned: and the other is prolonged by the addition of a glaſs ſtick, which ſuſtains the handle L and the piece G H ſeparately inſulated. E, F, are pins riſing out of the fixed plates A and C, at unequal diſtances from the axis. The croſs-piece G H, and the piece K, lie in one plane, and have their ends armed with ſmall pieces of harpſichord-wire, that they may perfectly touch the pins E, F, in certain points of the revolution. There is likewiſe a pin I, in the piece M, which intercepts a ſmall wire proceeding from the revolving plate B.

"The touching wires are ſo adjuſted, by bending, that when the revolving plate B is immediately oppoſite to the fixed plate A, the croſs-piece G H connects the two fixed plates, at the ſame time that the wire and pin at I form a communication between the revolving plate and the ball. On the other hand, when the revolving plate is immediately oppoſite the fixed plate C, the ball becomes connected with this laſt plate, by the touching of the piece K againſt F; the two plates, A and B, having then no connection with any part of the apparatus. In every other poſition the three plates and the ball will be perfectly unconnected with each other."

"Mr. Cavallo's diſcovery, ſo well explained in the laſt Bakerian lecture, that the minute differences of electrization in bodies, whether occaſioned by art or nature, cannot be completely deſtroyed in any definite time, may be applied to explain the action of the preſent inſtrument. When the plates A and B are oppoſite each other, the two fixed plates A and C may be conſidered as one maſs; and the revolving plate B, together with the ball D, will conſtitute another maſs. All the experiments yet made concur to prove, that theſe two maſſes will not poſſeſs the ſame electric ſtate; but that with reſpect to each other, their electricities will be plus and minus. Theſe ſtates would be ſimple and without any compenſation, if the maſſes were remote from each other; but as that is not the caſe, a part of the redundant electricity will take the form of a change in the oppoſed plates A and B. From other experiments I find that the effect of the compenſation on plates oppoſed to each other, at the diſtance of one fortieth part of an inch, is ſuch that they require, to produce a given intenſity, at leaſt one hundred times the quantity of electricity that would have produced it in either, ſingly and apart. The redundant electricities in the maſſes under conſideration will therefore be unequally diſtributed: the plate A will have about 99 parts, and the plate C one; and, for the ſame reaſon, the revolving plate B will have 99 parts of the oppoſite electricity, and the ball D one. The rotation, by deſtroying the contacts, preſerves this unequal diſtribution, and carries B from A to C, at the ſame time that the tail K connects the ball with the plate C. In this ſituation, the electricity in B acts upon that in C, and produces the contrary ſtate, by virtue of the communication between C and the ball; which laſt muſt therefore acquire an electricity of the ſame kind with that of the revolving plate. But the rotation again deſtroys the contact, and reſtores B to its firſt ſituation oppoſite A. Here, if we attend to the effect of the whole revolution, we ſhall find that the electric ſtates of the reſpective maſſes have been greatly increaſed: for the 99 parts in A and in B remain, and the one part of electricity in C has been increaſed ſo as nearly to compenſate 99 parts of the oppoſite electricity in the revolving plate B, while the communication produced an equal mutation in the electricity of the ball. A ſecond rotation will, of courſe, produce a proportional augmentation of theſe increaſed quantities; and a continuance of turning will ſoon bring the intenſities to their maximum, which is limited by an exploſion between the plates."

"If one of the parts be connected with an electrometer, more eſpecially that of Bennet, theſe effects will be very clearly ſeen. The ſpark is uſually produced by a number of turns between 11 and 20; and the electrometer is ſenſibly acted upon by ſtill fewer. When one of the parts is occaſionally connected with the earth, or when the adjuſtment of the plates is altered, there are ſome variations in the effects, not difficult to be reduced to the general principles, but ſufficiently curious to excite the meditations of perſons he moſt experienced in this branch of natural philoſophy."

"If the ball be connected with the lower part of Bennet's electrometer, and the plate A with the upper part, and any weak electricity be communicated to the electrometer, while the poſition of the apparatus is ſuch that the croſs-piece G H touches the two pins; a very few turns will render it perceptible. But here, as well as in the common doubler, the effect is rendered uncertain by the condition, that the communicated electricity muſt be ſtrong enough to deſtroy and predominate over any other electricity the plates may poſſeſs. I ſcarcely need obſerve, that if this difficulty ſhould be hereafter removed, the inſtrument will have great advantages as a multiplier of electricity in the facility of its uſe, the very ſpeedy manner of its operation, and the unequivocal nature of its reſults."

If this remarkable machine be not uſeful for aſcertaining any ſmall quantities of electricity in various caſes, ſurely it may be applied to other uſes. Mr. Read of Knightſbridge, in his "Summary View of the ſpontaneous Electricity of the Earth and Atmoſphere," ſays, "Query, would not a doubler of electricity, properly mounted with large braſs plates, anſwer all the purpoſes of the moſt powerful electrical machines? I think I can conceive how it may be done. It will no doubt be difficult to make the revolving plate gradually recede in proportion as the charge advances."

It is remarkable that notwithſtanding this hint, and the very promiſing appearance of ſucceſs; no philoſophical inſtrument-maker has, as yet, been induced to attempt the conſtruction.

We ſhall, laſtly, barely mention, that the doubler of electricity has likewiſe been conſtructed under other forms ſomewhat different from, but not ſuperior to, the above. A contrivance has alſo been made for applying the doubler to the pendulum of a clock, *viz.* ſo that the bob of the pendulum rod of a clock, in the form of a flat plate, might, in the courſe of the vibrations, perform the office of the revolving plate of a doubler; but ſuch conſtruction would be capable of a very inconſiderable effect, at the ſame time that it would diſturb the regular vibrations of the pendulum.

DOUBLES, in our *Statutes*, ſignify as much as letters patent, being a French word made of the Latin *diploma*. Anno 14 Hen. VI. cap. 6.

DOUBLETS, among *Lapidaries*, denote cryſtals wrought into ſuch a form, and ſo coloured, that the ſurfaces of two pieces thus coloured being laid together, might produce the ſame effect as if the whole ſubſtance of the cryſtal had been tinged. For this purpoſe, two plates of cryſtal muſt be cut in the manner of a brilliant, and fitted ſo exactly, that no diviſion can appear when they are laid together. The upper part muſt be poliſhed ready for ſetting, and then the colours may be put between them by the following proceſs; take of Venice, or Cyprus turpentine, two ſcruples, and add to it one ſcruple of the grains of pure maſtic powdered. Melt them together in a ſilver or braſs ſpoon, ladle, or other veſſel, and mix with them any of the coloured ſubſtance propoſed, well powdered. Warm the doublets to the ſame degree of heat with the mixture, and paint the upper ſurface of the lower part, and put the upper one inſtantly upon it, preſſing them evenly together. When the cement is quite cold, ſcrape the edges, and let the doublets be ſkilfully ſet, by carrying the mounting over the joint, ſo that the two pieces may be well ſecured from ſeparating. The colour of the ruby may be imitated, by mixing a fourth part of carmine with fine crimſon lake; the ſapphire and amethyſt may be counterfeited by mixing very bright Pruſſian blue, with a ſmall quantity of crimſon lake; the emerald may be imitated by diſtilled verdigriſe, with a little powdered aloes; the garnet may be counterfeited by dragon's blood, the brightneſs of which may be improved by the addition of a ſmall quantity of carmine; the yellow topazes may be imitated by mixing the powdered aloes with a little dragon's blood. Glaſs may be alſo prepared in the ſame manner.

Doublets may be eaſily diſtinguiſhed, by holding them betwixt the eye and the light, in ſuch poſition, that the light may paſs through the upper part and corner of the ſtone; which will then ſhew ſuch parts to be white, and that there is no colour in the body of the ſtone. Handmaid to the Arts, vol. ii. p. 328, &c.

DOUBLETTE, in *Muſic*, the principal, or octave ſtop in French organs.

DOUBLINGS, in *Heraldry*, the lining of robes, or mantles of ſtate; or of the mantlings in atchievements.

Doubling, in a *Military Senſe*, is the putting of two ranks, or files of ſoldiers, into one.

When the word of command is, "double your ranks," then the ſecond, fourth, and ſixth ranks are to march up into the firſt, third, and fifth; ſo that of ſix ranks they make but three, leaving double the interval there was between them before. But it is not ſo when they "double the half files," becauſe then three ranks ſtand together, and the three others came up to double them; that is, the firſt, ſecond, and third are doubled by the fourth, fifth, and ſixth; or on the contrary.

"Double your files," directs each to march to that next to it on the right or left, according to the word of command; in which caſe the ſix ranks are turned into twelve, the men ſtanding twelve deep; the diſtance between the files being now double of what it was before.

Doubling *a Cape or Point*, in *Navigation*, ſignifies the coming up with it, paſſing by it, and leaving it behind the ſhip.

The Portugueſe pretend to be the firſt that ever doubled the Cape of Good Hope, under their admiral Vaſquez de Gama; but we have accounts in hiſtory, particularly in Herodotus, of the Egyptians, Carthaginians, &c. having done the ſame long before them.

Doubling *nails*, among *Shipwrights*, are the nails commonly uſed to faſten the lining of the gun-ports, &c.

Doubling-*upon*, in a *Naval Engagement*, is the art of incloſing any part of a hoſtile fleet between two fires, or of cannonading it on both ſides. It is uſually performed by the van or rear of that fleet which is ſuperior in number taking the advantage of the wind; or of its ſituation, and tacking, or veering round the van or rear of the enemy, who are thereby expoſed to great danger, and can ſcarcely avoid being thrown into a general confuſion.

DOUBLON, Dubloon, a Spaniſh and Portugueſe coin, being the double of a piſtole. See Pistole and Coin.

There are alſo double dubloons formerly current among us for three pounds twelve ſhillings.

DOUBS, *the department of the*, in *Geography*, is the third department of the fourth, or eaſtern region of France. It derives its name from the river Doubs, by which it is nearly encircled, and was formerly part of the province of Franche Comté. Beſançon is its chief place.

The department of the Doubs is bounded to the north by the department of the Upper Rhine; to the eaſt, and ſouth-eaſt, by the Helvetian republic; to the ſouth-weſt, by the department of the Jura, and to the north-weſt, by that of the Upper Saône. Its principal rivers are the Doubs, the Louve, the Oignon, and the Deſouvre. The ſurface is diverſified by hills and plains, which produce wheat, oats, and wine. Towards Switzerland it is bounded by lofty mountains, covered with a few dwarf trees, and yielding but a very ſcanty paſture. In the interior there are ſome fine extenſive foreſts, iron and coal mines, quarries of marble, jaſper, agate, and free ſtone, and abundance of turf. It has ſeveral extenſive marſhes, which want draining, chiefly near Beſançon, Ruffey, Morteau, Pontarlier, and Saint Marie.

The territorial extent of the department of the Doubs is 1,040,381 arpens, or 5309½ ſquare kiliometres, equal to about 251 ſquare leagues. Its foreſts cover a ſurface of 244,864 arpens. Its population amounts to 227,075 individuals, or 908 inhabitants to the ſquare league. It contributes annually to the expences of the ſtate 1,886,833 livres, which averages 8 livres 31 centimes, or about 7 *s.* ſterling, for each individual.

The department of the Doubs is divided into four diſtricts, Beſançon, Baume, St. Hypolite, and Pontarlier, 25 cantons and 605 communes. It has ſeveral manufactures, of which thoſe of caſt iron, hardware, pins, cutlery and watches are the principal. (Herbin. Statiſtique de la France.)

Doubs, *the*, is a river of France, which gives its name to the third of its eaſtern departments. It has its ſource in the mountains called Jura, near Mouthe, to the ſouth of Pontarlier, flows round the Jura, divides the department to which it gives its name from the Helvetian republic, paſſes by Saint Hypolite and Montbeliars, runs to the weſt of Baumes, Beſançon, and Dole, and after having taken up the Louve, falls into the Saône near Verdun, in the department of Saône and Loire. Its courſe is remarkable both for its ſingularity, and for its length, which is about 180 Engliſh miles, or more than 300 kiliometres. It abounds in fiſh, eſpecially carp of an excellent kind.

The river Doubs is not navigable; but there are ſeveral projects to render it ſo, and to form canals by which it is to communicate with the Rhine, the Saône, and the Rhône. It frequently overflows its banks.

DOUBTFUL Island, an iſland in the ſouthern Pacific ocean, diſcovered by M. Bougainville and ſeen by captain Cook, in his ſecond voyage, Auguſt 1773. S. lat. 17° 20′. W. long. 141° 38′.

Doubtful *Harbour*, a bay on the W. coaſt of the ſouthernmoſt iſland of New Zealand, in the ſouth Pacific ocean. S. lat. 45° 6′. W. long. 168° 5′.

DOUBTING, the act of with-holding a full aſſent from any propoſition; on ſuſpicion, that we are not thoroughly appriſed of the merits thereof; or from our not being able peremptorily to decide between the reaſons for, and againſt it.

The Sceptics and Academics doubt of every thing; the character of their philoſophy is, not to allow any thing for truth; but to with-hold the aſſent, and keep the mind free, and in ſuſpence. See Sceptics.

The Epicureans truſt their ſenſes, and doubt of their reaſon; their leading principle is, that our ſenſes always tell truth; that they are the firſt and only criterions of truth; and that if you go ever ſo little from them, you come within the proper province of doubting.

The Carteſians, on the contrary, of all things bid us doubt our ſenſes; they are perpetually inculcating the deceitfulneſs of our ſenſes; and tell us, that we are to doubt of every one of their reports, till they have been examined, and confirmed by reaſon. See Cartesians.

Doubting, in *Rhetoric*, a figure wherein the orator appears ſome time fluctuating, and undetermined what to do, or ſay. See Aporia and Diaporesis.

Tacitus furniſhes us with an inſtance of doubting, almoſt to a degree of diſtraction, in thoſe words of Tiberius, written to the ſenate: "Quid ſcribam, P. S. aut quomodo ſcribam, aut quid omnino non ſcribam hoc tempore, dii me deæque pejus perdant quam perire quotidie ſentio, ſi ſcio."

DOUBTLESS Bay, in *Geography*, a deep bay of New Zealand, 7 leagues to the weſtward of the Cavalles iſlands, running in to the land S.W. by W. and W.S.W.; the entrance being formed by two points, which lie W.N.W. and E.S.E.; 5 miles diſtant from each other. S. lat. 34° 47′. W. long, 186° 21′.

DOUC, in *Zoology*. See Simia *Nemæus*.

DOUCETS, or Doulcets, among *Sportſmen*, denote the teſtes of a deer or ſtag. Dict. Ruſt.

DOUCINE, in *Architecture*, a moulding, or ornament, on the higheſt part of the corniche, in form of a wave, half convex, and half concave.

The doucine is the ſame with a cymatium, or gula. See Cymatium, and Gula *recta*, and *inverſa*.

DOUDEVILLE, in *Geography*, a ſmall town of France, in the department of the Lower Seine, chief place of a canton, in the diſtrict of Yvetot; 27 miles N.W. of Rouen, and 12 miles S. of St. Valéry. The number of its inhabitants is 2929; thoſe of the canton amount to 11,797, diſperſed in 20 communes, on a territorial extent of 85 kiliometres.

DOUDYNS, or Dodvens, William, in *Biography*, a painter of hiſtory, was born at the Hague in 1630; and having acquired a competent knowledge of drawing and deſign from Alexander Petit, an inconſiderable artiſt, he went to Italy, purſuing the art of painting as an amuſement more than as a profeſſion, becauſe his family was very rich. But his attachment to it increaſing, he at length made it his ſole employment. Having ſpent 12 years at Rome, he returned home, in compliance with the importunate wiſhes of his family; was immediately employed in ſeveral grand works, and was appointed director of the academy in deference to his merit. His manner of deſigning and compoſing his ſubjects was grand; and he was diſtinguiſhed by correctneſs of outline, and elegance of form. His draperies are well caſt, broad, light, and natural, and his pencil is free and firm; ſo that the beſt judges conſidered his pictures as the productions of an Italian invention, taſte, and deſign. He died in 1697. Pilkington.

DOUE, or Doe, in Latin *Theotvaldum*, in *Geography*, an ancient but ſmall town of France, in the department of Maine and Loire, chief place of a canton, in the diſtrict of Saumur, with a population of 1805 individuals; 9 miles S.W. of Saumur, remarkable for the ruins of the palace of the ancient dukes of Aquitaine, for its beautiful fountains, and for a ſtud lately eſtabliſhed by general Harville. Its canton contains an extent of 230 kiliometres, 18 communes, and 10,867 inhabitants.

DOVE, a river of England, in the county of Derby, which runs into the Trent near Burton.

Dove, *Cape*, a cape on the coaſt of Nova Scotia. N. lat. 44° 20′. W. long. 64°.

Dove, in *Mythology*, was an object of reverence, and even of worſhip, in the Eaſtern nations; and more eſpecially in India, Arabia, Syria, and Aſſyria. This reſpect ſhewn to the dove, is traced by Bryant to the deluge; and to the dove which returned to Noah with a leaf of olive, whence it was inferred that the waters of the deep were aſſuaged. To this circumſtance, as he conceives, it was owing that this bird was held in many nations as particularly ſacred. It was looked upon as the peculiar meſſenger of the deity, and an emblem of peace and good fortune; whereas the raven, which diſappointed the hopes repoſed in him, and which never returned, was for the moſt part eſteemed a bird of ill omen. The name of the dove, ſays this learned etymologiſt, among the ancient Amonians, was Iön and Iönah, ſometimes expreſſed Iönas, whence came the Οινας, Oinas, of the Greeks. It was eſteemed an interpreter of the will of the gods to man; and, on that account, in the firſt ages was looked upon as a bird of preſage. Among mariners it was thought to be particularly auſpicious; who, in their voyages, uſed to let a dove or pigeon fly from their ſhips, in order to judge from its movements of the ſucceſs of their voyage. The moſt favourable ſeaſon for ſetting ſail was at the heliacal riſing of the ſeven ſtars, near the head of Taurus; and they, ſays Bryant, are in conſequence of it called Peleiades (Pleiades), or the doves. It was at the time of their appearance that the Argonauts were ſuppoſed to have ſet out upon their expedition. (Theocrit. Idyll. 13. v. 25.) It was thought a fortunate time for navigation in general, as we learn from Ovid (Feſti, l. v. v. 65.) The Argonauts are ſaid, in a time of difficulty and danger, to have made the ſame experiment with a dove, as was ſuppoſed to have been made by Deucalion, and to have formed from it the like fortunate preſage. (Apollon. Rhod. l. ii. v. 328.) From the prophetic bird Iönah and Iönas, the Greeks formed many terms, which related to augury. As the dove was eſteemed the interpreter of the will of the deity, the prieſts and ſoothſayers were from that circumſtance ſtyled Iönah, or doves. And as Theba, in Egypt, was originally the temple of the ark, it is natural to look for prieſts of this denomination in a ſanctuary of that name. Some of theſe are ſuppoſed to have carried the rites of Theba, or the ark, to Libya, and others to Dodona in Epirus, where Deucalion was ſuppoſed to have ſettled. See DODONA. The dove, under its ancient and true name, Iōnah or Iōnas, was almoſt univerſally received as a ſacred emblem; for not only the Mizraim, and the reſt of the line of Ham, ſo eſteemed it, but it was admitted as an hieroglyphic among the Hebrews; and the myſtic dove, ſays Bryant, was regarded as a ſymbol from the days of Noah, by all thoſe who were of the church of God. The prophet who was ſent upon an embaſſy to the Ninevites, is ſtyled Iōnas; a title probably beſtowed upon him as a meſſenger of the deity. The great patriarch who preached righteouſneſs to the antediluvians, is by Beroſus and Abydenus ſtyled Oan and Oannes, which is the ſame name as Ionah. The author of the Apocalypſe is denominated in the like manner; whom the Greeks ſtyle Ιωαννης, Ioannes. And when the great forerunner of our Saviour was to be named, his father induſtriouſly called him Ιωαννης, for the ſame reaſon. John, continues our author, ſignifies a dove, and alſo means an oracular perſon, by whom the voice of the Moſt High is made known, and his will explained. The dove, it is ſaid, was a truly ſacred ſymbol, and ſo acknowledged in the times of the moſt pure worſhip. But the ſons of Ham perverted that which was intended to be only typical, and carried their regard for it to a degree of idolatrous veneration. They inhabited the regions of Chaldæa and Babylonia, where they conſtituted the firſt kingdom upon earth, and whence we obtain the earlieſt account of thoſe rites and myſteries, which prevailed in the Gentile world, in conſequence of the deluge. The dove, or Iōnah, was of courſe a favourite hieroglyphic among the Babylonians and Chaldæans; and from them it was tranſmitted to other nations. It was depicted on their military ſtandard, when they went to war, and hence they ſeem to have been ſtyled Iōnim, or the children of the Dove, and their city Iōnah. (See Jerem. xxv. 38. xlvi. 16. l. 16.) The Cuthites brought with them to Samaria the enſign of their country, and ſhewed a great veneration for the dove. Hence it was reported that the Samaritans worſhipped a dove, and that they had a repreſentation of it on mount Gerizim. (Bochart. vol. iii. c. 1. p. 6.) Hence originated a tradition, that the ſtandard of Semiramis was a dove.

The dove with an olive branch was an emblem of peace; it was a token of the deity to man, aſſuring him of an evil being paſt and of future plenty and happineſs. According to Bryant, Semiramis was an emblem under the figure of a dove, or pigeon; and not a real perſon. (See SEMIRAMIS.) Venus alſo, ſays this writer, was no other than this ancient Iōnah; and accordingly we find in her hiſtory numberleſs circumſtances relating to the Noachic dove and to the deluge. (See VENUS.) For other alluſions we muſt refer to Bryant's Analyſis of Anc. Myth. vol. i.

DOVE, in *Ornithology*. See COLUMBA.

DOVE, *ring*. See COLUMBA *Palumbus*.

DOVE, *turtle*. See COLUMBA *Turtur*.

DOVE, *ſea-turtle*, or *Greenland-dove*. See COLYMBUS *Grylle* and ALCA *Alce*.

DOVE, *order of the*, or of *the Holy Ghoſt*, an order inſtituted in Spain, according to ſome writers, in the year 1379, by John I. king of Caſtle, or, as others ſay, by his ſon Henry, in the year 1399; but whenever it was inſtituted, it ſoon fell into decay. The badge of the order was "a dove diſplayed argent, on rays of gold," pendant to a collar of two chains of gold.

DOVE *cots*. See PIGEON *houſe*.

DOVE'S *foot*, in *Botany*. See GERANIUM.

DOVE-*tail piles*, or *plank-piles*, in *Carpentry*, piles of wood with grooves in their ſides to receive tongúes or ſlips of wood after they are driven cloſe together, to prevent water from paſſing. See *Plate* IV. *Canals*, *fig*. 30.

DOVE *tailing*, a method of toothing two pieces of wood together, by cutting the ends of both pieces into notches, ſo that the projecting parts of the one piece are adapted to the hollows of the other, and that the piece which contains the projecting parts can only be drawn in one direction out of the other, or that only one of the pieces can be drawn out.

Dove-tailing is of three kinds. The moſt common ſhews the ends of the teeth in the form of trapezoids, or in the form of the tail of a dove, whence the name dove-tailing ſeems to be derived. On the other ſide, which contains the angle, the teeth or projecting parts, or indeed the whole joinings, appear as rectangles. The ſecond is called lap dove-tailing, which conceals the dove-tails, but ſhews a ſtraight joint parallel to the angle, and a part of the thickneſs of the ends of one of the pieces. The third is called mitre dove-tailing; this not only conceals the dove-tails but the joint alſo, which is only in the angle of the two planes. The firſt kind is the ſtrongeſt, but the laſt is the moſt beautiful. The firſt mode is employed in all work where ſtrength is more regarded than beauty, and the laſt mode where beauty and ſtrength are both neceſſary.

DOVEIN, in *Geography*, a town of Egypt; 7 miles S.S.E. of Siût.

DOVELLA, in *Ichthyology*, a name given by the Maſſilians to the fiſh called the donzellina by the Italians: it is the julia, or julis, of authors; and according to the Artedian ſyſtem, it is a ſpecies of the labrus. That author diſtinguiſhes it by the name of the labrus of variegated colours, with two large teeth in the upper jaw. See LABRUS.

DOVER, in *Geography*, a ſea-port, cinque-port, and market-town of Kent, England, is a place of conſiderable note in the hiſtorical annals of Great Britain. It is ſeated in a valley, nearly ſurrounded by lofty chalk hills, and is the neareſt Engliſh ſea-port to the coaſt of France, being only 7½ Engliſh leagues from the ſhore of that empire. The port, caſtle, fortifications, and white-cliffs of Dover, are objects of much importance; have each afforded a theme for poetic and hiſtoric narrative; and will therefore demand from us a more circumſtantial deſcription than we uſually appropriate to topographical articles. The contiguity of this place to the continent muſt have rendered it important as a port, or harbour, at the earlieſt period of commercial, or warlike intercourſe between this iſland and the main land: but all attempts at identifying the time when, or perſons by whom, the ſtation was firſt occupied, muſt be nugatory. That the ancient Britons poſſeſſed it as a military poſt anterior to the Roman conqueſt is extremely probable: and that the Romans fortified and adapted it to their ſyſtem of tactics is admitted by the moſt authentic and diſcriminating writers. Various relics and veſtiges of this have been diſcovered here; ſome of which have remained till a late period. Mr. King, in his Munimenta Antiqua, vol. ii. repeats and ſanctions the old tradition, that "Arviragus, the Britiſh chief, here fortified himſelf, when he refuſed to pay the tribute impoſed by Julius Cæſar; and that here, afterwards, king Arthur alſo held his reſidence." Darrell, in his "Hiſtory of Dover Caſtle," has given currency to another tradition, which aſſigns the foundation of this fortreſs to Cæſar himſelf: and Lambard quotes Lidgate and Roſſe, as ſaying, that "they of the caſtle kept till this day certeine veſſels of olde wine and ſalte, which they affirme, to be the remayne of ſuche proviſion as he" (Cæſar) "brought into it." From what we know, however, of Cæſar's operations in this country, as detailed in his own commentaries, the aſſumed fact may be conſidered as wholly devoid of truth; though the ancient Pharos, which ſtill remains on the upper part of the Caſtle hill, furniſhes unqueſtionable evidence of Roman workmanſhip; and as the importance of this ſituation muſt have pointed it out as an object of primary regard, there is ſtrong preſumption that it muſt have been one of the firſt places fortified by the Romans. The outline of the Roman camp may yet be traced, which, in this inſtance, partook of a cuſtomary deviation, according to the nature of the ground, and had more of the oval in its figure than of the parallelogram. The form of the Roman Pharos is octagonal without, but ſquare within: the ſides of the internal ſquare, and each ſide of the external octagon, being about fourteen of our feet, or about fourteen and half Roman feet, in dimenſions: the thickneſs of the wall, in the lower part, is about ten feet. The foundations were laid in a bed of clay, notwithſtanding it is built on a chalk rock; a circumſtance that has alſo been obſerved in other Roman buildings. It has an arched door way, about ſix feet wide on the eaſt ſide: on the other three ſides of the internal ſquare were Roman arches, and narrow ſpaces for windows, about thirteen feet and an half high, and nearly four feet wide: theſe have been much altered in ſubſequent ages, to convert them into loop-holes. The old arches at the top of theſe receſſes were turned with Roman tiles, and with pieces of ſtalactitical concretion cut wedge-ſhaped, about four times the thickneſs of the tiles, and placed alternately with them. The component parts of this Pharos plainly ſhew its age: for it is compoſed (in the uſual Roman ſtyle) of long, thin, irregular bricks; but in the intermediate courſes, both the facing, and great part of the interior ſubſtance of the wall, was filled up, not, as might have been expected, with flints and chalk rubbiſh from the neighbouring country, but with maſſes of hard ſtalactitical incruſtations, cut into blocks of various dimenſions, that could not have been met with nearer than the more northern coaſts on the eaſt ſide of the iſland; and therefore could not have been obtained by any Roman commander prior to Agricola, who firſt circumnavigated Albion. Immediately contiguous to the Roman Pharos, are the ruins of an ancient church, which is generally ſtated to have been built by king Lucius in the ſecond century. The roof is entirely deſtroyed, and the walls much dilapidated. Whatever may be the fact as to a Chriſtian edifice having been founded here at that early period, the remains of the building are certainly of much later date; though, as in St. Martin's church at Canterbury, Roman tiles have been worked up in the walls, particularly of the tower. Theſe remains, with the Pharos, and the foundations of a building, ſuppoſed to have been a Roman bath, which have been ſeveral times laid open in digging graves near the weſt end of St. Mary's church, are all the veſtiges of Roman occupation that are now known in this town.

In the Itinerary of Antoninus, Dover is called *Ad Portum Dubris*. Lambard ſuppoſes its name to have been derived from the Britiſh *Dwfyrrha*, ſignifying a ſteep place; and Camden agrees with him in this derivation. The Saxons called it *Dorfa* and *Dofris*, which in the Domeſday book is ſoftened into *Dovere*. The third Iter of Antoninus proceeds immediately from London to this port, "a Londinio ad Portum Dubris;" mentioning only the intermediate ſtations of Rocheſter and Canterbury: the tract of the old road over Barham Downs can be eaſily traced. It is probable that the Roman town was on the ſouth ſide of the river which flows through the valley into Dover harbour, and that the Watling-ſteet, coming ſtraight from Canterbury over Barham Downs, entered it where Biggin gate formerly ſtood.

The Saxons are ſtated, by Darell, to have made themſelves maſters of Dover at an early period; and ſoon after their converſion to Chriſtianity, the ancient church within the walls of the caſtle is ſaid to have been re-conſecrated by St. Auguſtine, at the requeſt of king Ethelbert, whoſe ſon and ſucceſſor Eadbald founded a college near it for ſecular canons, under the government of a provoſt. In the reign of Edward the Confeſſor, and probably before, the great earl Goodwin was governor of Dover caſtle, and is recorded to have ſtrengthened it by additional works.

The importance of this caſtle was ſo well known to William the Norman, that when he was contriving the conqueſt of England, he refuſed to permit earl Harold to depart from Rouen, 'till he had bound him by a ſolemn oath to deliver up after Edward's death, the *caſtle* of Dover, with the *well of water* in it.

From Domeſday book we learn that "in the time of king Edward, Dovere paid 18*l.*, of which ſum Edward had two parts, and the earl Goodwin the third part of one moiety, and the canons of St. Martin the other. The burgeſſes have furniſhed the king with twenty ſhips once in each year for fifteen days, and in each ſhip were twenty-one men; this they had done becauſe he had freed them from ſac and ſoc. When the king's meſſengers have come there, they have given for the paſſage of a horſe, *3d.* in winter and *2d.* in ſummer; but the burgeſſes found a ſteerſman, and one other aſſiſtant: if more were neceſſary, they were provided at the expence of the king. Whoever conſtantly reſided in the town, and paid cuſtom to the king, was quit of toll throughout England. All theſe cuſtoms were in uſe there when king William came into England. At his firſt coming, the town itſelf was burnt; and therefore the value of it, when the biſhop of Baieux received it, could not be computed: now it is rated at 40*l.*, though the bailiff renders from thence 54*l.* In Dover are twenty manſions, of which the king has loſt the cuſtom."

At this period, and during ſeveral ſucceeding centuries, Dover caſtle was regarded as the "key and barrier of the whole kingdom." "Clavis et repagulum totius regni," are the words uſed by Matthew Paris; and the propriety of this deſcription may be eaſily ſeen, when it is recollected, that in every civil broil the poſſeſſion of this fortreſs was eagerly ſought by the contending powers. Henry II., on his arrival from Normandy, re-built the keep on the Norman plan, and otherwiſe fortified the caſtle, ſo that its ſtrength was materially increaſed. Lewis, the dauphin, beſieged it when he landed to aſſiſt the diſcontented barons; but was repulſed with great loſs, by Hubert de Burgh, then governor, with a garriſon of only 140 men.

Many alterations were made in the fortifications and apartments of the caſtle by different ſovereigns, previous to the time of the civil war of the 17th century, when it was wreſted from the king by a merchant named Drake, who was a zealous partizan for the parliament, and on the night of Auguſt 1, 1642, took it by ſurprize, with the aid of ten or twelve men only. By the means of ropes and ſcaling ladders, he contrived to lead his party to the top of the cliff on the ſea-ſide, which being conſidered as inacceſſible, was left unguarded. After the terrors of civil commotion had ſubſided, this ſtrong pile was, for upwards of a century, left to moulder into ruins; though on one occaſion, in 1745, barracks had been built here ſufficiently large to contain a regiment of ſoldiers. The effects of the French revolution, however, and the many threats of invaſion thrown out by the ſucceſſive rulers of the French empire, have occaſioned a vaſt alteration in the defences of this coaſt; and government has thought it adviſeable to put Dover caſtle into a ſtate of ſufficient ſtrength, to enable it to withſtand any attempt to carry it by coup-de-main, or any thing ſhort of a continued ſiege.

Dover caſtle, in its *preſent ſtate*, conſiſts of an immenſe congeries of almoſt every kind of fortification which the art of war has contrived to render a fortreſs impregnable; though its conſequence has been materially leſſened ſince the invention, and general uſe of cannon; the eminences to the north-weſt by weſt, and ſouth-weſt, being much higher than the ſite even of the keep itſelf. The buildings occupy nearly the whole ſummit of the high eminence which bounds the ſouth-eaſtern ſide of the deep valley in which Dover is built. In a general way, this caſtle may be deſcribed as conſiſting of two courts, a lower and an upper, defended by deep, broad, and dry ditches, from which communications with the inner towers have been made by well-like ſubterraneous paſſages. The lower court is ſurrounded by an irregular wall, excepting on the ſide next the ſea, where a conſiderable part of the cliff, with the remainder of the wall, was thrown down by an earthquake on the 6th of April, 1680. This wall is called the curtain, and is flanked, at unequal diſtances, by a variety of towers of different ſhapes, ſemi-circular, ſquare, polygonal, &c. Theſe are the workmanſhip of different ages: the oldeſt of them, which is on the eaſtern ſide of the caſtle, is ſaid to have been built by earl Goodwin, and ſtill bears his name; though this, as well as moſt of the others, have been much altered ſince their original erection. Nine of the other towers are ſtated to have been built in the Norman times, and to have derived their names from ſir John de Fiennes, and the eight approved warriors whom he had ſelected to aſſiſt in the defence of this fortreſs. Theſe towers, according to their relative ſituation on the wall, beginning from the cliff on the weſtern ſide, are, 1. The Old, or Canons' tower, which anciently had a drawbridge and battery: 2. A pentagonal tower, originally named after its firſt commander Albrancis, but afterwards Rokeſly tower, from one of its captains: 3. Chilham, or Calderſcot tower, built by Fulbert de Lucy, lord of the manor and caſtle of Chilham: 4. Hurſt: 5. Arſic, or Sayes: and, 6. Gatton towers. Theſe three were named after adjacent manors appropriated to their repairs: 7. Peveril, Beauchamp, or Marſhal's tower, ſo ſucceſſively called after William de Peveril and Hugh de Beauchamp, ancient commanders, and the marſhalmen who had the ſuperintendence of military ſtores, &c.: 8. Port, or Porth's tower, which took its name from William de Porth, and was alſo called Gaſtings, from one of its captains; but now bears the name of Mary's tower, from queen Mary, by whom it was re-built: 9. Fiennes tower, as it was originally named, after ſir John Fiennes, now more generally called New-gate, to diſtinguiſh it from the ancient entrance; and Conſtable's tower, from its having been the occaſional reſidence of the conſtable or governor of the caſtle: 10. Clopton's tower, built by Edward IV., and deriving its name from the lord of a manor aſſigned for its repair; 11. Godsfoe tower, ſo called from an ancient commander: 12. Crevequer's, Craville's, or the earl of Norfolk's tower, a work of great magnificence, which has a ſubterraneous paſſage leading to a vault of vaſt extent, and ſtrongly defended: 13. Fitz-William, or St. John's tower, which derived its former name from Adam Fitz-William, to whom, for his valour at the battle of Haſtings, the conqueror gave the ſcarf from his own arm, and its latter name from lord St. John, who held the lands allotted to it: 14. Averanche's, or Maunſel's tower, a fine remain of Norman workmanſhip, ſo named from Averanche, an ancient commander of this caſtle, and his ſucceſſor Maunſel, who was lord warden of the cinque ports in the reign of Henry III.: 15. Veville, or Pinceſter tower, ſo called from two of its commanders, the latter of whom aſſiſted Hubert de Burgh in the defence of the caſtle againſt the Dauphin: 16. Earl Goodwin's tower, built by that nobleman when governor of the caſtle, in the time of Edward the Confeſſor.

The upper court of the caſtle is, like the lower one, ſurrounded by a ſtrong wall and various towers; and near the centre ſtands the ſpacious keep, erected in the beginning of Henry III.'s reign. This noble building is ſtill in fine preſervation, and is conſtructed on a ſimilar plan to thoſe built by biſhop Gundulph, and particularly to that at Rocheſter. It is now uſed as a magazine, the roof having been rendered bomb-proof for additional ſecurity. On the eaſtern ſide of this court are three towers, which derived their names from Gilbert de Maminot, or Mainmouth, who was one of the knights that accompanied the conqueror to England, and was appointed marſhal of this caſtle by John de Fiennes: theſe towers command the whole vallum and aſcent leading to the principal entrance to this court; near the ſouth angle of which is another entrance, by a gate called Palace, or Subterranean Gate. The new works recently formed for the defence of this important fortreſs conſiſt of different batteries, furniſhed with a very formidable train of artillery, caſemates dug in the ſolid chalk-rock, magazines, covered-ways, and various ſubterranean communications and apartments for ſoldiery: the latter are ſufficiently ſpacious for the accommodation of about two thouſand men, and, with their inhabitants, form a very curious ſpectacle: light and air are conveyed into them by well-like apertures cut in the chalk, and by other openings in the face of the cliffs. A new road has alſo been made, under the direction of the Board of Ordnance, from the town to the top of the hill (where it unites with the Deal road) in a direction to be commanded by the batteries, the old road having become ſo hollow, as rather to protect than obſtruct the approaches of an enemy: a branch from this road turns to the right nearly oppoſite Gatton tower, and enters the caſtle by a new bridge and gate. Near the edge of the cliff ſtands a piece of braſs ordnance, twenty-four feet long, caſt at Utrecht in 1544, and called Queen Elizabeth's Pocket Piſtol, it having been a preſent from the ſtates of Holland to that queen.

This fortreſs occupies about thirty-five acres of ground: the hill on which it ſtands is very ſteep and rugged on the ſide of the town and harbour; and towards the ſea it is a complete precipice of upwards of 320 feet from its baſe on the ſhore. Like other royal caſtles, it was formerly both extra-parochial and extra-judicial; but as ſeveral of the ancient franchiſes are either loſt or diſuſed, the civil power has of late years been exerciſed within its limits, independently of any controul from the lord warden. Since the re-commencement of hoſtilities, in 1803, the heights on the weſtern ſide of Dover have been ſtrongly fortified, agreeably to the modern ſyſtem, and a new military road leading to them made. The other fortifications are Archliff fort, at the extremity of the pier, and Amherſt battery, at the north Pier-head: theſe acting in conjunction with the heights and caſtle, entirely command the road to Dover. During the American war two other forts were erected; North's battery on the Rope Walk, and Townſend's battery on the ſouth Pier-head: theſe have been rendered uſeleſs by inroads of the ſea, and are now wholly decayed, except the guard houſes and magazines.

It is evinced by ſeveral concurrent circumſtances, that, in ancient times, the ſea flowed over the greateſt part of the valley in which Dover is now ſituated, and that the harbour was conſiderably more inland, towards the north-eaſt, than at preſent. At what particular era the ancient haven became

came uſeleſs is not exactly known. From the number of ſhips furniſhed by the burgeſſes of Dover for the king in Edward the Confeſſor's time, as we have already mentioned, it may be conjectured that the harbour was then flouriſhing. Of the preſent harbour, little is recorded till the time of Henry the VIIth, in whoſe fifteenth year, anno 1500, a round tower was built, on its ſouth-weſt ſide, to protect the ſhipping from the violence of the ſouth-weſt winds: to this tower the veſſels were moored by rings; and it is ſaid to have made that part of the haven ſo pleaſant, that it was called *Little Paradiſe.* Conſiderable ſums were alſo expended in this reign on other works; but it was at length found that nothing but the conſtruction of a pier could effectually benefit the harbour. Accordingly, in the next reign, a plan was laid down by ſir John Thompſon, who at that time held the living of St. James in this town, and this being approved by the king, was commenced in 1533, under the direction of Thompſon as chief ſurveyor. The pier was begun at Archcliff, on the ſouth-weſt ſide of the bay, and carried out directly eaſtward into the ſea, to an extent of 131 rods. It was compoſed of two rows of main poſts, and large piles of about 26 feet long, ſhod with iron, and driven into the main chalk, and faſtened together by iron bolts and bands. The bottom was laid with vaſt ſtones, of twenty tons weight, brought from Folkſtone by water, on rafts ſupported by empty caſks; and the whole was filled up with beach-ſtones, chalk, &c. The king himſelf came ſeveral times to Dover, to view the works, and is ſtated by Harris (from the Dering Manuſcripts) to have expended about 80 000*l.* on this pier; yet his abſence at the ſiege of Boulogne, and ſubſequent illneſs and death, prevented its completion. Slight attempts were made in the two following reigns to forward the work, but no effectual advance was made till the time of Elizabeth, to whom a memorial on the ſubject was preſented by ſir Walter Raleigh, who ſtated that "no promontory, town, or haven, in Chriſtendom, is ſo placed by nature and ſituation, both to gratify friends, and annoy enemies as this town of Dover." About this time, the immenſe quantity of beach thrown up by the ſea, had formed a bar acroſs the harbour which totally impeded the paſſage. Several projects were then formed to make a proper channel; and the queen granted the town the free exportation of 30 000 quarters of wheat, 10,000 quarters of barley, and 4000 tons of beer, in aid of the expence; and for the ſame purpoſe, in her twenty-third year, a duty of three-pence *per* ton was laid on every veſſel paſſing this port above twenty tons burthen: this duty produced about 1000*l.* annually. A commiſſion was then iſſued for the repairs and improvements of the harbour; and after ſeveral failures and alterations in the plan, a ſecure haven was at length conſtructed: and its preſervation and repairs have been provided for by ſeveral grants and acts of parliament in the ſeventeenth and eighteenth centuries. The harbour at the preſent time is in a reſpectable condition. Agreeably to the idea of captain Perry, in his report after a ſurvey in 1718, ſeveral jetties have been erected towards the eaſt, to prevent the encroachments of the ſea; and though the ſtrong ſouth-weſt winds ſtill throw up large quantities of beach at the mouth of the harbour, the ſluices have been ſo conſtructed, that, with the aid of the back-water, they generally clear it in one tide. Ships of 400 or 500 tons may now enter in ſafety; the depth at ſpring tides being between eighteen and twenty feet, and at neap tides about fourteen.

Dover was the firſt of the cinque ports incorporated by charter, which was granted by Edward I. who had a mint here; and who, by letters patent in the twenty-ſeventh of his reign, appointed "the table of the exchequer of money" to be held here, and at Yarmouth. Shortly before this, the greateſt part of the town had been burned by the French, though two cardinals from France were then in England to treat of peace. In the 17th of Edward II., as appears from the patent rolls of that year, Dover was divided into twenty-one wards, each of which was charged with one ſhip for the king's uſe, and on that account each had the privilege of a licenſed packet boat, called a Paſſenger, to convey goods and paſſengers from this port to Whitſan in France, which was then a common place of embarkation to this country. In the 10th of Edward III., it was enacted that "all merchants, travellers, and pilgrims, going to the continent, ſhould not go from any other place than Dover;" and the price of conveyance, as regulated in the next reign, was, in ſummer, for a ſingle perſon 6*d.* and for a horſe 1*s.* 6*d.*; and in winter, for a ſingle perſon 1*s.* and for a horſe 2*s.* It is probable that the above law for confining the intercourſe between England and the continent to this port, was not duly obſerved, as, in the 4th of Edward IV., another ſtatute was paſſed, ordaining that none ſhould take ſhipping for Calais but at Dover. This laſt act was repealed 21 James I. In the year 1665 the great plague, which made ſuch dreadful ravage in the metropolis, extended itſelf to this town, and carried off 900 of its inhabitants.

The ancient town of Dover was defended by a ſtrong embattled wall, which included a ſpace of about half a mile ſquare, and in which were ten gates; though not a trace of any now remains, except a part of Cow-gate. The form of the town is ſingular, and from the hills above, it has a moſt intereſting and romantic aſpect. It conſiſts of three long ſtreets, extending in contrary directions, to the eaſt, ſouth-weſt, and north, and meeting at one point in the centre. The town is now divided into the two pariſhes of St. Mary the Virgin, and St. James the Apoſtle: there were formerly ſix, each of which had its diſtinct church; four of theſe edifices have long been deſtroyed, with the exception of ſome parts of thoſe of St. Nicholas and St. Martin-le-Grand. The latter church was founded by king Widred in 691 for ſecular canons: theſe were ſuppreſſed by Henry I., at the inſtigation of archbiſhop Corboyl, who formed a deſign to replace them by a priory of canons regular, the buildings for which he begun, but dying before he completed them, they were finiſhed by his ſucceſſor, Theobald. Great part of the priory buildings ſtill remains: the gateway and refectory are nearly entire; and a portion of the church is yet ſtanding. This priory was, for a long period, called the Newark, to diſtinguiſh it from the ancient foundation from which it ſprung. On the left of the entrance to the town was a *maiſon dieu*, or hoſpital, built and endowed by Hubert de Burgh the great juſticiary of England, about the beginning of the reign of Henry III., who made conſiderable additions to the endowment. After the diſſolution, it was converted by queen Mary into an office for victualling the navy, to which uſe it is ſtill appropriated. In times of war, much buſineſs is done here, this being the only eſtabliſhed office between Portſmouth and Sheerneſs; and all ſhips in the Downs, belonging to the royal navy, are ſupplied hence by veſſels engaged for that purpoſe. They ſail from the Victualling quay, near the old dock, at the bottom of Snargate-ſtreet, where there are ſtorehouſes for the uſe of government, and whence all ſtores are ſhipped. The buildings of this office, though much altered and modernized, evince the maiſon dieu to have been an extenſive and ſplendid eſtabliſhment. Another hoſpital, connected with this town, though ſtanding in the adjoining pariſh of Buckland, was built for lepers at the joint expence of Henry II., and the monks of St. Martin's priory, to whom it was ſubject; not a veſtige of the building is now remaining, though an ancient fair is ſtill kept on the ſpot, on the anniverſary of St. Bartholomew, to whom the hoſpital was dedicated.

Of the two churches in this town, St. Mary's is the principal: this is a ſpacious and curious edifice, in length about 120 feet, in breadth 55, conſiſting of a nave and ailes, with a tower at the weſt end. It is ſaid to have been built by the priory and convent of St. Martin, in the year 1216; yet, as the architecture of the tower, and part of the weſt end, is that of an earlier age, it ſeems probable that this was one of the three churches in Dover, which are recorded in Domeſday book as being ſubject to St. Martin, and of courſe its origin muſt have been prior to the date mentioned. The weſt front is of Norman architecture, as are alſo the three firſt arches and their ſupporting columns on each ſide of the nave. Among the numerous monuments in this church, the moſt obſervable is one to the memory of Philip Eaton, eſq., who died in January, 1769. Two years after the diſſolution, this church, which had previouſly belonged to the maiſon dieu, was given to the pariſhioners by Henry VIII., who was then at Dover; and every houſekeeper, paying ſcot and lot, has now a right to vote in the election of a miniſter. The other church, St. James's, is an irregular ſtructure, and its interior, which is kept particularly neat and clean, diſplays its origin to have been Norman: it has a ſquare tower at the weſt end.

Dover, in its preſent civil juriſdiction, is governed by a mayor, twelve jurats, and thirty-ſix common-councilmen; from the latter of whom a town clerk and chamberlain are annually choſen. The mayor is elected by the reſident freemen, in St. Mary's church, on the eighth of September, the nativity of the Virgin. The two members of parliament are alſo choſen in St. Mary's church by the whole body of freemen, reſident and non-reſident, in number about 1600. Freedom is acquired here by birth, ſervitude, marriage and burgage tenure: the franchiſe obtained by marriage ceaſes at the death of the wife, and that by tenure at the alienation of the freehold. The ancient charter of Dover was ſurrendered to Charles II., and in Auguſt 1684 a new one was granted, according to the general proviſions of which, though the charter itſelf is loſt, the town is now governed.

The trade of Dover is extenſive; and, in times of peace, the general buſineſs is particularly great, this being ſtill the principal place of embarkation for the continent. Previouſly to the preſent war, thirty veſſels, excluſive of packets, were employed in the paſſage to the oppoſite ſhores: they were about ſixty or ſeventy tons burthen each; were fitted up in an elegant manner; and were conſidered as the handſomeſt ſloops in the kingdom. With a favourable wind, they have frequently reached Calais in three hours: the ſhorteſt paſſage ever known was two hours and forty minutes. A "Fellowſhip of Trinity Pilots" was eſtabliſhed here in 1515, under the direction of the court of Load-manage, whoſe buſineſs was to pilot veſſels into the Thames. King William, in 1689, reſtored to the pilots their ancient right of chooſing a maſter and wardens from their own body; and appointed the lord warden and his deputy, the mayors of Dover and Sandwich, with the captains and lieutenants of Deal, Walmer, and Sandown caſtles, commiſſioners of load-manage. In 3 George I. the pilots obtained an act authorizing an eſtabliſhment of fifty pilots at Dover, fifty at Deal, and twenty in Thanet: ſince that time the mayor of Sandwich has loſt his commiſſion, but the other commiſſioners are the ſame as before. The inſtrument by which a pilot is admitted is called a branch, and the ſeal of the admiralty and chancery courts is affixed to it.

Various improvements have been made at Dover ſince the year 1778, when an act was obtained for the better paving, cleanſing, lighting, and watching the town: and duties of ſixpence in the pound on every houſe, a ſhilling on every chaldron of coals, and a toll on all carriages equal to that given by the turnpike act, payable at the gate on the London road, were granted to defray the neceſſary expences; the paving and lighting are, however, but very indifferent. The upper road to Folkſtone having become very dangerous from the falling of the cliffs, a new one was made a few years ago, paſſing through the valley by Maxwell and Farthingloe, and joining with the upper road about three miles from Dover. In 1784, an act was paſſed for the recovery of ſmall debts above 2 *l.* and under 40*l.* in the liberties of Dover and Dover caſtle, and fourteen adjacent pariſhes.

Dover is ſituated 72 miles E.S.E. from London; has markets on Wedneſday and Saturday; and an annual fair, which continues three market days, and appears to have been originally granted to king Widred's foundation. The inhabitants of the two pariſhes, as returned under the late act, amounted to 7084, the number of houſes to 1788. This return conveys but an imperfect idea of the population, as the number of inmates, who have not a fixed reſidence, is generally very great; and the whole, including the garriſon of Dover caſtle, and the heights, together with thoſe diſtricts compriſed under the liberties of Dover, may, with much probability, be fixed at from 18,000 to 20,000.

Dover has, of late years, and particularly in the bathing ſeaſon, become a favourite ſummer reſidence of many reſpectable families. The attractions are numerous, and the proſpects particularly intereſting. The broad beach lying at the embouchure of the valley, the romantic view of the cliffs and caſtle, the ſingular ſituation of the buildings, the entrance of the port terminated by an extenſive ſea-proſpect, with the French coaſt in the diſtance, and the many veſſels paſſing up and down the channel, combine from various points in the compoſition of a ſeries of views, which, for grandeur and impreſſive effect, are not to be equalled by any on the ſhores of Britain.

On the ſea beach, below the caſtle hill, is a very ſingular villa, belonging to the brave ſir William Sidney Smith, by whoſe father, the late captain Smith, who had been aid-de-camp to lord George Sackville, at the battle of Minden, it was erected. It is conſtructed of flints and chalk, and conſiſts of different low buildings, incloſing a ſmall court, and in its general aſpect reſembles a fort: the roofing is compoſed of inverted ſea-boats of the largeſt ſize, ſtrongly pitched.

On the top of the hill, on the weſt ſide of Dover caſtle, are remains of a circular camp, which has been ſurrounded by a ſingle ditch and rampart, both of which are ſtill very apparent; though the former is partly filled up, and the latter much broken: the road to Eaſt Langdon croſſes the centre of the area.

The bold and high cliff that breaſts the ſurge on the ſouth-weſt ſide of Dover-harbour, in front of the heights, bears the name of the immortal Shakeſpeare, whoſe ſublime deſcription of this ſpot is almoſt without parallel: and its appoſite character muſt juſtify us in quoting it on the preſent occaſion.

"There is a cliff whoſe high and bending head
Looks fearfully on the confined deep—
Here's the place:—how fearful
And dizzy 'tis to caſt one's eyes ſo low!
The crows and choughs that wing the midway air
Show ſcarce ſo groſs as beetles:—half-way down
Hangs one that gathers ſamphire: dreadful trade!

Methinks he ſeems no bigger than his head.
The fiſhermen that walk upon the beach,
Appear like mice ; and yon tall anchoring bark,
Diminiſh'd to her cock ; her cock, a buoy
Almoſt too ſmall for ſight. The murm'ring ſurge,
That on the unnumber'd idle pebble chafes,
Cannot be heard ſo high :—I'll look no more,
Leſt my brain turn, and the deficient ſight
Topple down headlong." King Lear, act IV.

Among the more diſtinguiſhed natives of Dover, were Dr. White Kennet, biſhop of Peterborough, of literary celebrity, who was born in Auguſt, 1660, and died in December, 1728 :—and that illuſtrious ſtateſman, Philip Yorke, earl of Hardwicke, who was born in December, 1690, and having acquired great eminence at the bar, and filled the important ſituation of ſolicitor and attorney-general, was appointed lord chief juſtice of the king's bench in 1733, and lord chancellor in 1736; the functions of which high ſtation he exerciſed for twenty years with ſuch undeviating fidelity and juſtice, that only three of his decrees were appealed from, and even thoſe were affirmed by the houſe of lords : he reſigned the great ſeal in November 1756, and died in March, 1764.

On the high ground, about three miles ſouth-weſt from Dover, are the remains of Bradſole, or St. Radigund's abbey, which was founded for Premonſtratenſian canons about the year 1191, but by whom is uncertain. The walls of the out-buildings, gardens, &c. include a conſiderable extent of ground : and the whole appears to have been ſurrounded by a broad ditch and rampart, incloſing an extenſive circular area. Haſted's Kent. Darell's Hiſtory of Dover Caſtle. King's Munimenta Antiqua. Beauties of England and Wales, vol. viii.

Dover, a townſhip of America, in the ſtate of Maſſachuſetts and county of Norfolk, incorporated in the year 1650; containing 511 inhabitants, and lying 17 miles ſouthward of Boſton.—Alſo, a conſiderable poſt-town in Strafford county, New Hampſhire, and the ſhire-town of the county ; ſituated on the ſouthern ſide of Cocheco river, about four miles above its junction with Salmon-fall river, which together form the Piſcataqua ; 12 miles N. W. by N. from Portſmouth. By the Indians it was called Winichaknaut Cocheco, and by the firſt ſettlers Northam. It was incorporated in 1633, and contains 2062 inhabitants. The public buildings are a congregational church, court-houſe, and gaol. At Dover is a high neck of land, between the main branch of Piſcataqua and Black river, about two miles long and half a mile wide, riſing gently along a fine road, and declining on each ſide like a ſhip's deck. It commands an extenſive and variegated proſpect of the rivers, bays, adjacent ſhores, and diſtant mountains, and has often been admired by travellers as an elegant ſituation for a city, and by military gentlemen for a fortreſs. The firſt ſettlers pitched here, but the trade has been long ſince removed to Cocheco falls; and this beautiful ſpot is almoſt deſerted of inhabitants. N. lat. 43° 11'. W. long. 70° 50'.—Alſo, a townſhip of Monmouth county, New Jerſey, between Shrewſbury and New Stafford, and extending from the ſea to the county line. It is a large townſhip, but contains only 910 inhabitants, who moſtly live upon the ſea-ſhore. It has one church, erected by the benevolence of an individual, and open to miniſters of all denominations.—Alſo, the metropolis, and a poſt-town of the ſtate of Delaware and county of Kent, on the S. W. ſide of Jones creek, about 4½ miles from its mouth, in the Delaware; 12 miles from Duck creek, 48 from Wilmington, and 76 S.S.W. from Philadelphia. It contains 100 houſes, diſtributed into four ſtreets, which interſect one another at right angles in the centre of the town, and incloſe a ſpacious parade, having on its eaſt ſide an elegant ſtate houſe. This town, which has a lively appearance, carries on a conſiderable trade with Philadelphia, chiefly in flour. N. lat. 39° 10'. W. long. 75° 34'.—Alſo, a town in York county, Pennſylvania, on Fox-run, which falls into Conewago-creek, near its mouth in the Suſquehanna. It contains a German Lutheran and Calviniſt church united, and about 40 houſes. Morſe.

Dover's *Powder*, in *Pharmacy*, *Pulvis Ipecacuanhæ Compoſitus*, *P. L.*, a moſt excellent medicine, which bears the name of the inventor, and is compoſed of one part of ipecacuanha, one part of opium, and eight parts of vitriolated tartar ; the latter of which ingredients has probably no other uſe than to divide the two others, and to increaſe the bulk to a convenient form. In this excellent medicine the emetic property of the ipecacuanha is corrected by the opium, and the two united have a moſt powerful ſudorific effect, which is, on the whole, more certain in its operation than any other medicine of this kind. The doſe to an adult is from 15 to 20 or 25 grains, which is beſt given in the form of a bolus ; and as, notwithſtanding the opium, it produces ſome degree of nauſea, nothing elſe ſhould be taken into the ſtomach till about an hour afterwards. The Dover's powder is particularly uſed in thoſe caſes where a copious ſweating is required, as in rheumatiſm. By repeating it about every ſix or eight hours the ſudorific effect may be prolonged for many hours.

DOVERA, a town of Italy, in the duchy of Milan ; 24 miles W. of Milan.

DOUGE, *The*, a ſmall river of France, which has its ſource in the department of the Gers, flows by Baſkele d'Armagnac, Roquefort de Marſan, Mont de Marſan, and Tartas, in the department of the Saades, where it diſcharges itſelf into the river Adour.

DOUGIELISKI, a town of Lithuania, in the palatinate of Wilna ; 16 miles N.N.E. of Wilna.

DOUGLAS, Dr. John, in *Biography*, biſhop of Saliſbury, was born in Scotland, but removed, at an early age, to England for education, and entered a ſtudent at Baliol college, Oxford, where he took the degree of maſter of arts, in the autumn 1743. Soon after he had taken orders he was preſented to the rectory of Eaton Conſtantine, in Shropſhire, where he reſided, commenced his literary career, and laid the foundation of his future advancement in his profeſſion. Early in the year 1747, William Lauder, a Scotch ſchoolmaſter, made a moſt flagitious attempt to ſubvert the reputation of Milton, by ſhewing that he was a mere copier, or tranſlator of the works of others, and that he was indebted to ſome modern Latin poets for the plan, arrangement, &c. of his Paradiſe Loſt. Many perſons of conſiderable literary talents gave credit to the tale of Lauder, among whom was the celebrated Dr. Johnſon, who, perhaps, was led away more by his prejudices than judgment. Mr. Douglas, however, examined the merits of the caſe, conſidered moſt accurately the evidence adduced by Lauder, and ſoon found that the whole was a moſt groſs fabrication. He publiſhed a defence of Milton againſt Lauder, entitled, "Milton vindicated from the Charge of Plagiariſm," &c. which appeared in the form of a letter addreſſed to the earl of Bath. Having juſtified the poet, he proceeded to charge the accuſer with the moſt groſs and manifeſt forgery, which he ſubſtantiated to the entire ſatisfaction of the public. The detection was indeed ſo clear and manifeſt that the criminal acknowledged his guilt. In 1754, Mr. Douglas publiſhed "The Criterion, or Miracles examined, &c." This was deſigned as a refutation of the ſpecious objections of Mr. Hume and others to the reality of the miracles recorded in the

New Teſtament. The hiſtorian had maintained that there was as good evidence for the miracles ſaid to have taken place among the ancient heathens, and, in later times, in the church of Rome, as there was for thoſe recorded by the evangeliſts, and ſaid to have been performed by the power of Chriſt. Mr. Douglas, who had ſhewn himſelf an acute judge of the value of evidence, pointed out the diſtinction between the pretended and true miracles, to the honour of the Chriſtian religion. A new edition of this excellent work was lately publiſhed. In 1756, he undertook to ſhew that the hiſtory of the popes, by Bower, could not be depended upon, and that the author had ſhewn himſelf capable of much miſrepreſentation and falſehood, which he had indulged to ſecure the patronage of the proteſtants in this country. Theſe publications in the cauſe of literature and religion obtained for the author much and well merited reputation. Among thoſe who became his patrons was the earl of Bath, who, on his death in 1769, bequeathed to him his whole valuable library. In 1760 he went to Oxford, and took his degrees of B. D. and D. D. In 1762 he was made canon of Windſor, and in 1766 a canon of St. Paul's. After various other inſtances of preferment, he was made biſhop of Carliſle on the death of Dr. Law, and in 1791, on the removal of Dr. Barrington to Durham, he was tranſlated to Saliſbury, and made chancellor of the order of the garter. On the return of the ſhips that had been ſent out on a voyage of diſcovery under captain Cook, he arranged and prepared for the preſs the journals and obſervations which had been made during the expedition, and to the whole he prefixed an elaborate and excellent introduction, in which he gives a ſuccinct view of the progreſs of maritime diſcovery down to the time of captain Cook, and points out the great benefits likely to reſult from the voyages of that navigator.

Dr. Douglas died at Windſor, May 13, 1807. He was unqueſtionably an enlightened ſcholar, and a warm friend to men of learning and genius, and his character ſtands very high for fidelity and a conſcientious diſcharge of the public duties of his ſtation, and for benignity and amiableneſs of temper and behaviour in the intercourſes of private life.

Douglas, Gawin, a Scotch prelate, diſtinguiſhed for poetical talents, third ſon of Archibald, earl of Angus, was born in 1474-5. Having received a liberal education in his own country, he went to Paris to finiſh his ſtudies. When he came back he entered into the church, and obtained ſome very valuable preferments. He was indeed nominated to the archbiſhopric of St. Andrew's; but a ſtrong oppoſition rendered the nomination of no effect; he, however, obtained, in its ſtead, the biſhopric of Dunkeld. The duties of this high office he performed with exemplary diligence; and was at the ſame time the promoter of many uſeful public works, and finiſhed a ſtone bridge over the river Tay, which had been begun by his predeceſſors. The biſhop, in order to avoid the diſorders which raged in Scotland, retired to England, and at that juncture war broke out between the two countries: he was accordingly repreſented by his enemies as a diſaffected perſon, and all his epiſcopal revenues were ſequeſtered. Having now no motive to return, he determined to remain in England, and king Henry VIII. granted him a penſion as a man of learning, and perhaps as a reward for his attachment to the Engliſh cauſe. He died of the plague at London, in 1521-22, and was buried in the Savoy church. The biſhop has been juſtly eſteemed as the improver of Scottiſh poetry. In early life he tranſlated Ovid, "De remedio Amoris;" but his principal work is a tranſlation of Virgil's Æneid into Scottiſh heroic verſe. According to Mr. Warton, this is the firſt metrical tranſlation of a claſſic in the language of Great Britain, unleſs one of Boethius be an exception. It was written in a few months about the year 1512, and is executed with ſpirit and fidelity. To each of the books is prefixed a prologue in verſe, of which ſeveral are highly poetical. Two of them, ſays his biographer, which deſcribe the month of May, and the winter ſeaſon, abound in lively and characteriſtic imagery. Biſhop Douglas likewiſe compoſed an original poem entitled "The Palace of Honour," which is a moral viſion in the manner of the table of Cebes, and an allegorical poem called "King Hart," firſt publiſhed in Pinkerton's ancient Scottiſh poems. The biſhop has ever been regarded as a man of a mild and temperate character, more attached to letters than to the turbulent politics of the time. Brit. Biog.

Douglas, James, M. D. fellow of the Royal Society, and reader of anatomy to the company of Surgeons, was born in Scotland in 1675. After completing his education, he came to London, and applied himſelf diligently to the ſtudy of anatomy and ſurgery, which he both taught and practiſed ſeveral years with ſucceſs. Haller, who viſited him when he was in England, ſpeaks of him in high terms of approbation. He ſaw, he ſays, ſeveral of his anatomical preparations, made with great art, and ingenuity, to ſhew the motion of the joints, and the internal ſtructure of the bones. He was then meditating an extenſive anatomical work, which, however, he did not live to finiſh, and has not been ſince publiſhed.

When Mr., afterwards Dr. William Hunter, came to London, he called upon Dr. Douglas, to conſult with him on the method that would be moſt adviſeable for him to follow to improve himſelf in anatomy; Dr. Douglas took him into his houſe, to aſſiſt him in his diſſections, at the ſame time he gave him an opportunity of attending St. George's hoſpital. This was towards the end of the year 1741. The year following Dr. Douglas died. Beſides ſeveral communications to the Royal Society, which are publiſhed in their Tranſactions, containing the anatomy of the uterus, with the neighbouring veſſels, and ſome caſes in ſurgery, the doctor publiſhed, in 1707, "Myographiæ comparatæ ſpecimen," or a comparative deſcription of all the muſcles in a man, and in a quadruped (a dog), 12mo. It contains the moſt correct deſcription of the muſcles that had been ſeen to that time. "Bibliographiæ anatomicæ ſpecimen, ſeu catalogus pene omnium auctorum qui ab Hippocrate ad Harveium rem anatomicam illuſtrarunt." London, 1715, 8vo. It contains a tolerably correct account of all the books that had been written on the ſubject, with ſhort notices of the authors. An improved edition of this uſeful work was publiſhed at Leyden in 1734. "A deſcription of the peritoneum, and of that part of the membrana cellularis which lies on its outſide, &c." London, 1730, 4to. This is a very accurate and valuable work. "A hiſtory of the lateral operation for the ſtone," 1726, 8vo. republiſhed with an appendix in 1733. It contains a compariſon of the methods uſed by different lithotomiſts, particularly of that practiſed by Cheſelden.

Dr. Douglas collected, at a great expence, all the editions of Horace, which had been publiſhed from the year 1476 to the year 1739. Dr. Harwood, who mentions this circumſtance, in his view of the Greek and Roman claſſics, obſerves, that this one author, thus multiplied, muſt have conſtituted a very conſiderable library. A very accurate detail of thoſe different editions is prefixed to the firſt volume of Watſon's Horace. Haller Bib. Anat. et Chir. Gen. Biog.

Douglas, John, brother to James, ſurgeon to the Weſtminſter infirmary, was author of ſeveral controverſial pieces; in one of them, which he called "Remarks on a late pompous work,"

work," London, 1735, 8vo; he cenſures, with no ſmall degree of ſeverity, Cheſelden's anatomy of the bones; in another, ſome account of the ſtate of midwifery in London, publiſhed in 1736; he criticiſes with equal aſperity the works of Chamberlen and Chapman, on the ſubject of midwifery; and in a third he decries the new invented forceps of Dr. Smellie. He alſo wrote a work on the high operation for the ſtone, which he practiſed, a diſſertation on the venereal diſeaſe, publiſhed in 1737, and "An account of mortifications, and of the ſuprizing effects of the bark in putting a ſtop to their progreſs," London, 1729. The practice recommended in this little work is ſtill followed. Haller Bib. Ch. Eloy. Dict. Hiſt.

DOUGLAS, in *Geography*, or, according to its ancient orthography, Duſglaſs is now the moſt extenſive and populous town in the Iſle of Man. This iſland is ſituated in the Iriſh ſea, between the counties of Down in Ireland and Cumberland in England. The town riſes in a triangular form from the ſouthern part of the bay, and commands a fine view of the neighbouring country, as well as a moſt extenſive proſpect of the ſea, and many parts of Cumberland and Lancaſhire. Scarcely a century paſt, it was little more than a group of clay-built huts, though it now enjoys the greateſt portion of the commerce of the iſle. The ſtreets are yet extremely irregular, many of the beſt houſes being environed with miſerable cottages. The reſidence of the duke of Athol, near the town, is a ſpacious and ſtately building: it was erected at a conſiderable expence, by a merchant, a ſhort time previous to the ſale of the iſland; but ſoon after that tranſaction, was ſold to the duke for 300*l*., the general conſternation which then prevailed having excited an apprehenſion that all property was inſecure. The advance of Douglas to importance may be eſtimated by its convivial ſociety, aſſemblies, race courſe, and theatre: the latter was erected a few years ago by captain Teniſon, with the benevolent deſign of contributing to the relief of the poor. During the herring fiſhery, Douglas is a ſcene of general feſtivity. This ſeaſon is a jubilee for the fiſhermen when the Manks-man ſhakes off his wonted ſloth and melancholy, and aſſumes an air of gaiety and mirth. The day is paſſed in banquetting, and flowing cups go round; gladneſs ſmiles in every eye; the ſong echoes from every corner; and, not unfrequently, dances conclude the feſtivity of the night. In Douglas is a free-ſchool, and a ſmall chapel, dedicated to St. Matthew; and on an eminence weſt of the town, is St. George's chapel, a ſpacious and elegant modern building, with galleries and an handſome organ. This was propoſed to be erected by ſubſcription, and the funds were lodged in the hand of Dr. Maſon, late biſhop of the dioceſe; but the prelate dying inſolvent, the perſons employed in its conſtruction have never been paid. The town is in the pariſh of Kirk-Bradden: the parochial church is two miles diſtant, beautifully ſituated amidſt a group of aged trees. Douglas is 15 leagues from Whitehaven, and 24 from Liverpool: the number of houſes is about 900; the population nearly 3000, of which the labouring claſſes derive their chief ſubſiſtence from an extenſive linen manufactory, ſome tan-yards, ſnuff and tobacco factories, breweries, &c. The town is defended by a ſtrong fort, which renders it almoſt impregnable by ſea. In the vicinity was anciently a convent; the ruins of its chapel and monuments are ſtill remaining.

The *Bay of Douglas* is in the form of a creſcent, about three miles in extent from Clay-head to Douglas-promontory. The neighbouring high-lands render it an aſylum for veſſels from the tempeſts of the north-weſt and ſouth; but to the ſtorms of the eaſt it is much expoſed: both points preſent a dangerous and rocky ſhore. The bay is viſited by abundance of fiſh, particularly cod and ſalmon: the latter are ſmall but of extremely fine flavour. Gobbeck, or dog-fiſh, are alſo found in great plenty, and are frequently eaten by the lower claſſes. At low water the bay is entirely dry, and is conſidered the beſt dry harbour in St. George's channel; its depth is ſufficient for veſſels of 500 tons. A very handſome new pier and lighthouſe (the ancient having been deſtroyed by a ſtorm in 1786) have been lately erected, at an expence of upwards of 20,000*l*. granted by government: the firſt ſtone was laid by the duke of Athol in 1793. The walks round the pier and bay are exceedingly pleaſant. Near the mouth of the harbour are the ruins of an old round tower, now uſed as a temporary priſon for criminals. Robertſon's Tour through the Iſle of Man. Feltham's Tour to the Iſle of Man. Beauties of England and Wales, vol. iii.

DOUGLAS, a townſhip of America, the ſouthernmoſt in Worceſter county, Maſſachuſetts, having the ſtate of Rhode iſland on the ſouth, and that of Connecticut on the ſouth-weſt; and though it paſſes the middle road from Boſton to New York, it is very rocky, contains 1140 inhabitants, and lies 18 miles S. of Worceſter and 48 S. of Boſton. It was incorporated in 1746, and received its name in honour of William Douglas, M.D. of Boſton, a native of Scotland, and a conſiderable benefactor to the town.—Alſo, a townſhip in Montgomery county, Pennſylvania, on the north ſide of the Schuylkill, and has 1297 inhabitants.—Alſo, a cape on the N.W. coaſt of North America, ſo called by Capt. Cook in his third voyage in 1778, in honour of Dr. Douglas, late biſhop of Saliſbury, and forming the weſt ſide of the entrance into Cook's river oppoſite to point Bede, which forms the eaſt ſide. This is a very lofty promontory, whoſe elevated ſummit formed two exceedingly high mountains, which appeared above the clouds. It is ſituated in N. lat. 58° 56′, and E. long. 206° 10′; ten leagues to the weſtward of "Barren iſles" in N. lat. 59°, and 12 from "Point Banks," in the direction of N.W. by W. ½ W. Between this point and cape Douglas, the coaſt ſeemed to form a large and deep bay, which, from ſome ſmoke that had been ſeen on Point Banks, obtained the name of "Smokey bay."

DOUGLAS *River*, or *Arland River*, in Lancaſhire. This river is made navigable for barges from its efflux into the Ribble river at Haſketh to the Leeds and Liverpool canals at Briers Mill, and the ſame is now incorporated with that concern. See CANAL.

DOUGLASSIA, in *Botany*, (in memory of James Douglas, M.D. author of a deſcription of the Guernſey Lily, and a hiſtory of the Coffee-tree,) Schreb. Gen. 809. Mart. Mill. Dict. v. 2. Aiouea; Aubl. Guian. v. 1. 310. t. 120. Juſſ. 80. Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Lauri*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, turbinate, permanent, regular, with ſix ovate, acute, coloured ſegments. *Cor.* none, except, with Linnæus in *Laurus*, we reckon the calyx ſuch. *Nectaries* ſix, ovate, fringed at their baſe, alternate with the ſtamens. *Stam.* Filaments ſix, capillary, inſerted into the rim of the calyx, alternately with the nectaries, but oppoſite to the ſegments of the calyx, which rather exceed them in length; anthers vertical, elliptical, of two cells, burſting by two valves on their inſide which ſhrivel up and remain at the top; pollen large, yellow. *Piſt.* Germen ſuperior, ovate; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma in ſix ſegments. *Peric.* Berry ovate, acute, of one cell. *Seed* ſolitary, with a brittle coat.

Eſſ. Ch. Calyx ſix-cleft. Nectaries ſix glands between the ſtamens. Anthers burſting by two valves. Berry ſuperior, with one ſeed.

The analogy of *Laurus*, near to which Juſſieu refers this genus, and a ſimilar ſtructure of anthers in *Epimedium* and *Leontice*, help us to underſtand its characters, which Aublet and Schreber have made more wonderful than nature will juſtify, the latter writer having taken the pollen for anthers, which led him to refer it to the claſs *Polyadelphia*.

1. D. *laurina* is the only ſpecies, (Aiouea guyanenſis; Aublet t. 120,) a native of the woods of Guiana, 30 miles from the ſea. It forms a ſmall tree; its *trunk* five feet high crowned with ſix, ſeven, or more *branches*. *Leaves* alternate, ſtalked, ever-green, lanceolate, ſmooth, firm, entire. *Flowers* ſmall, yellowiſh, in axillary, reddiſh, corymboſe panicles. *Berry* black, with viſcid pulp. *Seed* oily and aromatic. It flowers in October, and is called by the natives of the country *Aiouvé*. The wood is white and compact. *Aubl.*

DOUGLEDY, or Dougledye, in *Geography*, a river of South Wales, which joins the Clethy, about three miles S. from Haverford-weſt, in the county of Pembroke. This river is navigable from Milford haven, at a place called Landſhipping, to the ſtone bridge of ſeveral ſmall arches, over the ſame in the town of Haverford-weſt, up to which place the tide flows. (See our article Canal.) Ships go no further up than Little-Milford and Frayſtrap, where they take in coals, brought in carts and waggons from the coal mines near thoſe places. Lime-ſtone and deals are among the principal imports by this navigation.

DOULA Baſſendar, a town of Aſia, in the country of Kemaoon; 17 miles N. of Lucknow.

DOULAINCOURT, a town of France, in the department of the Upper Marne, and diſtrict of Joinville; 10 miles S. W. of Joinville.

DOULEIA, Δουλεια, among the Athenians, a kind of puniſhment, by which the criminal was reduced into the condition of a ſlave. It was never inflicted upon any but the ατιμοι, *ſojourners*, and *freed ſervants*. Potter's Archæol. Græc. lib. i. cap. 25. tom. i. p. 130.

DOULEVENT, in *Geography*, a ſmall town of France, in the department of the Upper Marne, chief place of a canton, in the diſtrict of Waſſy, with a population of 643 individuals. The canton has an extent of 247½ kiliometres, 19 communes, and 7798 inhabitants.

DOULLENS, Doulens, or *Dourlens*, a ſmall town of France, with an ancient caſtle on the river Authie, in the department of the Somme, 18 miles N. of Amiens, and 21 miles W. of Arras. It has a population of 2946 individuals, and is the chief place of a diſtrict, conſiſting of four cantons, 89 communes, 725 kiliometres in extent, and containing 45,627 inhabitants. Its chief manufactures are thoſe of linen cloth; its principal articles of trade are corn, cattle, hemp, and cyder.

As chief place of a diſtrict, Doullens has a ſub-prefect, a court of juſtice, a regiſter office, and a ranger. Its canton contains 12,786 inhabitants in 15 communes, on a territorial extent of 155 kiliometres.

DOULON, a river of France, which runs into the Allier, near Brioude.

DOUR, a town of France, in the department of Jemmape, chief place of a canton in the diſtrict of Mons, with 4290 inhabitants. The canton has an extent of 100 kiliometres, 17 communes, and a population of 14,148 individuals.

DOURDAN, a town of France, in the department of Seine and Oiſe on the river Orge, in the diſtrict of Etampes, 27 miles N. E. of Chartres, nine miles N. W. of Etampes, and 57 miles S. E. of Paris. Its whole population amounts to 2870 individuals: but it is divided into two parts, each of which is the chief place of a canton. The northern part has 143 and its canton 11,540 inhabitants, diſperſed into 18 communes; the ſouth reckons alſo 1435, but its canton has only 8944, inhabitants diſperſed in 23 communes. The territorial extent of both cantons is 552¼ kiliometres.

Dourdan has a very conſiderable manufacture of ſilk hoſiery. Its knitted ſilk ſtockings are of a ſuperior quality.

DOURGNE, a ſmall town of France, in the department of the Tarn, 18 miles S. E. of Lavaur. It is the chief place of a canton in the diſtrict of Caſtres. The number of its inhabitants is 1661, and of the canton 11,636. The latter live in 17 different communes, on a territorial extent of 212½ kiliometres.

DOURLACH. See Durlach.

DOURLENS. See Doullens.

DOURLERS, or Doulers, a town of France, in the department of the North and diſtrict of Aveſnes; two leagues S. of Mauberge.

DOURO, a river of Spain, which ſprings near the ruins of ancient Numantia, the courſe of which may be computed at 350 geographical miles. See Duero.

DOUSA, Janus, in *Biography*, an intimate friend and zealous admirer of George Buchanan, was born at Noortwyck in Holland, in the year 1545, and, like Buchanan, was a poet and a ſtateſman. He enjoyed ſome of the higheſt civil offices which his country could beſtow; and having been appointed governor of Leyden, he defended it, during a memorable ſiege, with diſtinguiſhed bravery. He was one of the firſt curators of the univerſity founded in that city in 1575. He died in the year 1604, much lamented by the republic of letters. His moral character was blameleſs, and he held a very reſpectable ſtation among the ſcholars of that learned age. His merits are highly celebrated in the poems of Joſ. Scaliger, Grotius, Heinſius, and Baudias. His reading, according to Meurſius, was multifarious: his memory almoſt incredible. He was the Varro of Holland, and the common oracle of the univerſity; nor was he more conſpicuous for his learning than for his humanity, candour, urbanity, and modeſty. His amiable family was ſingularly attached to letters. Five of his ſons, *viz.* Janus, Francis, George, Stephen, and Theodore, are well known as authors; and the Latin poems of the firſt, who died before he had compleated his 26th year, have been preferred by Grotius to thoſe of his father. Irving's Memoirs of George Buchanan.

Douse, *To*, in *Sea Language*, is to lower ſuddenly, or ſlacken; and it is applied to a ſail in a ſquall of wind, an extended hawſer, &c.

DOUSES, or Locks, among *Miners*, are cavities or open places in a rock or vein, having their inſides lined with cryſtallized incruſtations; from locks it is that moſt of the beautiful ſpars of Derbyſhire are obtained. See Loch.

DOUTY's Falls, in *Geography*, ſituated in the county of York, and ſtate of Maine in North America, where a poſt-office is kept; 7 miles from Berwick, and 8 from Sanford; 563 N. from Waſhington.

DOUVAINE, a ſmall town of France, in the department of the Léman, chief place of a canton, in the diſtrict of Thonon; 9 miles S.W. of Thonon, 7 miles N. E. of Geneva, and 87 miles N.N.E. of Chambery. It has a population of 742 individuals. Its canton occupies a territorial extent of 117½ kiliometres, and contains 15 communes, with 6357 inhabitants.

DOUVEN, John Francis, in *Biography*, a painter of landſcapes, animals, portraits, and hiſtory, was born at Ruremonde, in 1656, and having received ſome inſtruction from Gabriel Lambertin, at Liege, and Chriſtopher Puitlink, owed his chief improvement to the collection of Don John de Velaſco for Charles II. king of Spain. At the court of Duſſeldorp, to which he was invited, he was employed in painting portraits, and ſucceeded ſo well that he made this branch of the art an object of particular attention. At the age of 28 years he was appointed principal painter to that court. He afterwards attended the duke to Vienna; and he was likewiſe employed at the courts of Portugal, Denmark, Modena, and Tuſcany. The pictures of this maſter are well coloured and well pencilled; and poſſeſs much force and ſpirit, with a ſtriking likeneſs, and an amiable as well as majeſtic air. In the ſtyle of painting hiſtory in ſmall, which he frequently practiſed, his compoſition is good, his deſign correct, and very much in the taſte of the Italian ſchool. He died in 1727. Pilkington.

DOUVRES, in *Geography*, a ſmall town of France, in the department of Calvados, chief place of a canton, in the diſtrict of Caen, with a population of 2239 individuals. The canton contains 18 communes, and 13,783 inhabitants, on a territorial extent of 127½ kiliometres.

DOUW, Gerhard, in *Biography*, a painter of portraits, converſations, and ſubjects of fancy, was born at Leyden in 1613, and after receiving ſome previous inſtructions in drawing and deſign, he became, at the age of 15 years, a diſciple of Rembrandt; from whom, in three years, he learned the true principles of colouring, and obtained a complete knowledge of the chiaro-ſcuro; adding to this knowledge a delicacy of pencil, and a patience in working up his colours to the higheſt degree of neatneſs, ſuperior to any other maſter. His pictures are uſually of a ſmall ſize, with figures ſo exquiſitely touched, and ſo wonderfully delicate, as to excite aſtoniſhment as well as pleaſure. He deſigned every object after nature, ſo that it appears a juſt reſemblance of nature itſelf, in colour, freſhneſs, and force. In painting portraits he generally uſed a concave mirror, and ſometimes looked at the object through a frame with many exact ſquares of fine ſilk. The pictures of Douw fetch at this day a very high price, not only in his own country, but even in Italy, and every part of Europe, where any attention is paid to the fine arts. His patience in finiſhing the moſt inconſiderable parts of his pictures was moſt aſtoniſhing. As an inſtance of this it is mentioned, that a broom in one of his pictures was particularly noticed and admired for its neatneſs; upon which he told them, that he propoſed to ſpend three days more in working on that broom, before he ſhould think it complete. In another picture he ſpent five days for finiſhing the hands of a lady that leaned on her arm-chair. Perſons of leſs patience than himſelf were indiſpoſed to ſit to him for their portraits, and, therefore, he chiefly indulged himſelf in works of fancy. It is ſaid that his great patron, Mr. Spiering, allowed him 1000 guilders a year, as a compenſation for the option of every picture painted by him, beſides the full price at which it was rated. The colouring of Douw's pictures, poſſeſſing all the true and lovely tints of nature, without any ſeeming labour and ſtiffneſs, is much admired; his pictures are remarkable, not only for retaining their original luſtre, but for having the ſame beautiful effect at a proper diſtance, as they bore when brought to the neareſt view. The moſt capital picture of this maſter in Holland, 3 feet high by 2½ feet broad, repreſents two rooms with a variety of objects. At Turin are ſeveral of his pictures, particularly one of a doctor attending a ſick woman, and ſurveying an urinal. In the gallery of Florence there is a night-piece by candle-light, exquiſitely finiſhed; and alſo a mountebank attended by a number of figures, which is admirable. Pilkington.

DOU-WAR, among the *Arabs*, a collection of tents, uſually pitched in a circle, with their doors opening towards Mecca, which were the habitations of thoſe Arabs, called *Bedoweens*, who were commonly the inhabitants of the plains; whereas the Kabyles uſually live upon the mountains, in little villages called *daſkrahs*, compoſed of mud-walled hovels. The tents of the Bedoweens are called *Hhymas*, from the ſhelter which they afford the inhabitants, and *bert el ſhar*, *i. e.* houſes of hair, from the materials or webs of goats' hair, of which they are made. They are the ſame which the ancients called *Mapalia* (Liv. l. xxix. § 31. Tacit. Annal. l. iv. § 25.); and being then, as they are to this day, ſecured from the weather by a covering only of ſuch hair-cloth, as our coal-ſacks are uſually made of, might very juſtly be deſcribed by Virgil to have (*rara tecta*) thin roofs. The colour of them is beautifully alluded to, (Cant. I. 5.) "I am black, but comely, like the tents of Kedar." For nothing can afford a more delightful proſpect than a large extenſive plain, either in its verdure or even ſcorched up by the ſun-beams, with thoſe moveable habitations pitched in circles upon them. The faſhion of each tent is of an oblong figure, not unlike the bottom of a ſhip turned upſide down, as Salluſt (Bell. Jugurth. § 21.) has long ago deſcribed them. They are of different ſizes, and are ſupported by either a ſingle pillar, or with two or three pillars, if their bulk require them; and a curtain, or carpet, occaſionally let down from each of theſe diviſions, turns the whole into ſo many ſeparate apartments. The pillars, which are ſtraight poles, 8 or 10 feet high, and 3 or 4 inches in thickneſs, ſerve not only to ſupport the tent, but being full of hooks, the Arabs hang upon them their cloaths, baſkets, ſaddles, and accoutrements of war. The tents are kept ſteady by cords ſtretched down their eaves and tied to hooked wooden pins, driven into the ground with a mallet. Shaw's Travels, p. 220.

DOVY, in *Geography*, a river of Wales, which riſes in the S.E. part of Merionethſhire, paſſes by Machynlleth, &c. and runs into the ſea about 7 miles N. of Aberyſtwith.

DOUX, in *Geography*. See Doubs.

Doux, *Fr.* ſoft, the ſame as *dolce* and *piano*, in Italian. *Dolce*, however, in Italian, means ſomething more than ſoft, or the echo of a ſhort muſical phraſe, as *piano* at firſt implied. But puriſts among the Italians ſay, that the indiſcriminate uſe of *dolce* for *piano*, is an abuſe of words. Beſides the diminution of force, dolce indicates a more ſweet and expreſſive manner of playing, by ſuſtaining the tones, and marking the firſt note of a bar ſomewhat more forcibly than the reſt.

Doux in French, as well as *piano* in Italian, has three ſhades, which ought to be diſtinguiſhed; as *doux*, *plus doux*, and *très doux*; *piano*, *più piano*, and *pianiſſimo*.

DOUXIEME, the 12th, or octave of the 5th. Every ſonorous body gives with the principal, the 12th rather than the 5th, becauſe the 12th is produced by an aliquot part of the whole ſtring, which divides itſelf into three parts, or octaves of the 5th of the entire ſtring; whereas the two 3ds, which conſtitute the 5th, are not aliquot parts of the ſame ſtring.

DOUZE, in *Geography*, a ſmall town of France, in the department of the Dordogne; 9 miles S.E. of Perigueux.

Douze, a river of France, which runs into the Adour, near Tartas.

DOUZENS, a ſmall town of France, in the department of the Aude; 12 miles E. of Carcaſſonne.

DOUZEAVE, in *Muſic*, ſignifies the common ſyſtem of 12 ſounds within an octave, in which caſe each interval is not very diſtant from equal among themſelves, and are called half notes; whereas by conſidering the ſcale as a ſeptave (or octave) five of the intervals are nearly double in value to the other two reſpectively, called notes and half-notes;

notes: for ſome of the chief properties of douzeaves, ſee our article Temperament: ſee alſo the Philoſophical Magazine, vol. xxvii. p. 316. xxix. p. 348, &c.

DOUZY, in *Geography*, a ſmall town of France, in the department of the Ardennes; 6 miles S. E. of Sedan.

DOWAGER, Dotissa (*q.d.* a widow *endowed,* or that has a jointure). a title, or addition, applied to the widows of princes, dukes, earls, and perſons of high rank only.

Dowager, *queen*. See Queen.

DOWER, Dotarium, *Doarium,* or *Dos,* a portion of lands, or tenements, which a widow enjoys for term of life, from her huſband, in caſe ſhe ſurvives him; for her own ſuſtenance and the nurture and education of the younger children. (Bract. l. ii. c. 39. Co. Litt. 30.)

Dower out of lands ſeems to have been unknown in the early part of our Saxon conſtitution; for in the laws of king Edmund (Wilk. 75.) the wife is directed to be ſupported wholly out of the perſonal eſtate. Afterwards, as in gavel-kind tenure, the widow became entitled to a conditional eſtate in one-half of the lands, with a proviſo that ſhe remained chaſte and unmarried (Somner. Gavelk. 51. Co. Litt. 33. Bro. Dower. 70.); as is uſual alſo in copyhold dowers, or free bench. Yet ſome (Wright. 192.) have aſcribed the introduction of dower to the Normans, as a branch of their local tenures, though we cannot expect any feodal reaſon for its invention, ſince it was not a part of the pure, primitive, ſimple law of feuds, but was firſt of all introduced into that ſyſtem (in which it was called *triens, tertia,* and *dotalitium*) by the emperor Frederick the ſecond, contemporary with our king Henry III. (Crag. l. ii. t. 22. § 9.) with us it might poſſibly be the relic of a Daniſh cuſtom; ſince, according to the hiſtorians of that country, dower was introduced into Denmark by Swein, the father of our Canute the Great, out of gratitude to the Daniſh ladies, who ſold all their jewels to ranſom him when taken priſoner by the Vandals. (Mod. Un. Hiſt. v. xxxii. 91.)

Judge Blackſtone, in treating of this eſtate, (Comm. b. ii.) conſiders, *who* may be endowed; of *what* ſhe may be endowed; the manner *how* ſhe ſhall be endowed; and how dower may be *barred* or prevented.

The perſon who may be endowed muſt be the actual wife of the party at the time of his deceaſe, not divorced *à vinculo matrimonii;* but a divorce *a menſa et thoro* only doth not deſtroy the dower, not even for adultery itſelf by the common law. (Bract. l. ii. c. 39. Co. Litt. 30. 32.) But by the ſtat. Weſtm. 2. (13 Edw. I. c. 34.) if a woman voluntarily leaves, or elopes from her huſband, and lives with an adulterer, ſhe ſhall loſe her dower, unleſs her huſband be voluntarily reconciled to her. As an ideot cannot marry, the former doctrine, that his wife might be endowed, cannot now take place. By the ancient law the wife of a perſon attainted of treaſon or felony could not be endowed; however, the ſtatute 1 Edw. VI. c. 12. abated the rigour of the common law, and allowed the wife her dower. But a ſubſequent ſtatute (5 & 6 Edw. VI. c. 2.) revived this ſeverity againſt the widows of traitors, who are now barred of their dower (except in the caſe of certain modern treaſons relating to the coin), but not the widows of felons. An alien cannot be endowed, unleſs ſhe be queen conſort, for no alien is capable of holding lands. (Co. Litt. 31.) The wife muſt alſo be above nine years of age, at the time of her huſband's death, otherwiſe ſhe ſhall not be endowed. (Litt. § 36.)

To the inquiry of what a wife may be endowed, it is replied that ſhe is now by law entitled to be endowed of all lands and tenements, of which her huſband was ſeiſed in fee-ſimple or fee-tail at any time during the coverture; and of which any iſſue, which ſhe might have had, might by poſſibility have been heir. (Litt. § 36. 53.) In ſhort, a widow may be endowed of all her huſband's lands, tenements, and hereditaments, corporeal or incorporeal, under certain reſtrictions, unleſs there be ſome ſpecial reaſons to the contrary. Thus, a woman ſhall not be endowed of a caſtle, built for defence of the realm (Co. Litt. 31. 3 Lev. 401.); nor of a common without ſtint, for as the heir would then have one portion of this common, and the widow another, and both without ſtint, the common would be doubly ſtocked. (Co. Litt. 32. 1 Jon. 315.) Copyhold eſtates are alſo not liable to dower, being only eſtates at the lord's will; unleſs by the ſpecial cuſtom of the manor, in which caſe it is uſually called the widow's free-bench. (4 Rep. 22.) But, where dower is allowable, it matters not though the huſband aliene the lands during the coverture; for he alienes them liable to dower. (Co. Litt. 32.)

With regard to the manner in which a woman is to be endowed, there were formerly five kinds of dower ſubſiſting in this kingdom: *viz.* 1. *Dower by the common law* which is a third part of ſuch lands or tenements above deſcribed, which the widow is to enjoy during her life. 2. *Dower by cuſtom,* ſo that the wife may have half the huſband's lands, or in ſome places the whole, and in ſome only a quarter. (Litt. § 37.) 3. *Dower ad oſtium eccleſiæ,* which is where tenant in fee-ſimple of full age, openly at the church door, where all marriages were formerly celebrated, after affiance made and troth plighted between them, doth endow his wife with the whole, or ſuch quantity as he ſhall pleaſe, of his lands; at the ſame time ſpecifying and aſcertaining the ſame; on which the wife, after her huſband's death, may enter without farther ceremony. (Litt. § 39.) 4. *Dower ex aſſenſu patris,* which is only a ſpecies of dower *ad oſtium eccleſiæ,* made when the huſband's father is alive, and the ſon, by his conſent, expreſsly given, endows his wife with parcel of his father's lands. In either of theſe caſes, in order to prevent frauds, they muſt be made *in facie eccleſiæ et ad oſtium eccleſiæ.* (Litt. § 40. Bract. l. 2. c. 39. § 4.) *Dower de la plus belle,* which was where the wife was endowed with the faireſt part of her huſband's eſtate. But this was aboliſhed together with the military tenures of which it was the conſequence.

Judge Blackſtone traces the ſeveral revolutions, which the doctrine of dower has undergone ſince its introduction into England. It ſeems firſt to have been of the nature of gavel-kind, *viz.* a moiety of the huſband's lands, but forfeitable by incontinency or a ſecond marriage. By the charter of Henry I. this condition, of widowhood and chaſtity, was only required in caſe the huſband left any iſſue. (Cart. Hen. I. A.D. 1101.) Under Henry II. the dower *ad oſtium eccleſiæ* was the moſt uſual ſpecies of dower; nor was the huſband, in thoſe days of feodal rigour, allowed to endow his wife *ad oſtium eccleſiæ* with more than the third part of the lands, whereof he was then ſeiſed, though he might endow her with leſs; but if no ſpecific dotation was made at the church-porch, when ſhe was endowed by the common law of the third part, called her *dos rationabilis,* of ſuch lands and tenements as the huſband was ſeiſed of at the time of the eſpouſals, and no other, unleſs he ſpecially engaged before the prieſt to endow her of his future acquiſitions: and, if the huſband had no lands, or endowment in goods, chattels, or money at the time of eſpouſals, it was a bar of any dower of lands, which he afterwards acquired. (Glanv. c. 2.) In king John's magna carta, and the firſt charter of Henry III. (A. D. 1216. c. 7.) no mention is made of any alteration of the common law, in reſpect of lands ſubject to dower; but in thoſe of 1217 and 1224, it is particularly provided, that a widow ſhall be entitled for her dower to the third part of all ſuch lands as the huſband had held in his life-time; yet in caſe of a ſpecific endowment of leſs *ad oſtium eccleſiæ*, the widow had ſtill no power to waive it after her huſband's death. This continued to be the law during the reigns of Henry III. and Edward I. In the time of Henry IV. it was denied to be law, that a woman can be endowed of her huſband's goods and chattels; (P. 7. Hen. IV. 13, 14.) and under Edward IV., Littleton, (§ 39.) lays it down expreſsly, that a woman may be endowed *ad oſtium eccleſiæ* with more than a third part; and ſhall have her election, after her huſband's death, to accept ſuch dower, or refuſe it, and betake herſelf to her dower at common law. This ſtate of uncertainty was probably the reaſon, that theſe ſpecific dowers, *ad oſtium eccleſiæ*, and *ex aſſenſu patris*, have ſince fallen into total diſuſe.

As to the method of endowment or aſſigning dower, by the common law, which is now the only uſual ſpecies, ſee Assignment *of dower*.

A widow may by *barred* of her dower not only by elopement, divorce, being an alien, the treaſon of her huſband, and other diſabilities already mentioned; but alſo by detaining the title deeds, or evidences of the eſtate from the heirs, until ſhe reſtores them (Co. Litt. 39.); and by the ſtatute of Glouceſter, (6 Edw. I. c. 7.) if a dowager alienes the land aſſigned her for dower ſhe forfeits it *ipſo facto*, and the heirs may recover it by action. A woman may be alſo barred of her dower, by levying a fine or ſuffering a recovery of the lands, during her coverture. But the moſt uſual method of barring dowers is by jointures, as regulated by the ſtatute 27 Hen. VIII. c. 10. See Jointure.

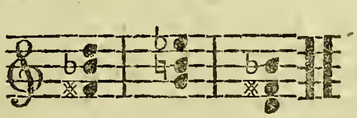
Dower, *admeaſurement of*. See Admeasurement.

Dower, *aſſignment of*. See Assignment.

Dower, *tenant in*. See Tenant.

DOWLAND, John, in *Biography*, an Engliſh muſician, and an eminent performer on the lute, was born in 1562, and admitted to a bachelor's degree in muſic at Oxford in 1588, at the ſame time as Morley. He is ſtyled doctor by Tomkins, Peacham, and Ravenſcroft; but Ant. Wood is ſilent concerning his ever having obtained that honour. He was ſo much celebrated for his performance on the lute, that Ant. Wood (Faſti 1588), who never could have heard him, ſcrupled not to ſay, that "he was the rareſt muſician that his age did behold."

After being at the pains of ſeeing ſeveral of Dowland's compoſitions, we have been equally aſtoniſhed and diſappointed at his ſcanty abilities in counterpoint, and the great reputation he acquired with his cotemporaries, which has been courteouſly continued to him, either by the indolence or ignorance of thoſe who have had occaſion to ſpeak of him, and who took it for granted that his title to fame, as a profound muſician, was well founded. There are among the Lamentations, publiſhed by Leighton, ſeveral by Dowland, which ſeem to be inferior in every reſpect to the reſt; for, beſides want of melody and deſign, with the confuſion and embarraſſment of a principiante in the diſpoſition of the parts, there are frequently unwarrantable, and, to our ears, very offenſive combinations in the harmony; ſuch as a ſharp third, and flat ſixth; an extreme flat fourth and ſixth, &c.



We make no doubt but that Dowland was a captivating performer on the lute, to which Shakſpeare has borne teſtimony in his "Paſſionate Pilgrim," (No. VI.) where, addreſſing his friend, he ſays:

> If Muſic and ſweet Poetry agree,
> As they muſt needs, the ſiſter and the brother,
> Then muſt the love be great 'twixt thee and me,
> Becauſe thou lov'ſt the one, and I the other.
>
> Dowland to thee is dear, whoſe heav'nly touch
> Upon the lute doth raviſh human ſenſe;
> Spenser to me, whoſe deep conceit is ſuch,
> As paſſing all conceit needs no defence.
>
> Thou lov'ſt to hear the ſweet melodious ſound
> That Phœbus' lute, the Queen of Muſic makes;
> And I in deep delight am chiefly drown'd,
> When as himſelf to ſinging he betakes.
>
> One god is god of both, as poets feign;
> One knight loves both, and both in thee remain.
>
> Suppl. to Shakſpeare, vol. i. p. 713.

It has frequently happened that a great performer has been totally devoid of the genius and cultivation neceſſary for a compoſer; and, on the contrary, there have been eminent compoſers whoſe abilities in performance have been very far from great. Cloſe application to the buſineſs of a compoſer equally enfeebles the hand and the voice, by the mere action of writing, as well as want of practice; and if the art of compoſition, and a facility of committing to paper muſical ideas, clothed in good harmony, be not early acquired, even ſuppoſing that genius is not wanting, the caſe ſeems hopeleſs; as we never remember the difficulties of compoſition thoroughly vanquiſhed, except during youth, and we think we may venture to own, from the works of Dowland, which we have had an opportunity of examining, that he had not ſtudied compoſition regularly at an early period of his life; and was but little uſed to writing in many parts. In his prefaces, particularly that to his "Pilgrim's Solace," he complains much of public neglect; but theſe complaints were never known to operate much in favour of the complainants, any more than thoſe made to a miſtreſs or lover whoſe affection is diminiſhing, which ſeldom has any other effect than to accelerate averſion. As a compoſer, the public ſeem to have been right in withdrawing that favour from Dowland, which had been granted on a bad baſis; but with regard to his performance, we have nothing to ſay: as at this diſtance of time there is no judging what proportion it bore to that of others who were better treated.

The king of Denmark was ſo much pleaſed with Dowland, that he requeſted king James to permit him to leave England. He accordingly went to Denmark and died there. Malone's note to a Sonnet in the 1ſt vol. of the ſupplement to Shakeſpear's plays.

DOWLATABAD, in *Geography*, a province of Hindooſtan, formerly called *Amednagur*, which ſee. Mr. Fraſer, in his life of Nadir Shah, ſtates the revenue of this province under Aurungzebe at 259 lacks of rupees.

Dowlatabad, a town and fortreſs of Hindooſtan, which has given name to a conſiderable province in the Deccan, and ſuperſeded that of Amednagur. The fortreſs is ſituated on a ſteep rock, not to be aſcended by a horſe or camel; the town is at the foot of the rock, and was once very flouriſhing, but the wars have ruined it; 9 miles N.W. Aurungabad, and 92 S. of Burhampour. Lieutenant Wilford, in his examination of Arrian's Periplus, has ſhewn that the poſition of the modern Dowlatabad is the ſame with that of the ancient Tagara, and that the high grounds acroſs which goods were conveyed to Baroach, are the Ballagaut mountains. Aſ. Reſ. vol. i. 369.

DOWLE and Deal, in our *Old Writers*, are uſed to ſignify a diviſion. The word comes from the Saxon *dal*, i. e. *diviſio*, and that from *dælan, dividere;* whence our Engliſh word *dealing* is formed.

In this ſenſe it is, that the ſtones laid to the boundaries of lands are called dowleſtones.

DOWN, in *Botanical Phraſeology*, is not only uſed in its common acceptation for any ſoft woollineſs or pubeſcence clothing any part of a plant, but technically for the *Pappus*, Seed-down, which crowns the ſeed of compound flowers, as well as for the hairy appendages of ſeveral ſeeds encloſed in capſules, as in the Willow, Poplar, Cotton, Willow-herb, and many others. Gærtner, however, reſtrains the term *pappus* to the ſeed-down of compound flowers, uſing *coma* for the hairy crown of any ſeeds in a capſule, and *pubes* for hairs ſpringing from the baſe or ſides of ſuch ſeeds. The ſeed-down of compound flowers is either hairy, feathery, chaffy, briſtly, ſimple, or compound, and is of the greateſt uſe for generic diſcrimination. It is truly of the nature of a partial calyx. *Valeriana* too, though a ſimple flower, has as genuine a *pappus* or ſeed-down as any plant whatever. "The uſe of this organ is to tranſport ſeeds to a diſtance from their native ſpot, either by reſigning them to the power of the wind, or by attaching them to the ſhaggy coats of animals. In due time the feathery crown ſeparates, and leaves the ſeed behind it." Sm. Introd. to Bot. 300.

Down, in *Geography*. See Doon.

Down, a large and populous county, in the province of Ulſter, Ireland. It lies on the ſouth of Antrim, from which it is ſeparated, except for a ſmall part, by Belfaſt lough, and the river Lagan. Lough Neagh touches upon its north-weſtern extremity, and the valley through which the Newry canal is carried forms the greater part of the weſtern boundary, dividing it from the county of Armagh. The Iriſh ſea and Carlingford lough are on the eaſt, ſouth, and ſouth-weſt. Its greateſt length from north to ſouth is 40 Iriſh (51 Engliſh) miles, and its greateſt breadth from eaſt to weſt 31 Iriſh (39½ Engliſh) miles. The figure, however, is very irregular, and in ſome parts has not half this extent. The area of this county is 348,550 Iriſh acres, or 544 ſquare miles, which is equal to 559,995 acres, or 874 ſquare miles, Engliſh meaſure. There are 60 pariſhes, partly in the dioceſe of Dromore, and partly in that of Down and Connor. The population is very conſiderable. In 1792, the number of houſes was 36,636, which, at ſix to a houſe, gives about 220,000 inhabitants, a number which has probably increaſed ſince that time.

In conſidering the face of the country, we may divide it into three diſtricts, the peninſula of Ardes in the eaſtern part, the land between Strangford lough, and the county of Armagh, extending northwards to the boundaries of Antrim, and forming the principal diviſion; and the mountainous country in the ſouth extending towards the centre. The Ardes, as it is uſually called, is a level country, having a deep clayey ſoil, which being well manured is very productive. Lime is brought for this purpoſe by water from Carlingford; and marle, ſhell ſand, and ſea weed, are alſo much uſed. The grain produced is excellent. In this diſtrict there are no bleach greens, through want of water proper for the purpoſe. There are ſome bogs, but here, and in every part of the county, they are not ſufficient to anſwer the demands for fuel, turf being much preferred to ſea coal, even where the latter can be procured at a moderate price, on account of its greater cleanlineſs. In the more extenſive diſtrict, weſt of Strangford lough, the ſoil is various, but is chiefly loam mixed with a conſiderable quantity of ſtones, ſometimes having clay below it, and ſometimes gravel, in which latter caſe it requires conſtant manure. It may, however, be reckoned on the whole fertile. Except on the banks of rivers the land is moſtly arable, and is, in general, badly managed. The produce is chiefly flax, potatoes, and oats, the latter of which is a principal article of food. In the north-weſtern part there is limeſtone gravel, and in the neighbourhood of Moira the white limeſtone, which is ſo prevalent in the adjoining county of Antrim. Near the banks of rivers, where the waters naturally overflow and promote fertility, the ground is chiefly under meadows, or laid out in bleach greens. The dairies, in theſe parts, prepare a conſiderable quantity of butter for exportation. This is not a well-wooded country, though ſome particular ſpots ſhew how favourable it is to the growth of timber. It is, however, in moſt parts, delightful to the eye, eſpecially in the neighbourhood of the rivers Bann and Lagan. The irregularity of the ground, well-watered, abounding in bleach greens, and full of neat and cleanly habitations, with an orchard to almoſt every cottage, affords a moſt cheerful and pleaſing proſpect, as it proves the opulence and comfort of the inhabitants. Such are the happy effects of the linen manufacture, which extends through every part of it; though much may alſo be attributed to a number of reſident proprietors, paying attention to improvement, which does not happen in moſt counties of Ireland. The remaining diſtrict, which conſiſts of the Mourne and Sliebh-droob mountains, though very rough, affords ſupport in moſt places to a hardy race of cattle, which are ſold at the fairs in the adjoining towns. There is here a native breed of ſheep, which is much prized for the delicacy of the mutton, and ſome of which have wool of a very fine texture. Theſe ſheep are ſmall and hardy, and moſt of them horned. The vallies amidſt theſe mountains ſometimes afford graſs, and ſometimes turf bogs, which are very valuable to the proprietors. Some ſmall tracts have been lately planted, and the larch is found to grow luxuriantly in ſpots which can be applied to no other purpoſe. Theſe mountains conſiſt of granite interſected by beds of ſlate. The higheſt of them, called Sliebh-Donard, is ſtated to be 2800 feet high. Some mountainous plants have been diſcovered on them, ſuch as vaccinium vitis idæa, (the whortle berry) ſaxifraga ſtellaris, papaver cambricum, &c.; but it does not appear that they have yet been ſufficiently examined either by the botaniſt or mineralogiſt. With reſpect to the county at large, its mineral productions, hitherto diſcovered, are few and of little importance. Some valuable quarries of free-ſtone, and the ſlate, which is found of excellent quality, are the moſt profitable ones. Copper and lead ores are ſaid to have been found, but they have not yet been applied to uſe, and there are no collieries which offer much encouragement. There are ſome ſulphureous and chalybeate waters, of which that near Ballinahinch is moſt frequented. The uſeful vegetable productions are probably much the ſame as in other parts of Ireland. The graſſes moſt generally eſteemed, and other plants fit for cattle, are found in great variety and abundance; ſo that, notwithſtanding bad management, the general character of the whole iſland for paſture is applicable to this part of it. A ſpecies of roſe has lately been diſcovered in the northern parts of it, which differs from any before deſcribed, and to which the name of roſa Hibernica has been applied. It was diſcovered by Mr. Templeton. The Lagan is one of the principal rivers of this county. It riſes in the Sliebh-droob mountains, and making a ſweep to the weſt by Dromore, becomes the northern boundary, from the neighbourwood of Moira until it flows into Belfaſt lough. The Bann, celebrated for the purity of its waters, whence it obtained the epithet of *Silver*, riſes in the Mourne mountains, and taking a north-weſtern direction enters the county of Armagh, a little beyond Gillford. The waters of this river are eſteemed ſuperior to any other for the purpoſe of bleaching; and its banks are accordingly crowded with bleach greens. This is generally called the South or Upper Bann, to diſtinguiſh it from that which flows from Lough Neagh to the northern ocean. A muſcle found in this river, and the river Lagan, produces pearls, ſome of which have been much valued. The Newry river is a ſmall ſtream which riſes in the ſame mountains of Mourne, and after a ſhort courſe falls into the bay of Carlingford. The canal, however, which connects it with the Bann, and which has thus opened a connection with Lough Neagh, has rendered it of importance. Veſſels of 50 or 60 tons are thus enabled to paſs through the heart of Ulſter, and the benefits which have reſulted are a ſtriking proof of the advantages of inland navigation. There are other ſtreams which, though not deſerving the name of rivers, contribute greatly to the proſperity of the country. There are alſo ſeveral ſmall lakes abounding with fiſh, which form one of the many natural beauties of this county. There is alſo one large ſalt-water lake, communicating with the Iriſh ſea by a narrow gut, through which the tide ruſhes with great rapidity. This lake is called Lough Conn, or Strangford Lough, and covers upwards of 25,000 acres. (See STRANGFORD and CONN LOUGH).

The aſſiſe town is Downpatrick, but Newry is the place of greateſt importance. Four members repreſent this county in parliament, two knights of the ſhire, and one member each for the towns of Newry and Downpatrick. This county was early poſſeſſed by the Engliſh, and was formerly divided into two, called Down and Newtown; it appearing that John de Mandeville was made ſheriff of Down and Newtown in the year 1325. It was formerly called Uiladh, or Ullagh. It was invaded in 1177 by John de Courcey, afterwards earl of Ulſter, who built many caſtles, but his deſcendants were ſoon diſpoſſeſſed of it. At that time, it would appear from an old writer in Hollingſhed's collection, to have been called Ardes, which is at preſent the name of a diſtrict of it. Dubourdieu's account of Down. Beaufort's Memoirs, &c.&c.

DOWN, a biſhopric in Ireland, united with Connor, and in the province of Armagh. Theſe biſhoprics were both founded in the 5th century, and united in 1454. The extent of the united ſees, from the north of Antrim to the ſouthernmoſt point of Down, is 70 Iriſh miles. It contains 597,450 Iriſh acres, divided into 114 pariſhes, but from unions there are only 65 benefices. The church of Liſburn was by the patent of James I. conſtituted the cathedral for the united biſhoprics; but an act of parliament having been paſſed for reſtoring the cathedral of Down, in the city of Downpatrick, it has been repaired in a ſtyle of Gothic architecture, conformable to the venerable remains of the ancient building. Beaufort's Memoir of a Map of Ireland.

DOWM, in *Natural Hiſtory*, denotes the firſt feathers of geeſe, with which beds and pillows are ſtuffed. The cottony ſubſtance on the tops of thiſtles, &c. is alſo thus called.

DOWN *Dinner*, in *Rural Economy*, a word provincially employed to ſignify the afternoon luncheon.

DOWN-*Caſt*, a term among *Miners* and *Colliers*, for the ſinking down of the meaſures or ſtrata on one ſide of a fault, fiſſure, or vein; and that ſide of the ſame where the meaſures are loweſt, is ſaid to be down-caſt: it has generally been noticed (ſee COAL and COLLIERY) that the fiſſure overhangs or hades from the down-caſt ſide, or towards the upcaſt meaſures, which ſee.

DOWNE, or DOUNS, in *Geography*, a townſhip of America, in Cumberland county, New Jerſey.

DOWNHAM, or MARKET *Downham*, a market town and pariſh, included in the hundred of Clackcloſe, in the county of Norfolk, England; is ſeated on the declivity of a hill, which ſlopes to the river Ouſe, over which is a bridge at this place, and another very conſiderable ſtructure called Danver-Sluice, where the waters of the Cam unite with thoſe of the former river, and jointly flow through a flat, marſhy tract of land to Lynn, and on to the German ocean. Spelman ſays that a market was confirmed to this town by Edward the Confeſſor, and it appears that the principal manor here, with the whole hundred, were given by king Edgar to Ramſay abbey, in Huntingdonſhire. King John granted to this abbot a fair, and in the time of Henry III. he was authorized to try and execute malefactors at his "gallows of Downham." Here are now two annual fairs, and two weekly markets, one of which, on Mondays, is chiefly appropriated to the ſale of butter, which is conveyed by water to Cambridge, and thence to London, where it is known by the name of Cambridge butter. The ſale of this article was formerly averaged at 3000 firkins *per* week in ſpring and ſummer; but at preſent the ſale is not ſo great. Contiguous to the church were formerly ſome monaſtic buildings, particularly a priory of Benedictine monks. Downham is 11 miles ſouth of Lynn, and 84 north from London. In the year 1801 it contained 278 houſes, and 1512 inhabitants. Blomefield's Hiſtory of Norfolk, vol. vii. 8vo. edit. 1807.

DOWN-HAULER, in *Sea Language*, a rope which hoiſts down the ſtay-ſails, ſtudding-ſails, and boom-ſails, to ſhorten ſail, &c.

DOWNINGS, in *Geography*, a poſt town of America, in the ſtate of Pennſylvania and Cheſter county, on the eaſt ſide of Brandywine creek; 33 miles weſt by north of Philadelphia.

DOWNPATRICK, the chief town of the county of Down, in the province of Ulſter, Ireland. It is a place of great antiquity, being ſaid to have been noted before the time of St. Patrick. There is a rath or mount on the north ſide of the town, the conical height of which is ſixty feet, and its circumference 2100 feet: it is ſurrounded by three great ramparts, one of which is thirty feet high, the whole works being three quarters of a mile in circuit. As the Danes were frequently on this coaſt in the 7th, 8th, and 9th centuries, it is probable this may have been raiſed by them. The name of the town, (which ſignifies Mount of Patrick,) is ſuppoſed to have been derived from it. The celebrated De Courcey, the firſt earl of Ulſter, took poſſeſſion of Downpatrick in the 12th, and Edward Bruce deſtroyed it at the beginning of the 14th century. The deſtruction of the cathedral of Down, in 1538, was one of the articles of impeachment againſt Leonard, lord Grey, but it has been lately re-built. The town is at preſent tolerably large and populous, and is one which ſends a member to the imperial parliament. It has a good linen market, and its public buildings are reſpectable. It is 74 miles N. by E. from Dublin, and near 24 E.N.E. from Newry. W. long. 5° 38′. N. lat. 54° 18′.

DOWNS, a bank, or elevation, of ſand, which the ſea gathers and forms along its ſhores; and which ſerves it as a barrier.

The word is formed from the French *dune*, of the Celtic *dun*, a mountain. Charles de Viſch, in his Compend.

Chronolog. Exord. et Progreſs. Abbat. Clariſſ. B. Mariæ, de Dunis, ſays "Vallem reperit arenarum collibus (quos incolæ Duynen vocant) undique cinctam."

Downs are particularly uſed for a famous road for ſhips, along the eaſtern coaſt of the county of Kent; from Dover to the North Foreland.

This road has excellent anchorage, and is well defended by the caſtles of Sandwich, Deal, and Dover.

Here it is the Engliſh fleets generally meet.

DOWNTON, a market and borough town of Wiltſhire, England, is ſituated on the banks of the river Avon, at the diſtance of ſix miles S. of Saliſbury, and 90 miles S. W. of London. It is an ancient borough by preſcription, and ſent members to parliament from 23 Edward I. to 38 Edward II.; after which no member was returned (except once in 1 Henry V.) till 20 Henry VI. The returning officer is the deputy ſteward of the leſſee of the manor; and the right of election is in burgage holders, in number about one hundred. The church is a neat edifice, the tower of which has lately been raiſed more than thirty feet at the expence of the earl of Radnor. The poor have the benefit of a free-ſchool, which was founded by Gyles Eyre, eſq., and of a well regulated workhouſe. The principal employment of the poor is lace-making and malting. Here are alſo a good paper-mill, a griſt-mill, and tan-yard; alſo a conſiderable branch of the tick-weaving buſineſs is carried on in this town. Here was formerly a caſtle; part of the walls were ſtanding within the memory of the oldeſt inhabitants, but are now totally decayed. Downton has two annual fairs, and a weekly market; but the latter is now merely nominal, from its contiguity to the more important market of Saliſbury. The pariſh of Downton is returned as containing 509 houſes and 2426 inhabitants. The living is a vicarage, to which Nuncton chapel is annexed. In this town was born Dr. Raleigh, (brother of the celebrated ſir Walter) who was ſignalized by his ſufferings in the civil wars of Charles I.

DOWNY, ſomething partaking of the nature of down. Thus ſome leaves and fruit, &c. are ſaid to be covered with a downy matter.

DOWRY. Dos, is properly the money, or fortune, which the wife brings her huſband in marriage, to have the uſe of it, during her marriage, towards ſupporting the charge thereof.

It is otherwiſe called *maritagium*, marriage goods; by the Romans *dos*; and it differs from dower. See Dower.

Among the Germans, it was anciently cuſtomary for the huſband to bring a dowry to his wife. "Romanos non in uſu fuit uxoribus dotes retribuere; ideo verbo genuino carent quo hoc dignoſcitur; & rem ipſam in Germanorum moribus miratur Tacitus: dotem inquit, non uxor marito, ſed uxori maritus affert." Spelman.

Dowry is alſo uſed, in a monaſtic ſenſe, for a ſum of money given along with a maid, upon entering her in ſome religious order.

In France, the dowry of perſons entering a monaſtery, to make profeſſion of a religious life, is limited by law. That, *e. gr.* given upon entering a monaſtery of Carmelites, Urſulines, and others, not regularly founded, but eſtabliſhed ſince the year 1600, by letters patent, muſt not exceed the ſum of 8000 livres, in towns where parliaments are held; nor 6000 in other places.

DOWSEINES, a ſort of kerſeys made in Devonſhire, in length twelve yards; whence alſo their name, which is otherwiſe writ doſens, dozens, or dozeins

DOXOLOGY, an appellation given by the Greeks to the angelic hymn, or canticle of praiſe, ſung by the Romans in the maſs; and which, in conformity to the fourteenth verſe of the ſecond chapter of St. Luke, *Glory be to God in the higheſt*, &c. they call *Gloria in excelſis*, becauſe it begins in Greek with the word δοξα, *glory*.

This they diſtinguiſh in their liturgies by the name of *great* doxology; and the *Gloria Patri et Filio*, &c., *Glory be to the Father*, &c., they call the *leſs* doxology, as beginning with the ſame word δοξα: with this the chant or pſalm ends.

Philoſtorgius, lib. iii. n. 13. gives three formulas of the leſſer doxology. The firſt is, *Glory be to the Father, and to the Son, and the Holy Ghoſt;* the ſecond, *Glory be to the Father by the Son, in the Holy Ghoſt;* and the third, *Glory be to the Father in the Son, and the Holy Ghoſt.*

Sozomen and Nicephorus give a fourth; *viz. Glory be to the Father, and the Son, in the Holy Ghoſt.*

The firſt of theſe doxologies is that in common uſe throughout the weſtern church. It was firſt inſtituted about the year 350, by the Catholics of Antioch, then called Euſtathians. The three others were compoſed by the Arians; the ſecond was that of Eunomius and Eudoxus, and which was approved by Philoſtorgius. The three were all made about the year 341, in the council of Antioch, when they firſt began to diſagree among themſelves. Philoſtorgius aſſures us, that Flavian, afterward patriarch of Antioch, was the author of the firſt, or Catholic doxology; but Sozomen and Theodoret ſay nothing of it; and Philoſtorgius's ſingle authority is hardly ſufficient.

There were anciently very great diſputes, and principally at Antioch, as to the form of doxology; that moſtly uſed among the orthodox was the ſame as ſtill obtains; the reſt were affected by the Arians, and other Antitrinitarians; yet St. Baſil, in his book on the Holy Spirit, defends the ſecond as orthodox and legitimate; and it is certainly more agreeable to ſcripture authority; to which we muſt ultimately appeal, as the only infallible rule of our devotion, as well as of our conduct: and it has been urged, that no inſtance of the former doxology occurs in the New Teſtament: and "it matters not much to inquire," ſays Dr. Lardner, "when this doxology was firſt uſed, or how long it has been in uſe, if it be not in the New Teſtament." It has been ſaid, that we have ſeveral different doxologies in the epiſtles of the New Teſtament, but none of the former kind; and thoſe that occur in the moſt early Chriſtian writers are agreeable to thoſe we find in the ſcripture.

Some authors write hymnology as ſynonymous with doxology; but there is a difference; hymnology is applied to pſalms, or the recitation of pſalms; and doxology only to the little verſe, *Glory be to the Father*, &c. repeated at the end of each pſalm.

In Italy the moſt elaborate muſical compoſitions for the church have been produced by the greateſt maſters to the *Gloria Patri;* and, in England, beſides Handel's ſublime and reverential ſtyle of compoſition to the doxologies, our own countrymen, Purcell, Blow, and Crofts, have ſurpaſſed their uſual force and energy in ſetting theſe ſacred words.

DOYACACE, in *Geography*, a town of Poland, in the palatinate of Lemberg; 36 miles E.S.E. of Lemberg.

DOYET, a town of France, in the department of the Allier and diſtrict of Montmarault; ſeven miles W. of Montmarault.

DOYLSTOWN, a village of America, having a poſt-office, in the ſtate of Pennſylvania and county of Bucks; 15 miles N. of Newton, and 33 W. by N. of Philadelphia.

DOZARY, a town of Lithuania, in the palatinate of Minſk; 36 miles N.N.E. of Minſk.

DOZEIN, Decenna. In the ſtatute for view of frank-pledge, made 18 Edw. II. one of the articles for ſtewards in their leets to enquire of, is, if all the dozeins be in the aſſize of our lord the king, and which not, and who received them. Art. 3. See Deciners.

Dozein is alſo uſed for a ſort of Devonſhire kerſeys. Anno 5 and 6 Edw. VI. cap. 6. See Dowseine.

DOZELLINA, in *Ichthyology*, a name by which ſome authors have called the muſtela of the common ſpecies, which we in Engliſh term the ſea-loche and whiſtle-fiſh. See Gadus *Muſtela*.

DOZZAND, in *Agriculture*, a term uſed provincially to ſignify ſhrivelled, or not full and plump.

DRA, in *Geography*, a province of Morocco, E. of the province of Suz and N. of Vled-de-Nun, adjoining to the province of Geſula; both of which are in the neighbourhood of mount Atlas, which, in this ſouthern part of the country, extends almoſt to the ſea.

DRAABURG, or Ober-Traaburg, a town of Germany, in the duchy of Stiria; 56 miles E. of Clagenfurt and 42 E.N.E. of Brixen. N. lat. 46° 48′. E. long. 12° 49′.

Draaburg, or *Unter-Traaburg*, a town of Germany, in the duchy of Carinthia; 112 miles S.S.W. of Vienna, and 48 W.N.W. of Pettaw.

DRABA, in *Botany*, Δραβη of Dioſcorides, Whitlow-graſs. Linn. Gen. 333. Schreb. 436. Willd. Sp. Pl. v. 3. 424. Juſſ. 240. Gærtn. t. 141. Claſs and order, *Tetradynamia Siliculoſa*. Nat. Ord *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four ovate, concave, ſlightly ſpreading, deciduous leaves. *Cor.* cruciform, of four oblong, ſomewhat ſpreading, petals, with very minute claws. *Stam.* Filaments ſix, about the length of the calyx, of which four oppoſite ones are rather longer than the other two, and ſlightly ſpreading; anthers ſimple. *Piſt.* Germen ovate; ſtyle ſcarcely any; ſtigma capitate, flat. *Peric.* Pouch elliptic-oblong, compreſſed, entire, deſtitute of a ſtyle, of two cells, with a partition parallel to the valves, which are ſlightly concave. *Seeds* ſeveral, ſmall, roundiſh.

Eſſ. Ch. Pouch entire, long-oval: valves flattiſh, parallel to the partition. Style ſcarcely any.

Obſ. In ſome ſpecies the petals are ſeparated into two parts, even to their very claws; in others they are merely notched at the ſummit; while in others again they are entire. The form of the pouch, as above expreſſed, is the important character.

Willdenow enumerates 16 ſpecies of *Draba*, of which 11 have a naked ſtem, or ſtalk, and the reſt a leafy ſtem. D. *aizoides*, Curt. Mag t. 170, Engl. Bot. t. 1271, is a very hardy perennial, forming tufts of cluſtered leaves, and bearing bright yellow bloſſoms in March and April, very fit for the ornamenting of rock work. D. *verna*, Curt. Lond. faſc. 1. t. 49, Engl. Bot. t. 586, an annual white-flowered ſpecies, common on walls and dry barren ground, is one of our firſt harbingers of ſpring. Both theſe have naked ſtalks, and there are ſeveral alpine ſpecies akin to them. D. *pyrenaica*, Jacq. Auſtr. t. 228, decorates the loftieſt mountains of Europe with its pale purple diminutive flowers, in the ſpring and early ſummer, and vies with the neighbouring *Androſaces* and *Aretiæ* in beauty. Of the leafy-ſtalked kinds, D. *muralis*, Engl. Bot. t. 912, and D. *incana*, t. 388, are the principal. They have a rough herbage, and ſmall white flowers. The flavour of the whole genus is acrid and muſtard-like. The name Whitlow-graſs has been applied to this genus, becauſe D. *verna* is one of the plants that have been taken for the Παρονυχια of the ancients, but its virtues in curing whitlows are not much relied on at preſent. Sheep are ſaid to be fond of it.

Draba, ſee Cochlearia, ſp. 9.

DRABESCUS, in *Ancient Geography*, a town of Thrace, which belonged to Macedonia, when this kingdom extended to the eaſt; W. of Philippi, towards the river Strymon.

DRABICIUS, in *Biography*, a divine of note, was born about the year 1587, at Stranſnitiz in Moravia, and, after the uſual preparatory ſtudies, he was admitted a miniſter among the Proteſtants in the year 1616. The duties of his ſtation he continued to exerciſe till the year 1629, when the imperial edicts againſt thoſe who profeſſed and taught the reformed religion, forced him from his native country to Lednitz, a town in Hungary, where he engaged in trade, in order to furniſh the means of ſupporting his family. This ſtep, which was as honourable to an active mind as prudent, gave offence to his brethren, who regarded it as diſgraceful to the miniſterial character. Soon after this he was reproved, and, at length, ſuſpended from the duties of his profeſſion, for the vice of drunkenneſs. Openly he exhibited marks of penitence and reformed manners, but it was ſuppoſed that he ceaſed not, in private, to indulge in propenſities that had been habitual to him; and to this courſe of intemperance was imputed a derangement of his intellects, which induced him to believe, at leaſt to avow, that he was favoured with divine communications, and that he was choſen by Almighty God to ſuſtain the character of a prophet. Under this kind of influence, he denounced vengeance againſt the houſe of Auſtria, and predicted to himſelf, and his brother refugees, a ſpeedy reſtoration to their country and their rights, by means of armies which ſhould come from the north and from the eaſt, the latter of which was to be commanded by Ragotſki, prince of Tranſylvania. Unfortunately for the credit of the prophet, almoſt all his predictions were falſified by ſubſequent events: and thoſe who had hoped rather than expected the deliverance which he held out, abandoned him to contempt. Drabicius was not, however, cured of his folly, he continued to threaten on the one hand, and to promiſe ſalvation on the other; and, about the year 1650, Comenius, being brought into Hungary by buſineſs, was viſited by the prophet, who explained to him all his expectations. Comenius ſeems to have been ſatisfied with the pretenſions of his friend to divine inſpiration, was admitted into his confidence, and declared coadjutor in the miſſion. They united in invoking the aid of Sigiſmund Ragotſki to carry into effect the divine judgments. Finding him unwilling to co-operate with their deſigns, they entreated, they even threatened him with the vengeance of Almighty God; ſtill he refuſed to act, and continued in peace till his death, in the year 1652. To George Ragotſki, the brother and ſucceſſor of Sigiſmund, they now applied, and were in ſome degree countenanced by his authority. Drabicius was reſtored to the exerciſe of his miniſtry, and his viſions became more frequent in proportion to the rank which he held in the eſtimation of the public. To Comenius he communicated all his projects, who was now in Poland, and who had orders to proclaim the reſult of every new viſion to all nations, but particularly to the Turks and Tartars. Comenius, however, publiſhed the account only at Amſterdam, and there with a diffidence which ill accorded with a ſound and firm faith in the verity of the tranſactions. But when Ragotſki actually commenced war againſt the emperor, by making an irruption into Poland, he felt confident that the criſis was actually arrived when the predictions of Drabicius would be all accompliſhed, and he announced their publication with much confidence, in a work entitled "Lux in Tenebris." Succeeding events gave the lie to all their promiſed dreams, but the credit of the prophet was not deſtroyed, and he continued to announce new viſions, and Comenius, encouraged by a deluded public, gave an abridgment of his work, and afterwards publiſhed the whole, with additions, down to 1666. From this time we hear little of Drabicius, and the event of his ſucceeding days is not at all aſcertained. According to ſome writers he was burnt as an impoſtor, but according to others he was obliged to fly from Tranſylvania into Turkey. Bayle. Moreri.

DRABLER, in the *Sea-Language*, a ſmall ſail in a ſhip, which is the ſame to a bonnet that a bonnet is to a courſe, and is only uſed when the courſe and bonnet are too ſhoal to clothe the maſt. See Bonnet and Course.

DRABOWICE, in *Geography*, a town of Poland, in the palatinate of Kiov; 36 miles S.W. of Czerkaſy.

DRABS, in the Engliſh *Salt-Works*, a name given to a ſort of wooden caſes in which the ſalt is put as ſoon as it is taken out of the boiling-pan. Theſe are partitions like ſtalls made for horſes; they are lined on three ſides and at the bottom with boards, and at the front have a ſliding board to put in or take out occaſionally. Their bottoms are made ſhelving, being higheſt at the backſide, and gradually inclining forwards; by which means the ſaline liquor that remains mixed with the ſalt eaſily drains out from it, and the ſalt in three or four days becomes ſufficiently dry, and is then taken out and laid up in large heaps for ſale. In ſome places they uſe cribs inſtead of the drabs. See Crib.

DRAC, Le, in *Geography*, one of the principal rivers of the department of the Iſere, in France, which has its ſource in the department of the Upper Alps. After heavy rains, the water pouring down from the mountains ſwells it to a torrent, which overflows its banks and overthrows every obſtacle to its violence. It abounds with fine trouts.

DRACÆ, in *Ancient Geography*, a people of Aſia, who inhabited the parts adjoining to mount Caucaſus.

DRACÆNA, in *Botany*, (Δρακαινα, *a female dragon*, ſo applied by Vandelli, becauſe the original ſpecies had been named *Draco arbor* by the old botaniſts, and *Draco* was preoccupied, as the appellation of a genus in *Zoology*.) Vandelli Diſſ. et Faſc. Plant. t. 2. Linn. Mant. 1. 9. Syſt. Nat. ed. 12. v. 2. 246. Schreb. 224. Willd. Sp. Pl. v. 2. 155. Juſſ. 40. Mart. Mill. Dict. v. 2. Gærtn. t. 16. (Dianella; Lamarck Encycl. v. 2. 276. Juſſ. 41. Redoutè Liliac. t. 1.) Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Sarmentaceæ*, Linn. *Aſparagi*, Juſſ.

Gen. Ch. *Cal.* none *Cor.* Petals ſix, oblong, rather ſpreading, equal, cohering by their claws. *Stam.* Filaments ſix, inſerted into the claws, awl-ſhaped, thickened in the middle, membranous at the baſe, ſcarcely ſo long as the corolla; anthers oblong, incumbent. *Piſt.* Germen ovate, with ſix furrows; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma three-cleft, obtuſe. *Peric.* Berry ovate, with ſix furrows and three cells. *Seeds* moſtly ſolitary, ovate-oblong, incurved at the ſummit.

Eſſ. Ch. Petals ſix, upright, cohering at their baſe. Filaments ſwelling in the middle. Berry of three cells. Seeds moſtly ſolitary.

The firſt ſpecies, D. *Draco*, Syſt. Veg. ed. 14. 333, (Aſparagus Draco, Sp. Pl. 451; Draco yuccæformis, ſeu Dracæna, Vand. Faſc. Plant. 12. t. 2; Draco arbor, Bauh. Pin. 503. Cluſ. Hiſt. v. 1. 1) is a native of the Eaſt Indies, with an arboreous thick *ſtem*, branched and level-topped, crowned with tufts of lanceolate pungent large *leaves*. *Flowers* white, in large, terminal, compound ſpikes. The ſtem and roots exude a crimſon reſin, one of thoſe kept in the ſhops under the name of Dragon's blood. D. *terminalis*, Syſt. Veg. 334. Jacq. Ic. Rar. v. 2. t. 448. (Aſparagus terminalis, Sp. Pl. 450.) a native of the Eaſt Indies and South ſea iſlands, was found by captain Cook very uſeful in making a kind of beer. The juices of its root are ſweet and mucilaginous. A variety with purple leaves, as figured by Jacquin, is common in our ſtoves. This is conſidered as a ſort of ſacred plant, and an emblem of peace and friendſhip among the natives of the South ſea iſlands, and is planted about their places of worſhip and burial. D. *enſifolia*, (Dianella nemoroſa of Lamarck, and Jacq. Hort. Schoenbr. v. 1. t. 94; Dianella enſifolia, Redout. Liliac. t. 1,) grows in the iſlands of Mauritius and Bourbon, as well as in the Eaſt Indies and New South Wales. It is now not rare in our greenhouſes. Its *ſtem* is herbaceous, *flowers* panicled, green *berries* blue. D. *borealis*, Ait. Hort. Kew. v. 1. 454. t. 5, a rare plant in gardens, though very hardy, is a native of Hudſon's bay. It has elliptical *leaves*, and an almoſt naked herbaceous *ſtem*. The whole herbage is ſomewhat pubeſcent, which in this genus is remarkable.

Dracæna, in *Zoology*, is the name of a ſpecies of American lizard. See Draco.

DRACANIUM, or Dracanon, in *Ancient Geography*, a mountain of Aſia Minor, in Caria.

DRACHENFELS, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and capital of a diſtrict in the electorate of Cologn, with a citadel; four miles S. E. of Bonn, and ſeven N. N. W. of Linz.

DRACHM, Δραχμη, an ancient ſilver coin, uſed among the Greeks; equal to the eighth part of an ounce, both in weight and coinage, and at a medial value nine pence ſterling. See Coin.

This they divided into ſix oboli; and their larger coins above the drachm were the didrachm, or double drachm, worth 18*d.*, tridrachm, or three drachms, or 2*s.* 3*d.* of our money, and tetradrachm, or ſtater, worth four drachms or 3*s.* ſterling; and this is the largeſt form of Greek ſilver coins, except the tetradrachm of the Eginean ſtandard, which is worth five ſhillings.

There are many ſubdiviſions of the drachm in ſilver. The higheſt is the *tetrobolion*, or coin of four oboli, being in proportion to the drachm as our groat to a ſix-pence; it weighs about 44 grains, and is worth 6*d.* The next is the *hemidrachm*, or *triobolion*, a piece of half the drachma, or about 33 grains; worth four-pence half-penny. The ſilver *diobolion*, or third of the drachm, weighing about 22 grains, is worth 3*d.* The *obolus* of ſilver weighs about 11 grains, and in ancient currency bore the value of 1½*d.* There is likewiſe the *hemiobolion* in ſilver, or half the obolus, of 5½ grains, worth a half-penny farthing; and the *tetartobolion*, *dichalcos*, or quarter obolus, which is the moſt minute coin yet found, being of 2¾ grains, and its current worth a farthing and a half. The laſt coins are ſo very ſmall, that it is no wonder they have periſhed; but there is one of Athens in Dr. Hunter's cabinet; and Mr. Stuart is ſaid to have brought ſome from Athens. Mr. Pinkerton (Eſſay on Medals, vol. i.) is of opinion that they alſo occur of Tarentum.

The drachm was likewiſe a weight as well as a piece of money; and the mina contained a hundred drachmæ, both as a ſum and a weight; and their talent ſixty minæ, and ſix thouſand drachmæ, both by weight and tale; and this method of reckoning was common to all Greece; ſo that if the drachma of one city differed from that of another, their talents differed in the ſame proportion.

Although in coinage, as well as in medical weight, eight drachms went to the ounce, and the mna or mina or pound of 12 ounces in courſe had 96; yet four were given to the round ſum to ſupply defects in alloy, conformably to a common practice in all ages and countries of giving ſome addition to a large weight. Thus the pound in weight had but 96 drachmæ in fact, while the pound in tale had 100; as the Roman libra in weight had but 84 denarii, in tale 100;

and as one pound in tale, by an inverſe progreſs, is not a third of our pound in weight.

We ſhall here obſerve, that the coins of Ægina were famous among the Greeks for antiquity and peculiarity; Ægina having long maintained her glory and independence, for in the war of Xerxes againſt Greece, ſhe was miſtreſs of the ſea by means of a numerous navy; and Herodotus tells us that of all the cities engaged in that arduous conflict, ſhe bore away the palm. Some authors inform us, that the firſt money coined at all was that ſtruck in the iſland of Ægina by Phidon, king of the Argives; and his reign is fixed by the Arundelian marbles to an era, correſponding to about 820 years before Chriſt.

The coinage of Ægina was different from the common Greek ſtandard; inſomuch that the drachma of Ægina was worth 10 Attic oboli, while the Attic drachma was worth only ſix. Hence the Greeks gave the drachmas of Ægina the name of παχειαν, or thick, a name peculiarly applicable to the very coins of which we ſpeak. According to a juſt proportion, the drachma of Ægina ſhould weigh about 110 grains; and one of the coins, preſerved in Dr. Hunter's cabinet, very much rubbed, weighs 90. The others of larger ſize, which ſeem to be didrachms of Ægina, weigh from 181 to 194 grains; but an allowance of about 10 grains being made for the waſte of 2400 years in ſo ſoft a metal as ſilver, the drachma of Ægina would be brought to nearly its proper ſtandard. The obolus of Ægina was in proportion to its drachma of ſix oboli, and is the piece of $15\frac{1}{2}$ grains, and of 13, when rubbed very much; the hemiobolion is that of eight, which, if perfect, ſhould weigh nine. Gronovius labours to prove, that the Corinthians uſed the ſtandard of Ægina, but the oldeſt coins of Corinth, as well as the lateſt, are all upon the common Attic model.

The Attic drachma has been ſuppoſed by moſt authors, before Greaves, who firſt ſuggeſted the contrary, to have been the ſame, among the Greeks, with the denarius, among the Romans; which was equivalent to four ſeſterces. Of this opinion is Budæus, De Aſſe; who confirms it from the authorities of Pliny, Plutarch, Strabo, and Valerius Maximus, with whom δραχμη is ſynonymous with denarius. Plin. Nat. Hiſt. lib. xxi. fin.

A. Gellius, who reſided long at Athens, and could not be ignorant of the value of the current money of that city, ſays, that ten thouſand drachms were in Roman money ſo many denarii. Lib. i. cap. 8. See alſo Val. Maxim. lib. vii. cap. 6. and Strabo Geog. lib. v. the former of whom writes, that a certain commodity was ſold for two hundred denarii; and the latter, in ſpeaking of the ſame thing, ſays, that it was bought for two hundred drachmæ. But this is no ſtrong conviction, that the two coins were preciſely of the ſame value; thoſe authors, not treating expreſsly of coins, might eaſily render the one for the other, provided there were no conſiderable difference between them. Greaves's Miſc. Works, by Birch, vol. i. p. 287, &c. 8vo.

Scaliger, in his diſſertation, De Re Nummaria, does not ſay abſolutely that the denarius and drachma were the ſame thing; but from the Greek paſſage in an ancient law, c. xxvi. Mundati, where the drachma is ſaid to be compoſed of ſix oboli, he concludes, that in the age of Severus, at leaſt, they were the ſame. But Agricola, De Menſ. & Ponder. lib. xiv. ſhews from Pliny, Celſus, and Scribonius Largus, that the denarius contained only ſeven ounces; and from Livy, Appian, Cleopatra, &c. that the drachma contained eight; and maintains, that when ſome Greek authors ſpeak of the ounce as only containing ſeven drachms, they do not mean the Attic drachm, but the Roman denarius, which Greek authors render by δραχμη. We learn from Galen, that the writers on weights and meaſures differed in the number of drachms or denarii, which they aſſigned to an ounce; moſt of them making it to contain ſeven and a half, ſome but ſeven, and others eight. De Med. Comp. ſec. Genera, lib. iii. cap. 3.

Gronovius agrees with Agricola, that the drachma was the eighth part of an ounce; and the opinion is confirmed by Iſidore, lib. xiv. cap. 24. by Fannius, who ſays as much in expreſs terms, and by Voluſius, who divides the ounce into twenty-four ſcriptuli, or ſcruples, of which the drachm comprehended three.

It is probable, that, when the Romans became maſters of Greece and Aſia, the Athenians might find it their intereſt to lower their drachm to the weight of their denarius, long before they were reduced into the form of a Roman province by Veſpaſian. When they did this is uncertain; but it appears by the treaty between the Romans and Antiochus, recorded by Polybius, Excerp. Leg. ſect. 35. and by Livy, lib. xxxviii. cap. 38. which ſtates the Euboic talent at eighty Roman pounds; and ſuppoſing this to be equal to the Attic, and to contain ſix thouſand Attic drachms, and eighty Roman pounds to contain ſix thouſand ſeven hundred and twenty denarii, that the weight of the Attic drachm muſt have been to that of the denarius as 6720 to 6000; and this proportion is confirmed by an anonymous Greek fragment, publiſhed by Montfaucon, which makes a hundred Attic drachmæ equal to a hundred and twelve denarii. Anal. Græc. p. 393. Paris 1688.

Greaves concludes, after weighing a number of Attic tetradrachms, and ſtating the weight of the tetradrachm at two hundred and ſixty-eight grains, that the Attic drachm was ſixty-ſeven grains. J. Caſpar Eiſenſchmid, in his book De Pond. & Menſ. Vet. from an ancient tetradrachm weighing three hundred and thirty-three Paris grains, and by eſtimating the proportion between the Roman pound and Attic talent, mentioned by Livy, lib. xxxviii. makes the drachm $83\frac{1}{4}$ Paris grains, or almoſt $68\frac{1}{10}$th Troy.

Mr. Raper has eſtimated the weight of the Attic drachm, by comparing it with the gold coins of Philip and Alexander, which were probably formed upon that ſtandard. They both coined gold of 4, 2, 1, and $\frac{1}{2}$ an Attic drachm; and from a mean of twenty-one Philippics, which were equivalent to two drachmæ, preſerved in the Britiſh Muſeum, and in private collections, or mentioned by other writers, he infers, that the ſtandard weight of the Philippic was not leſs than 133 troy grains; which agrees very nearly with the weights of ſome preſerved ſilver drachms of Philip and Alexander, and with the mean weight of ſeven perfect ſilver tetradrachms of Alexander, which give a didrachm a little more than $132\frac{1}{2}$ grains. He obſerves, that the gold Philippics, both of Alexander and his father, are ſo correctly ſized, and ſo perfect, that the mean didrachm, derived from them of 133 troy grains, muſt be very near its juſt weight; and its half, $66\frac{1}{2}$ grains, that of the Attic drachm. Then, for the value of it, as ſixty-two Engliſh ſhillings are coined out of eleven ounces two penny-weight troy, of fine ſilver, and eighteen penny-weight of allay, the troy grain of fine ſilver is worth $\frac{62}{111}$ths of a farthing; and ſince the Greeks and Romans uſed no allay in their money, but eſteemed what they coined to be fine ſilver, the Attic drachm of $66\frac{1}{2}$ grains will be found worth a little more than $9\frac{1}{4}$*d.* or, for the eaſe of reduction:

	£.	*s.*	*d.*
The Attic drachm may be ſtated at	0	0	9.286
The obolus a little more than	0	0	$1\frac{1}{2}$
The chalcus about	0	0	0 $\frac{7}{9}$ of a farthing,

The

	£.	s.	d.
The mina	3	17	4.6 or 3.869 *l.*
The talent	232	3	0 or 232.15 *l.*

Phil. Tranſ. vol. lxi. part ii. art. 48.

Others eſtimating the ancient Roman ounce equal to the modern one, or to 536 French grains, and the Attic drachma at 67 grains, and ſuppoſing the ſilver at Athens of the ſame fineneſs with ours, make it equal to 7¾*d.* ſterling. See Coin.

Drachm, or *Dram*, is alſo a weight uſed by our phyſicians, containing juſt ſixty grains, or three ſcruples, or the eighth part of an ounce troy, and the ſixteenth of an ounce avoirdupois.

Drachm was likewiſe an ancient Jewiſh money; having on one ſide a harp, and on the other ſide a bunch of grapes.

This coin was a half ſhekel; and was ſo called by the Jews. It is only the Greeks called it δραχμη. It was equal to two Attic drachmæ See Shekel.

DRACHONTIUS, in *Ancient Geography*, an iſland of the Mediterranean ſea, near Africa; placed by Ptolemy N. of the promontory of Apollo, and S.E. of the iſle of Sardinia.

DRACIA, in *Geography*, a river of Boſnia, which runs into the Drin; 5 miles N.E. of Orach.

DRACKEMBOURG, or Drakemburg, a ſmall town of Germany, on the Weſer, 6 miles N. of Nienburg, famous for a battle which was fought in its neighbourhood in 1547, between the Auſtrians and the Saxons.

DRACMÆ, in *Ancient Geography*, a people of Aſia, in Aria. Ptolemy.

DRACO, Dragon, in *Aſtronomy*, a conſtellation of the northern hemiſphere; whoſe ſtars, according to Ptolemy, are 31: according to Tycho, 32; according to Hevelius, 40; according to Bayer, 33, and according to Mr. Flamſteed, 80. See Constellation.

DRACO, in *Biography*, ſucceeded Triptolemus as legiſlator at Athens, in the 39th olympiad, 324 years B.C. When the laws of Triptolemus were become obſolete, or found inſufficient for the regulation of the ſtate, Draco inſtituted a new code, which was ſo extremely rigorous, that his laws were ſaid to be written in blood. Under his ſyſtem of legiſlation, death was the penalty for every kind of offence, in vindication of which he alleged, that as ſmall faults ſeemed to him worthy of death, he could find no ſeverer puniſhment for the greateſt crimes. Such, however, was his abhorrence of the crime of taking away life, that he directed a proſecution to be inſtituted even againſt inanimate things, which had been inſtrumental to this purpoſe, and ſentenced a ſtatue, which had fallen upon a man and killed him to be baniſhed. This circumſtance, if the report of tradition be well founded, affords ſufficient evidence of the rude ſtate of legiſlation in his time. His laws, however, were the reſult of age and experience, and they owed their effect to the opinion that was entertained of his virtue and patriotiſm. The Athenians could not endure their rigour, and the legiſlator himſelf was obliged to withdraw to the iſland of Ægina. Here his popularity was ſuch that he was ſuffocated at the public theatre, amidſt the applauſes of the people. The rigour of his diſcipline was, in ſome meaſure, relaxed by Solon, in the 46th olympiad. See Athens.

Draco, in *Ancient Geography*, a mountain of Aſia Minor, which, according to Pliny, abutted on mount Tmolus on one ſide, and on the other on mount Olympus.

Draco, in *Zoology*, a genus of amphibious animals of the reptile kind, the body of which is four-footed, tailed and furniſhed at each ſide with a wing-like membrane. Linnæus ſpeaks of two diſtinct ſpecies, the *volans* and *præpos*, the laſt of which he deſcribes on the authority of Seba, and theſe appear as two ſpecies in the Gmelinian edition. There are nevertheleſs writers who conſider the latter as a variety only of the other, and thus admit only a ſingle ſpecies in this genus. On the contrary the French naturaliſts, Daudin eſpecially, maintain that there are three kinds at preſent known, and which are diſtinguiſhed by the appellation of the green, the rayed, and the brown. The principal and beſt authenticated ſpecies, however, appear to be the following:

Volans. Anterior legs unconnected with the wings. Linn. *Lacerta volans indica*, Raj. *Lacerta africana volans, s. Draco volans*, Seba. *Dracunculus*, Bont. Jav. *Flying dragon*, Shaw.

The length of this curious creature is about nine or ten inches, the tail being very long in proportion to the body, which does not exceed four inches in length. The head is of a ſingular form, being furniſhed on the under part with a very large triple pouch, one portion of which deſcends beneath the throat, while the two remaining parts project on each ſide; all are ſharp pointed, and ſeem analogous in ſome degree to the gular creſts of the Guana lizard. The head is of moderate ſize, the mouth rather wide; the tongue large and thick at the baſe, the teeth ſmall and numerous; the neck rather ſmall; the body and limbs ſomewhat ſlender, and entirely covered with ſmall, pointed, and cloſely ſet ſcales. The colour is an elegant pale blue, or blueiſh grey, the back and tail marked by ſeveral tranſverſe duſky undulations, and the wings with variouſly formed patches of black, deep brown, and white; the lower ſurface of the animal entirely pale, or whitiſh brown.

The flying dragon is an inhabitant of Africa and Aſia, and like moſt of the ſmaller kinds of lizards delights in wandering about trees in ſearch of inſects and worms on which it feeds. From the peculiar ſtructure of the lateral proceſſes it is enabled to ſpring from bough to bough in purſuit of its inſect food with the greateſt facility, or even for a ſhort time to follow them on the wing like the bat or flying ſquirrel. On the ground it walks indifferently, and therefore ſeldom deſcends from the boughs of the trees, or if it does, takes as ſpeedily as poſſible to the water, in which element it moves and ſwims with great celerity. It is oviparous, and depoſits its eggs in the hollows of trees, where they remain to be hatched by the heat of the ſun, and claim no further regard from the parent animals.

Præpos. Wings coaleſcing with the arms. Linn. *Draco volans americanus*, Seba.

This is admitted by Linnæus and Gmelin as a diſtinct ſpecies from volans on the teſtimony of Seba, who repreſents it as a native of America: at preſent this kind appears to be unknown to naturaliſts, and the deſcription of it may poſſibly have been formed only from an accidental variety or imperfect example of the firſt mentioned ſpecies.

Linnæus in the Amoen. Acad. and alſo in the earlier editions of the Syſtema Naturæ refers this animal (volans) to the lacerta tribe, but from this he was afterwards induced to ſeparate it, becauſe though in the general form this animal agrees with others of the lacerta, it differs altogether in the remarkable peculiarity of the lateral membranes. Linnæus therefore inſtituted a new genus for its reception, and from a fanciful reſemblance which he conceived it bore to the deſcription of the dragon tranſmitted to us in the fables of antiquity, gave it the appellation of Draco.

It is ſcarcely to be imagined, in the preſent period, that the reader can poſſibly, from a ſimilarity of names, aſſimilate in any manner the fabulous hiſtory of that ſuppoſed monſter, the dragon, with that of the little inoffenſive animal now under conſideration. Neither need any one, it is preſumed, be told that the dragon of antiquity is a creature ſolely of poetic birth. The tales related of this aſtoniſhing being may amuſe our infant years, but are too remote from reaſon for a moment to intereſt the ſerious attention of the naturaliſt. There is nothing in the wide expanſe of creation's range apparent to our knowledge that can incline us to believe even that the conception of the "dragon" originated from any natural object: it is aſſuredly the ſpontaneous offspring of a glowing imagination created in immediate ſubſerviency to the mythology of remote antiquity, and in which it conſtitutes a pre-eminent character. The exiſtence of the dragon was firmly accredited among the ancients of almoſt every nation both in the eaſtern and weſtern regions of the earth, as may be clearly deduced from numberleſs authorities: it occurs in the ſacred allegories of the Jews, and in the legends of the Chineſe, from the earlieſt times of which any record is preſerved, and even to this period is an object of worſhip in China; the like may be alſo ſaid of Japan, and indeed of moſt oriental countries. The claſſic poets of Greece and Rome afford abundant repreſentations of this formidable monſter; the dark retreats of their gods, and their ſacred groves were defended by dragons, and the Romans, Perſians, and various other nations, fought under its banners and protection. The chariot of Ceres was drawn by dragons, and a dragon kept the garden of the Heſperides. In the Scandinavian myſteries the dragon was the miniſter of vengeance under their vindictive gods, and the Britons, like the Gauls, entertained a ſimilar idea of its vengeful powers, while enſlaved in the trammels of Druidic ſuperſtition. The dragon of the ancients was repreſented as poſſeſſing attributes ſometimes even approaching divinity: his form was that of a ſerpent with wings and feet: his ſize was affirmed to be ſtupendous, and the powers he poſſeſſed deſtructive and irreſiſtible: his agility in flight was compared ſometimes with that of an eagle, or ſometimes with the velocity of lightning; and it was furthermore declared, that the brilliancy of his eyes was alone ſufficient to diſſipate the darkneſs of midnight!—The exiſtence of ſuch a marvellous monſter was believed—and may perhaps by ſome be ſtill admitted!—It is not to be denied that the vulgar belief in dragons, as in mermen and mermaids, has the ſanction of the older naturaliſts; and, in truth, we muſt alſo ſay, of ſome credulous writers in the preſent as well as earlier days. There can be no doubt that all the animals deſcribed and figured by thoſe authors, whether ancient or modern, under the ſpecious names of dragons, &c. are merely fictitious beings, either artificially compoſed of the ſkins of different animals, or made by diſtorting ſome of the ray tribe into a dragon-like ſhape, by bending back the two ſides, drawing out the mouth into a beak-like form, ſplitting the lower appendages into the form of feet, or ſubſtituting the legs of a bird or quadruped, and twiſting the tail in a formidable manner over the head, and which, when the creature is perfectly dried, will retain the poſition and appearance in which it is firſt placed. The monſtrous repreſentations to be found in Geſner and Aldrovandus, of a ſeven-headed dragon with gaping mouths, long body, ſnake-like necks, and tail, and feet reſembling thoſe of birds, are of a like kind. Theſe deceptions appear to have been formerly practiſed with much ſucceſs, and miſled not only the vulgar, but even men of ſcience: of this a curious example is ſaid to have occurred towards the cloſe of the ſeventeenth century, and is thus commemorated by Dr. Grainger, from a note of Dr. Zachary Grey, in his edition of Hudibras.

"Mr. Smith, of Bedford, obſerves to me on the word dragon as follows: Mr. Jacob Bobart, botany profeſſor of Oxford, did, about forty years ago, find a dead rat in the phyſic garden, which he made to reſemble the common picture of dragons, by altering its head and tail, and thruſting in taper ſharp ſticks, which diſtended the ſkin on each ſide till it mimicked wings. He let it dry as hard as poſſible. The learned immediately pronounced it a dragon; and one of them ſent an accurate deſcription of it to Dr. Magliabechi, librarian to the grand duke of Tuſcany; ſeveral fine copies of verſes were wrote on ſo rare a ſubject; but at laſt Mr. Bobart owned the cheat: however it was looked upon as a maſter-piece of art, and as ſuch depoſited in the muſeum, or anatomy ſchool, where I ſaw it many years after."

Another remarkable inſtance, in later times, is that of a dragon of a ſimilar kind, which was once the property of a merchant of Hamburgh, and was valued at an immenſe ſum. When Linnæus viſited that city, in his travels in 1735, this monſtrous production was in the poſſeſſion of Spreckelſen, ſecretary of the council, and a conſiderable naturaliſt, and till that time was eſteemed the moſt valuable curioſity in Europe, being received as a pledge for the loan of ten thouſand marks, a ſum equal to ſeven hundred and fifty pounds. This celebrated article, upon an accurate examination, Linnæus diſcovered to be an impoſture, and as he terms it "non naturæ ſed artis opus eximium," the whole being an artful combination of the ſkins of ſnakes, jaw-bones of weaſels, and the legs of birds, ingeniouſly contrived to repreſent a ſeven-headed dragon. A diſcovery ſo injurious to the owner and the credit of the univerſity, excited Linnæus many enemies, and the enraged proprietor determined on a proſecution againſt him, for having deſtroyed the reputation of his property; to avoid which, through the advice of his friend Dr. Jaeniſch, Linnæus thought proper to leave the city.—This monſtrous production is repreſented in the work of Seba.

In the Encyclopædia Britannica another production of the ſame monſtrous kind is deſcribed at ſome length, and repreſented in the 449th plate, under the name of Sea Dragon. An account of this it appears was firſt inſerted in the Gentleman's Magazine for the year 1749; the creature was ſaid to be taken between Orford and Southwould, on the coaſt of Suffolk, and afterwards carried round the country as a curioſity by the fiſhermen who caught it. "Its head and tail (ſays the writer) reſemble thoſe of the alligator; it has two large fins which ſerve it both to ſwim and to fly, and though they were ſo dried that I could not extend them, yet they appear by the folds to be ſhaped like thoſe which painters have given to dragons, and other winged monſters, that ſerve as ſupporters to coats of arms. Its body is covered with impenetrable ſcales; its legs have two joints, and its feet are hoofed like thoſe of an aſs; it has five rows of very white and ſharp teeth in each jaw, and is in length about four feet, though it was longer when alive, it having ſhrunk as it became dry.—It was caught in a net with mackarel; and being dragged on ſhore was knocked down with a ſtretcher, or boat-hook. The net being opened, it ſuddenly ſprung up and flew about fifty yards; the man who firſt ſeized it had ſeveral of his fingers bitten off, and the wound mortifying, he died. It afterwards faſtened on the man's arm who ſhows it, and lacerated it ſo much that the muſcles are ſhrunk, and the hands and fingers diſtorted; the wound is not yet healed, and is thought to be incurable."

A ſlight examination of this amazing prodigy will inconteſtibly prove that the whole is a deception; the article deſcribed is nothing more than the ſkin of the angel ſhark, ſqualus ſquatina, rudely diſtorted, and with very little contrivance diſpoſed into the figure in which we ſee it. With regard to the diſaſtrous circumſtances attendant on its capture, there is reaſon to admit their plauſibility at leaſt; the bite of a ſhark of the ſize deſcribed, would certainly be dangerous, and might eaſily deprive a man of his fingers: the ſhark is alſo both fierce and powerful, and this ſpecies in particular, by the action of its lateral fins in its ſtruggle to eſcape, might glide along a flat ſandy beach to a conſiderable diſtance; but the ſtory of its flight deſerves no credit. The number of its teeth in the figure and deſcription are at variance; the latter is apparently correct, for the angel ſhark, like the reſt of its tribe, have both jaws furniſhed with ſeveral rows of teeth, and in a ſpecimen, the length of four feet, or rather more, would amount to about five rows in each: the head has been compreſſed laterally, to give it a more elongated form: the broad lateral fins have been tortured into the ſemblance of wings, by being ſtretched conſiderably, and then folded in plaits; and the ventral fins, which in the fiſh are oblong, preſſed into the form of legs as above deſcribed. The whole of the ſkin, thus diſtorted and braced up with wire, or with any other kind of bandage till dry, would naturally afterwards retain the grotesque form the preſerver had given it.—A ſimilar cheat, we believe, but with the fiſh in a more recent ſtate, has been very lately attempted by ſome artful fiſhermen on one of the learned inſtitutions in Ireland.

Perhaps we have already digreſſed too far on the art of manufacturing dragons, and the ſpecious frauds that have been practiſed on the unwary virtuoſi, but we cannot conſider it altogether unimportant, and ſincerely truſt that what has been advanced, may operate as a caution to thoſe who, in the ſtudy of nature, are attracted only by the marvellous, to be on their guard againſt ſimilar impoſitions.

Draco, *Dragon*, in *Natural Hiſtory*, a fabulous animal, which has been repreſented under the form of a ſerpent with wings and feet. The ancients have given various deſcriptions of this animal, with reſpect to its ſize, ſhape, and colour, and have attributed many ill qualities to it, without foundation. Their accounts of it are very various and contradictory. They were probably led to the idea they formed of it by ſome extraordinary animals of the genus of ſerpents, lizards, or crocodiles, &c. which were ſingular either on account of their figure or ſize. See Draco *Volans*.

Draco, or *Dragon*, in *Mythology*, the animal conſecrated to Bacchus and Minerva. It is alſo the ſymbol of Janus, and alſo of Bacchus Beſſarus. Dragons are likewiſe employed to draw the chariot of Ceres; and a dragon keeps the garden of the *Heſperides*, which ſee.

It has been ſuggeſted that the ſame Phœnician root of the word *Nahhaſch* might equally ſtand for a keeper, or a dragon; and therefore when this word occurred to denote the keeper of ſomething of value, it was called a dragon. Hence were derived all thoſe fables of the famous dragons, who were ſet to keep the garden of the Heſperides, the Golden fleece, the cave at Delphi, and the famous fountain of Thebes. Inſtead of men they ſubſtituted monſters; and what has authoriſed the freedom they took in applying the Phœnician word to that ſenſe is, that to be the guardian of any thing of worth, and to watch for its preſervation, it was neceſſary to be ſharp ſighted and vigilant; which is imported in the Greek words ὄφις and δρακων, which Le Clerc upon Heſiod deduces from ὄπτομαι and δερκομαι, to ſee. "Igitur credibile eſt eandem vocem Phœnicia lingua et Serpentem et Cuſtodem ſignificaſſe." The winged dragons that drew the chariot of Medea, are ſuppoſed to have had their riſe from the ſhip in which Jaſon and Medea embarked, which was called the "Dragon."

Draco *Arbor*, in *Botany*. See Dracæna.

Draco *Marinus*, in *Ichthyology*, ſynonymous with the weever fiſh, or ſtingbull. See Trachinus.

Draco *Regis*, in *Antiquity*, the ſtandard enſign, or military colours, borne in war by our ancient kings, having the figure of a dragon painted on them. Rog. Hoved. ſub ann. 1191.

Draco *Volans*, in *Zoology*, a ſpecies of *Draco*; which ſee.

Draco *Volans*, among *Meteorologiſts*, is uſed for a fat, heterogeneous, earthy meteor, appearing long and ſinuous, ſomething in the ſhape of a flying dragon.

This ſhape is ſuppoſed to ariſe from the hind part of the matter of this meteor being fired with greater impetuoſity than what comes firſt out of the cloud, and it is ſuppoſed, that the broken parts of the cloud, and the ſulphureous matter which adhere to them, form the apparent wings of this imaginary dragon.

This ſort of exhalation is principally ſeen on the borders of rivers, and in marſhy places, and ſeldom riſes very high from the ground, but plays and dances about the ſurface in an agreeable manner; and if people go up to it, it will ſtick to their hands or cloaths without burning or doing them any injury. They are more common in the ſummer months than in the winter, and are more frequently ſeen in thick weather than in clear.

DRACOCEPHALUM, in *Botany*, (from Δρακων, a *dragon*, and κεφαλη, the *head*, becauſe of the large ſwelling form of its ringent corolla,) Linn. Gen. 298. Schreb. 395. Willd. Sp. Pl. v. 3. 149. Juſſ. 116. Gærtn. t. 66. Claſs and order, *Didynamia Gymnoſpermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, tubular, permanent, very ſhort. *Cor.* of one petal, ringent; tube the length of the calyx; throat very large, oblong, inflated, gaping, a little compreſſed at the back; upper lip direct, vaulted, folded, obtuſe; lower three-cleft, its lateral ſegments erect, as if belonging to the throat, its central one pendulous, ſmall, prominent at the baſe, roundiſh, cloven. *Stam.* Filaments four, awl-ſhaped, concealed under the upper lip of the corolla, two of them rather ſhorter than the reſt; anthers nearly heart-ſhaped. *Piſt.* Germen four-lobed; ſtyle thread-ſhaped, ſituated like the ſtamens; ſtigma cloven, acute, ſlender, reflexed. *Peric.* none, except the permanent calyx. *Seeds* in the bottom of the calyx, four, ovate-oblong, three-angular.

Eſſ. Ch. Corolla with an inflated throat, and concave upper lip.

Obſ. The calyx in this genus is variouſly formed in different ſpecies, but always more or leſs perfectly two-lipped.

Willdenow has eighteen ſpecies, ten of which bear their whorls crowded into a ſpiked form, the reſt have them axillary. The flowers are violet, pale purple, or reddiſh. The herbage in general is aromatic; in D. *canarienſe*, a common green-houſe plant vulgarly called Balm of Gilead, highly and moſt agreeably ſcented, as alſo in D. *Moldavica*, Moldavian Balm, a hardy annual ſpecies; while D. *ſibiricum* is fœtid, and compared by Willdenow, not unaptly, to rancid oil. D. *auſtriacum*, Jacq. Ic. Rar. v. 1. t. 112, a rare and magnificent ſpecies, was firſt figured by Cluſius, (Hiſt. v. 2. 185. Chamæpitys auſtriaca,) but from his time not obſerved by botaniſts, till it was detected by Hoſt again in Auſtria a few years ago, and by others in Hungary, &c. Its flowers are large, of a rich violet. D. *grandiflorum*, another fine alpine ſpecies, is well figured in Curt. Mag. t. 1009, where it is juſtly obſerved that this and the *altainenſe*, with Willdenow's *palmatum*, are all probably but one ſpecies.

DRACON, in *Ancient Geography*, a river of Italy, which ran near Veſuvius; now *Dragone.*

DRACONARIUS, in *Antiquity*, *Dragon bearer.* Several nations, as the Perſians, Parthians, Scythians, &c. bore dragons on their ſtandards; whence the ſtandards themſelves were called dracones, dragons. The Romans borrowed the ſame cuſtom from the Parthians, or, as Caſaubon has it, from the Dacæ; or, as Codin, from the Aſſyrians.

The Roman dracones were figures of dragons painted in red on their flags; as appears from Ammianus Marcellinus; but among the Perſians, and Parthians, they were like the Roman eagles, figures in full relievo; ſo that the Romans were frequently deceived, and took them for real dragons.

The ſoldier, who bore the dragon or ſtandard, was called by the Romans draconarius: and by the Grecks *δρακοναριος*, and *δρακοντειοφορος*; for the emperors carried the cuſtom with them to Conſtantinople.

Pet. Diaconus, Chron. Caſin. lib. iv. cap. 39. obſerves, that the bajuli, cercoſtatarii, ſtaurophcri, aquiliferi, leoniferi, and draconarii, all marched before king Henry when he entered Rome.

DRACONIS, Caput. See Caput and Dragon.

Draconis, *cauda.* See Cauda and Dragon.

Draconis, *ſanguis.* See Dragon's *blood.*

Draconis, *venter.* See Venter.

DRACONITES, John, in *Biography*, a learned German theologian, was born at Carlſtadt in the year 1494. By his great talents, and induſtry he acquired great reputation, was employed in many important negotiations, and attained to the high rank of biſhop of Marſpurg, and Roſtock, and Sameland in the Pruſſian dominions. He publiſhed Commentaries on various parts of the ſacred writings, in which were diſplayed much learning, and critical acumen. He began a Polyglott of the bible in five languages, which however, he did not live to finiſh. He died ſuddenly April 18th 1566. Moreri.

DRACONON, in *Ancient Geography*, a promontory, mountain, and town of the iſland of Icaria.

DRACONTEAS, in *Botany*, a name given, by Neophytus, and ſome others of the later Greek writers, to two plants diſtinguiſhed by the epithets of the great and the little kinds. The great draconteas is the plant we call dragons, and the ſmall draconteas is the arum. Neophytus ſays, that the roots of ſome ſpecies of the ſmall draconteas were eatable, which we alſo know to be true at this time; for though with us the juice of this plant is fiery and corroſive, yet we know that there are eſculent arums in other parts of the world. The Greek writers, from the earlieſt times we have accounts of, were not ignorant of this; and Theophraſtus in particular has deſcribed an eſculent rooted arum under the name of arum edodimum.

DRACONTHEMA, a name uſed by ſome of the old writers in medicine for what we call ſanguis dragonis, or dragon's blood, a red vegetable reſin.

DRACONTIA, in *Ancient Geography*, *Cani*, two ſmall iſlands upon the coaſt of Africa, over againſt the gulf of Hippone. They are mentioned by Ptolemy; and were ſituated N.N.W. of the promontory of Apollo, and E. of the promontory *Candidum.*

Draconties, or *Dracontia lapis*, in *Natural Hiſtory*, a name given by authors to a roundiſh or oval pellucid ſtone, which ſeems no other than a cryſtal cut into that form, and poliſhed by the ſavage inhabitants of ſeveral nations before the Roman conqueſts, and intended to be worn as ornaments. Authors tell a number of idle and fabulous ſtories about this ſtone, imagining it to be naturally of this figure and poliſh, and to be found in the head of a dragon. They are not indeed all agreed about the ſpecies of the ſtone; Ficinus deſcribing an aſtroites under this name, and others ſome other coloured ſtone; but the generality of writers, eſpecially the old ones, make it colourleſs and pellucid.

DRACONTIC Month, the ſpace of time wherein the moon going from her aſcending node, called caput draconis, returns to the ſame.

DRACONTIUM, in *Botany*, a genus founded by Linnæus in his Corollarium Generum Plantarum, 18, to which, on account of its affinity to *Arum*, he applied this name. The Δρακοντιον of Dioſcorides, and probably of Theophraſtus, is indeed *Arum Dracunculus* of Linnæus, and of all recent authors. Hermann applied the name of *Dracontium* to all of this natural order with divided leaves, ſuch being the caſe with *A. Dracunculus*; but this character neither indicates a natural generic diſtinction, nor does it accord with any technical marks in the fructification. Linn. Gen. 471. Hort. Cliff. 434. Schreb. 245. Willd. Sp. Pl. v. 2. 288. Juſſ. 24. Claſs and order, *Gynandria Polyandria*, according to Linnæus, but much more correctly *Heptandria Monogynia*, as Schreber and Willdenow have judged. Nat. Ord. *Piperitæ*, Linn. *Aroïdeæ*, Juſſ.

Gen. Ch. *Cal.* Sheath boat-ſhaped, coriaceous, very large, of one leaf. Spadix ſhort, ſimple, cylindrical, entirely covered with florets collected into a head, each of which has no proper perianth, unleſs the corolla be taken for ſuch. *Cor.* Petals five, inferior, concave, ovate, obtuſe, nearly equal, coloured. *Stam.* in each floret. Filaments ſeven, linear, depreſſed, erect, equal, longer than the petals; anthers ſquare, two-lobed, oblong, obtuſe, erect. *Piſt.* Germen ſuperior, nearly ovate; ſtyle round, ſtraight, the length of the ſtamens; ſtigma ſmall, triangular. *Peric.* Berry roundiſh. *Seeds* numerous.

Eſſ. Ch. Sheath boat-ſhaped. Spadix entirely covered with florets. Petals five, inferior. Berry with many ſeeds.

Linnæus enumerates ſix ſpecies, Willdenow ſeven. They are deſtitute of pubeſcence, with round ſtems or ſtalks, having the habit of an *Arum*. D. *pertuſum*, Plum. Amer. t. 56, 57, is remarkable for numerous elliptical perforations in its leaves. D. *polyphyllum*, Herm. Parad. t. 93, has repeatedly compound and pinnatifid *leaves*. Its *flowers* grow on ſhort radical, ſolitary ſtalks, each having a large dark purple ſheath. Linnæus in Hort. Cliff. ſays, "when the ſheath opens, it exhales a ſmell like that of the moſt putrid carcaſe, capable of taking away any perſon's ſenſes and underſtanding; but it is remarkable that after a few days, when the anthers begin to ſhed their pollen, this poiſonous fœtor in an hour's time abſolutely ceaſes." It grows between the tropics, in various countries, but is ſcarcely known in our ſtoves. Forſter mentions it as cultivated in the Society Iſlands for the ſake of its root, which, though acrid, is eaten in times of a ſcarcity of bread-fruit, being, no doubt, rendered eatable by cookery. Thunberg hints that it is uſed in Japan to procure abortion, and Forſter more openly declares that it ſerves the ſame iniquitous purpoſe among the members of the deteſtable aſſociations of thoſe iſlands, where child-murder is authorized. What an acquiſition would this root prove to ſome of our quacks, who in the public papers advertiſe, as openly as they dare, to render their patients the ſame pious ſervice! Happy for the community if their ignorance in ſome meaſure circumſcribes their powers of miſchief! S.

DRACONTUS, in *Ancient Geography*, an iſland of Africa, on the coaſt of Libya.—Alſo, a place of Aſia, in Armenia Minor, according to the Itinerary of Antonine.

DRACUNCULI, in *Medicine*, a name uſed by authors for a ſort of long and ſlender worms, which breed in the muſcular fleſh of the arms, legs, &c. and from their being more frequent in ſome parts of Guinea than elſewhere, are called by many Guinea-worms. They have been long known in the world; and Plutarch quotes Agartharcides for an account of theſe animals, which, he ſays, the people about the Red-ſea were at a certain time very much afflicted with. It is more particularly a diſeaſe in children, wherein they feel a vehement itching, ſuppoſed to ariſe from theſe worms, called dracunculi, generated of a viſcid humour under the ſkin, about the back, ſhoulders, and arms.

Children ſeized with the dracunculi become hectic, and ſcarce receive any nouriſhment at all, though they eat plentifully. The diſeaſe, however, is not ſo peculiar to children, but that grown perſons have been ſometimes affected with it. The emperor Henry V. is ſaid to have died of it; having had it from his birth.

The women in Poland cure their children of the dracunculi after the following manner: the child is waſhed and bathed in warm water, wherein a quantity of crummed bread, and a handful of aſhes have been caſt. The water being poured off, and the bread gathered into a maſs; when they come to break it again the next day, they find in it an infinite quantity of fine hairs, which ſome call dog's hairs, and others, worms; and it is thoſe hairs, or worms, which are ſuppoſed to be the cauſe of the diſeaſe.

After thus bathing the children, they rub their ſhoulders and arms with flour ſteeped in vinegar, or honey; upon which immediately there riſes on the ſkin a great number of tubercles, like poppy-ſeed; ſuppoſed to be the heads of worms. Theſe they ſcrape off as faſt as they appear; otherwiſe they withdraw beneath the ſkin again. The operation is repeated till ſuch time as no more tubercles ariſe.

The dracunculi is a diſeaſe little known in England. The editors of the Leipſic Acts, ſpeaking of it, in the tome for the month of October, 1682, call the bodies, which put forth at the pores after bathing, thick hairs, "corpuſcula pilorum craſſiorum inſtar denſa et ſpiſſa," and not fine ſlender hairs, as Degori calls them. They add, that theſe little corpuſcles are hence called crinones; and by reaſon of their devouring the food, which ſhould nouriſh the children, comedones. Velſchius, in a curious diſſertation on the ſubject, calls them capillary worms: "exercitatio de vermibus capillaribus infantum."

As to the nature and figure of theſe little bodies, the ſame editors obſerve, that the microſcopes have put it paſt doubt, that they are real living animals, of an aſh colour, having two long horns, two large round eyes, and a long tail, terminated with a tuft of hair; but that it is difficult to draw them out whole, by ſcraping the child's body; becauſe being very ſoft, the leaſt rubbing bruiſes them, and breaks them.

They are no where ſo frequent as on the Gold-coaſt in Guinea about Anamaboe and Cormantyn. The worm is white, round, long, and uniform, very much reſembling a piece of white round tape or bobbin. It is lodged between the interſtices of the membranes and muſcles, where it inſinuates itſelf to a prodigious length, ſometimes exceeding five ells. It occaſions no great pain in the beginning; but when it is about to ſhew its head a ſwelling and inflammation appear on the part, which is uſually the ankle, or ſome part of the leg or thigh.

The countries where this creature is thus produced are very hot, and ſubject to great droughts, and the inhabitants make uſe of ſtagnating and corrupted water, in which it is probable the ova of theſe animals lie: the white people and negroes, who drink this water, are equally ſubject to theſe worms.

The ſurgeons ſeldom attempt to extract this worm by inciſion; but when the tumour appears, they endeavour to bring it to a ſuppuration as ſoon as they can; and when they have broke the ſwelling, and the head of the worm appears, they faſten it to a ſtick, and continue gradually winding it round at the rate of an inch or two in a day, till they by this means, have wound it all out. If it be wound too haſtily, it is apt to break in the operation; and if it does, the end is not eaſily recovered again; and if not, there are abſceſſes formed, not only at the place where it breaks, but all along the whole winding of the muſcles where the dead worm remains; ſo that often from one worm thus broken, there are produced a number of obſtinate ulcers in different parts. When the worm has not been broken, the ulcer out of which it was extracted heals eaſily, and there is no farther trouble about it. Town's Diſeaſes of the Weſt Indies, p. 561.

The daily uſe of aloes, or of any other anthelmintic medicine, is proper, during the extraction of the worm in order to facilitate its diſcharge. See CHÆTIA.

DRACUNCULOIDES, in *Botany*, the name given by Boerhaave to the Blood-flower, or *Hæmanthus*, which ſee.

DRACUNCULUS, ſee ARTEMISIA, ſp. 40, and ARUM, ſp. 2; alſo ACHILLEA PTARMICA, ſp. 12; which laſt was named by C. Bauhin *Dracunculus pratenſis, ſerrato folio*. See likewiſe CALLA PALUSTRIS, ſp. 2, the *Dracunculus aquaticus* or *paluſtris* of ſome authors. *Polygonum Biſtorta* has been called by Brunfelſius *Dracunculus minor*.

DRACUNCULUS, in *Ichthyology*. See DRAGONET.

DRACUNCULUS, in *Zoology*. See DRACO *volans*.

DRACUS, in *Ancient Geography*, a river of Gaul, which diſcharged itſelf into the Iſara, near *Calaro* (Grenoble.)

DRACUT, in *Geography*, a poſt town of America, in Middleſex county, on the northern bank of Merrimack river, oppoſite to Patuchet's falls, lying 30 miles N. by W. of Boſton, and containing 1274 inhabitants.

DRAFF, a name given in ſome places to the waſh given to hogs; and the grains given to cows.

DRAG, in *Building*. A door is ſaid to drag; when in opening or ſhutting it hangs or grates upon the floor.

DRAG, in *Agriculture*. Drags are implements employed both for the purpoſes of clearing land, and preparing it for putting in the ſeed. They are made with conſiderable difference in different parts of the kingdom. The common drag is moſt generally made uſe of, but the duck-footed one, with four rows of teeth, is preferable in many caſes, as it does its work more effectually. A late writer recommends an inſtrument of this kind, in which the teeth are fixed in by wedges inſtead of ſcrews, ſo that they can be put in and taken out readily, and be ſet to any depth, as a very uſeful tool.

Implements of this ſort are commonly made of a triangular form, being about ſeven feet in width behind, and having thirteen or fourteen teeth in each of their ſides, but in ſuch directions as to croſs each other, being faſtened at top either by ſcrews or ſome other convenient means. Where ſuch implements are made uſe of, occaſionally as ſcarifiers, the teeth ſhould be wedged in ſomewhat in the manner of coulters, and a proper ſet muſt be had for the purpoſe.

DRAG, in *Sea-Language*, is a machine, conſiſting of a ſharp, ſquare, iron ring, encircled with a net, and commonly uſed to take the wheel off from the platform or bottom of the decks.

DRAG-*Ropes*. See ROPE.

DRAGA, in *Ancient Geography*, a town of Arabia Felix. olemy

DRAGE, in *Geography*, a town of Germany, in the duchy of Holſtein, 4 miles N. of Itzehoa.—Alſo, a river of Germany, in the circle of Upper Saxony, which runs into the Netza, ſix miles E. N. E. of Drieſen, in the New Mark of Brandenburg.

DRAGEMEL, a town of Germany, in the duchy of Carniola, on the Save; ſix miles N. of Laubach.

DRAGGING *the* ANCHOR. See ANCHOR.

DRAGHI, GIO. BATTISTA, in *Biography*, an Italian muſician, who came to England about the time of Charles II.d's marriage with the infanta Catherine of Portugal, and was appointed his majeſty's organiſt and maeſtro di cappella. He aſſiſted Lock in compoſing Shadwell's Engliſh opera of Pſyche, and was muſic-maſter to queen Anne. He preſerved his ſtation at Somerſet houſe to the time of that queen's death. We believe him to have been the brother of Antonio Draghi, who was opera compoſer to the court of Vienna during 40 years.

DRAGMA, in *Pharmacy*, a name uſed by the ancients for a handful of any herb or other medicine.

DRAGMIS, a word uſed by the ancients to ſignify a pugil, or as much of any thing as can be taken up at a pinch, between the thumb and two fingers.

DRAGMUS, in *Ancient Geography*, a town of the iſland of Crete.

DRAGO, BOCCADEL, in *Geography*, a ſtrait between the iſland of Trinidad and Andaluſia, in the province of Terra Firma, South America.

DRAGO, a village ſouth of Copenhagen, in the iſland of Zealand, inhabited chiefly by pilots, who, in time of peace, pilot all ſhips paſſing the Sound through the entrance of the Baltic, or the Cattegat.

DRAGOE, in *Geography*, a town of Denmark, in the iſland of Amack; ſix miles from Copenhagen

DRAGOGI, in *Ancient Geography*, a people of Aſia, placed by Arrian with the Drangi.

DRAGOMAN, DROGMAN, or *Drogueman*, is the name of ſecretaries attached to Chriſtian miniſters and conſuls reſiding at Conſtantinople, or in Aſia and Africa, who act as interpreters between them and the officers of the court or town where they reſide.

The word dragoman is ſaid to be derived from the Arabic *targeman*, or *taragem*, he has interpreted. From this the Italians formed *dragomano*, and the French *dragoman*, *truchemen*, or *truchement*. The latter denomination, however, might perhaps be deduced from *turcoman*, an inhabitant of Turcomania, an Aſiatic province, which may have produced the firſt, or the greateſt number of interpreters in the Eaſt.

It is only ſince the year 1669 that the French, with a policy worthy to be imitated by other Chriſtian nations trading with the Eaſt, ſent every three years ſix young boys, who chuſe to go, from eight to ten years of age, to be educated at the expence of the ſtate, in a convent of Capuchin friars at Conſtantinople, and to be early inſtructed in the different idioms of the Eaſt, in order to be afterwards appointed dragomans, or interpreters, to the French miniſters and conſuls, who thus were not left at the mercy of Greeks and other foreigners little attached to their nation, and frequently ſeduced to betray its deareſt intereſts.

DRAGOMAN, in *Geography*, a town of European Turkey, in the province of Bulgaria; 22 miles W.N.W. of Sofia.

DRAGOMESTRO, a town of European Turkey, in Livadia; 44 miles W.N.W. of Lepanto.

DRAGOMIRNA, a town of European Turkey, in Moldavia; 8 miles N. of Suczava.

DRAGON, in *Aſtronomy*. See DRACO.

Dragon's head, and tail, *caput & cauda draconis*, are the nodes of the planets; or the two points, wherein the ecliptic is interſected by the orbits of the planets, and particularly that of the moon; making with it angles of five degrees and eighteen minutes.

One of theſe points looks northward; the moon beginning then to have northward latitude, and the other ſouthward: where ſhe commences ſouth.

This her deviation from the ecliptic ſeems (according to the fancy of ſome) to make a figure like to that of a dragon, whoſe belly is where ſhe has the greateſt latitude; the interſection repreſenting the head and tail, from which reſemblance the denomination ariſes.

But note, that theſe points abide not always in one place, but have a motion of their own in the zodiac, and retrograde-wiſe, 3 minutes 11 ſeconds *per* day; completing their circle in 18 years 225 days; ſo that the moon can be but twice in the ecliptic, during her monthly period; but at all other times ſhe will have a latitude, or declination from the ecliptic.

It is about theſe points of interſection that all eclipſes happen.

They are uſually denoted by theſe characters, ☊ dragon's head, and ☋ dragon's tail.

DRAGON, in *Natural Hiſtory*. See DRACO.

DRAGON, *Allegorical*, the emblem of the devil, in alluſion to Pſalm xci. 13. Hence a dragon pierced or trampled upon is, in painting and ſtatuary, the attribute of different ſaints, particularly of St. Michael, St. George, and St. Margaret the Martyr.

DRAGON *Beams*, in *Architecture*, are two ſtrong braces or ſtruts, which ſtand under a breaſt-ſummer, and meet in an angle on the ſhoulder of the king-piece.

DRAGON'S *Blood*, *Sanguis Draconis*. This ſubſtance is a blood-red reſin, obtained from certain large palm-trees, growing in the Eaſt Indies, (*Calamus Rotang & Pterocarpus Draco*,) and alſo in South America; but the Eaſt Indies furniſh all that is uſed in this country.

The dragon's blood is of a deep red colour; and the beſt ſort is brought over in oval drops, obviouſly the exſudations from the tree; but the ordinary ſort is in large ſhapeleſs cakes or maſſes, generally impure, to the eye containing a good deal of foreign matter. There are beſides to be met with in trade ſeveral artificial compoſitions of ordinary gums, and other matters, coloured like the true dragon's blood, and paſſed off for it.

This reſin, when finely pulveriſed, becomes a fine crimſon. It is totally inſoluble in water, inſipid and without ſmell when cold, but if heated it gives a fragrant odour, like benzoin. Alcohol diſſolves it almoſt totally, eſpecially when aſſiſted by heat, and the ſolution is of a fine deep red, which will ſtain heated marble readily and permanently, and has often been uſed for this purpoſe. Dragon's blood diſſolves alſo in oils: like all the other reſins it burns readily, and with a bright flame and much ſmoke: when burning it emits a ſtrong ſmell of benzoic acid. Some of this acid, though in very minute quantity, may be obtained from this reſin, by means of lime, as from BENZOIN, in the way mentioned under that article.

The dragon's blood is uſed a little in medicine, and is ſuppoſed to be gently reſtringent, and the ſolution in alcohol does ſhew ſome degree of aromatic and aſtringent taſte. It is, however, but little employed in medicine, and might very well be expunged from the Pharmacopœia.

It the arts, however, this reſin is of very conſiderable utility, as a fine deep-bodied colour, totally unacted on by moiſture, and very permanent. It is employed in ſtaining marble, leather, wood; in lacquering and varniſhing, and for ſimilar uſes, and is ſo much valued by artiſts, that the fineſt ſamples bear a pretty high price.

Dragon *Fly*, in *Entomology*. See Libellula.

Dragon, *Gum*. See Tragacanth.

Dragon's *Head*, in *Botany*. See Dracocephalum.

Dragons. See Arum and Dracontium.

Dragon *reverſed*, *Knights of*, an order of knighthood inſtituted by the emperor Sigiſmund, about the year 1418, after the council of Conſtance, in memory of the condemnation of John Huſs and Jerome of Prague. This order, which once flouriſhed in Germany and Italy, is now extinct.

Dragon, *Sea*. See Draco.

Dragon, *Snap*. See Antirrhinum and Ruellia.

Dragon *of Wantley*; the title of an old Yorkſhire ſatirical ballad of much wit and humour. It is ſuppoſed to have been written early in the reign of James I., and in burleſque of romances and the wonders of chivalry. We have a very ample and curious hiſtorical account of the origin of this ballad, in the laſt edition of "Percy's Reliques of Ancient Poetry," in which a tyrannical and rapacious landlord is figured under the "Dragon;" and "More of More Hall" was either the attorney or the counſellor who conducted a ſucceſsful ſuit againſt him on the ſubject of tithes. But this ballad is mentioned here among muſical articles, having been the foundation of Harry Carey's celebrated burleſque opera of the "Dragon of Wantley," ſo admirably ſet to muſic by Lampe, in 1737, "after the Italian manner." This excellent piece of humour had run twenty-two nights, when it was ſtopped, with all other public amuſements, by the death of her majeſty queen Caroline, November 20th, but was reſumed again on the opening of the theatres in January following, and ſupported as many repreſentations as the "Beggar's Opera" had done, ten years before. And if Gay's original intention in writing his muſical drama was to ridicule the opera, the execution of his plan was not ſo happy as that of Carey; in which the mock heroic, tuneful monſter, recitative, ſpendid habits, and ſtyle of muſic, all conſpired to remind the audience of what they had ſeen and heard at the lyric theatre, more effectually than the moſt vulgar ſtreet tunes could do; and much more innocently than the tricks and tranſactions of the moſt abandoned thieves and proſtitutes. Lampe's muſic to this farcical drama was not only excellent fifty years ago, but is ſtill modern and in good taſte.

Dragons *Water*. See Calla.

Dragon, *Wild*. See Artemiſia.

Dragon's *Wort*. See Artemiſia.

DRAGONERA, in *Geography*, a town of Italy, in the kingdom of Naples, and province of Capitanata; 15 miles N. of Volturara.—Alſo, a ſmall uncultivated iſland in the Mediterranean, not more than a mile from the weſt coaſt of the iſland of Majorca. N. lat. 39° 35′. Long. 19° E. Peak of Teneriffe.

DRAGONET, in *Ichthyology*, the Engliſh name of the fiſhes belonging to the Linnæan genus Callionymus. The character of this genus conſiſts in having the upper lip doubled up: eyes approximate: gill membrane ſix-rayed, with the covers cloſed, and breathing aperture in the neck: body naked: ventral fins very remote.

Species.

Lyra. Anterior ray of the firſt dorſal fin as long as the body. Linn. Donov. Brit. Fiſhes, &c. Gemmous Dragonet.

A native of the Northern and Mediterranean ſeas; about 12 inches in length, and feeds on echini or ſea eggs, ſtar-fiſh, &c. Scarce on the Engliſh coaſt. The colours of this fiſh are various and beautiful.

Dracunculus. Rays of the firſt dorſal fin ſhorter than the body. Linn. Donov. Brit. Fiſhes, &c. Sordid Dragonet.

About the ſame ſize as the former or rather ſmaller, the general colour livid above, beneath whitiſh. It is a native of the European ſeas, and has been incorrectly named by ſome Engliſh writers the yellow gurnard.

Indicus. Head longitudinally wrinkled; gill covers open at the ſides. Bloch. Indian Dragonet.

A native of Aſia. The body is much depreſſed and of a livid colour.

Baikalensis. No ventral fins: firſt dorſal fin very ſmall: ſecond with ſerrated rays. Baikal Dragonet.

Inhabits the deepeſt parts of the lake Baikal, and in ſummer approaches the ſhore in great numbers. The length of this fiſh is about nine inches, the body, ſoft, ſlender, gradually tapering from the head, and oily to the touch.

Ocellatus. Membrane of the firſt dorſal fin ſtriped with brown, and marked with four brown ocellate ſpots. Ocellate Dragonet.

A native of the ſea round Amboyna; ſmall, varied with cinereous and brown, and ſprinkled with white ſpecks: beneath whitiſh, roundiſh, tapering, head much depreſſed: body fatter than the reſt of the tribe.

Sagitta. Head triangular: gill membrane three-rayed: rays of the dorſal fins equal. Arrow-headed Dragonet.

Found in the ſea about Amboyna: length three inches: above browniſh clouded with grey, beneath whitiſh grey; body thin, depreſſed near the head, and tapering downwards: form ſomewhat convex and four-ſided.

Japonicus. Firſt dorſal fin with a black ocellate ſpot, the firſt ray terminating in two hairs half an inch long. Japan Dragonet.

Length about nine inches; the head depreſſed: eyes large and approximate, the firſt dorſal fin with black rays, the poſterior whitiſh: the body is ſmooth, roundiſh and variegated.

DRAGONNE'E, in *Heraldry*. A lion dragonnée, is where the upper half reſembles a lion; the other half going off like the hind part of a dragon.

The like may be ſaid of any other beaſt as well as the lion.

DRAGOON, in *Ornithology*, the name of a ſmall kind of carrier-pigeon called columba tabellaria minima by Moore. It is a baſtard-breed between the two ſpecies of pigeons called the horſeman and the tumbler. They are very good breeders, and as they are lighter than the horſeman, they are ſuppoſed more expeditious in flight for a few miles, but the horſeman outdoes them at greater lengths. One of theſe pigeons flew from St. Edmundſbury to London, being a diſtance of ſeventy-two miles, in two hours and a half.

Dragoon, in *War*, implies a horſe ſoldier, who is at the ſame time, capable of acting with effect when diſmounted. Formerly the heavy dragoons were armed with muſkets and bayonets, as well as with ſword and piſtol, and were often poſted in woods, having their horſes in their rear, ſo as to deceive an enemy, and to gallop out whenever any break in his line might favour their evolutions. But as the mode of warfare throughout Europe became leſs ceremonious, and, that in lieu of meeting, as it were by common conſent, on ſome extenſive plain, to fight it out according to the manœuvres formerly in vogue, more active, and enterprizing practices have been adopted, the dragoons, with the exception of the dragoon guards, commonly called the life guards, are completely metamorphoſed. Their heavy accoutrements are ſupplanted by thoſe of a compact light conſtruction; and in lieu of muſkets, very light carabines are in uſe. But even this claſs has been conſiderably diminiſhed; there being now very few regiments of heavy dragoons in the ſervice. The Britiſh cavalry conſiſts, for the moſt part, of light cavalry, ſomething on the principle of the Auſtrian huſſars, and armed only with ſword and piſtols. The ſuperior effects produced in the field by troops ſo admirably calculated for celerity, and for promptneſs in remote attacks, added to the important advantages of the ſword exerciſe, as now taught in our cavalry regiments, muſt give a permanence to this part of the eſtabliſhment. Our light dragoons may, indeed, be competitors with thoſe of any nation: They are picked men, well mounted, well taught, and led on by officers of the greateſt ability and ſpirit. Hence we invariably find their efforts eminently ſucceſsful. It will, however, be obſerved that the old principle of making the dragoons diſmount has, in a great meaſure, become obſolete. The etymology of the word may be eaſily traced to the French derivation Dragon, which was originally given to theſe troops on account of the fierceneſs of their attack. The charge of heavy cavalry is certainly forcible to an extreme; but the light corps poſſeſs infinite advantages in other reſpects.

DRAGOT, in *Geography*, a town of European Turkey, in Albania, on the Crevaſta; 36 miles S. S. E. of Durazzo.

DRAGS, in *Agriculture*. See DRAG.

DRAGS, in *Rope making*, are formed like the after-part of the SLEDGE, to which they are faſtened by ropes, and are lined with a board on the upper ſide. They contain weight, as a preſs; when the rope requires more than the ſledge can carry to keep the ſtrands of a proper ſtretch, and prevent their ſhrinking, as they get hard, and as the rope is brought to its intended ſize.

DRAGS, in the *Sea-Language*, are uſed for whatever hangs over the ſhip in the ſea, as ſhirts, coats, or the like; and boats when towed, or whatever elſe that, after this manner, may hinder the ſhip's way when ſhe ſails.

DRAGS, denote alſo floating pieces of timber ſo joined together, that by ſwimming in the water they may bear a burden or load down a river. Stat. 6 Henry VI. c. 15.

DRAGS. See DROWNING.

DRAGUIGNAN, in Latin *Dracenum* and *Draguinianum*, in *Geography*, a town of France, chief place of a diſtrict of the ſame name, and of the department of the Var, ſituated on the river Pis in a fruitful and agreeable country, 12 miles N. W. of Frejus, as many N. by W. of Saint Tropez and 45 miles N. E. of Toulon. It has a population of 6561 individuals, and its canton contains 5 communes and 12,355 inhabitants upon a territorial extent of 257 kiliometres and a half. Draguignan is at a diſtance of 808 kiliometres, or about 605 Engliſh miles, from Paris.

As chief place of a diſtrict, and of the whole department, Draguignan has a prefect, a court of juſtice, a regiſter office, and is a military ſtation for the brigadier who commands in the department. The ſoil of its diſtrict is uncommonly fertile. The hills are covered with vineyards which produce excellent, but very ſtrong, wine.

The diſtrict of Draguignan contains 10 cantons, 58 communes and 71,383 individuals upon a territorial extent of 2757½ kiliometres.

DRAGUSCANI, a town of European Turkey, in Moldavia, 48 miles E. of Jaſſi.

DRAGUT, in *Biography*, was born of obſcure parents at a village of Natolia oppoſite the iſle of Rhodes. At an early age he ſhewed an attachment to the buſineſs of warfare, and entered when he was only 12 years of age under an officer of artillery in the grand ſignior's galley. Here he became expert in all the buſineſs connected with his ſtation, and was enabled from his gains to ſave as much money as would purchaſe a galley of his own, with which he made ſeveral ſucceſsful cruiſes. The ſkill and proweſs which he exhibited on every occaſion of difficulty and danger obtained for him the patronage of Barbaroſſa, the admiral of the Turkiſh fleet, who in a ſhort time raiſed him to the command of a ſquadron of twelve galleys. With this force he did incredible miſchief on the coaſts of Italy and the neighbouring iſlands, till he was attacked by Giannetino Doria in 1548. To him Dragut was forced to ſurrender priſoner. Offers to a great amount were made as a ranſom, which were refuſed, and Dragut ſuffered a moſt rigorous confinement for four years, when he was delivered to H. Barbaroſſa, who reinſtated him in his former command. Dragut now looked for revenge; he renewed his ravages with augmented fury, and in 1552 his good fortune prevailed over the celebrated Andrew Doria, from whom he took ſeveral ſhips, ſent out to oppoſe him. On the death of Barbaroſſa, Dragut ſucceeded to the full command of the Barbary corſairs, with which he performed prodigies of valour. He was afterwards unable, by his utmoſt efforts, to defend himſelf in the ſtrong fortreſs of Mehodia which he had ſeized, and made uſe of as the repoſitory of his treaſures and ſtores; all which fell into the hands of the Chriſtians. At the ſiege of Malta he was wounded in the head which proved fatal to him. In hiſtory Dragut is conſidered rather as a pirate than a regular commander. Moreri. Univ. Hiſt.

DRAIN, or DREIN, in the *Military Art*, a trench made to draw the water out of a moat, which is afterwards filled with hurdles and earth or with faſcines, or bundles of ruſhes and planks, to facilitate the paſſage over the mud. See TRENCHES.

DRAIN, a name given in the fen countries to certain large cuts, or ditches, of twenty, thirty, nay ſometimes forty feet wide, carried through the marſhy ground to ſome river, or other place capable of diſcharging the water they carry out of the fen-lands. Moſt of theſe drains are made in our fen-countries by a body of men called the Undertakers, whoſe reward is one third of the ground they drain. They alſo erect ſluices at a great expence, often not leſs than two thouſand pounds each. Yet theſe, with all the care they employ in erecting them, are ſubject to be blown up by the vaſt weight of water that lies upon them when the lands are overflown. Some of theſe ſluices have two or more pair of doors, of ſix, eight, or ten, feet high, which ſhut when the water in the river is higher than in the drains, by the weight and force of it; and ſo *è contra*, throw out a body of eight feet ſquare of water for about ſix or ſeven hours during the ebb. The real uſe of theſe drains is very evident from the preſent ſtate of the land where they are cut, and that of it before. In Camden's time all this was bog, and now it is all firm land. The country about Crowland was in that author's time ſo ſoft, that it was not paſſable by carriages, and thus grew a witticiſm upon it, that all the carts that entered this town were caſed on the wheels with ſilver; but this is now ſo firm ground, that carriages of any kind paſs over it. The duck-ponds uſed to be called the fen corn-fields, and they now are ſuch in reality, their bottoms being dry, and producing oats, and rape-ſeed, or cole-ſeed, with great increaſe. Phil. Tranſ. N° 223.

DRAINS are alſo more generally uſed to carry off the ſuperfluous moiſture from wet and marſhy lands. See DRAINING.

DRAINE, in *Ornithology*, the name given by Buffon to the TURDUS *viſcivorus*, which ſee.

DRAINING *of* LANDS, in *Agriculture*. Although it has been clearly ſhewn by the various experiments and obſervations that have been made on the nature of vegetation, that a large proportion of water is eſſentially neceſſary for the ſupport of the healthy growth of plants, and which will be ſtill further explained in ſpeaking of the application of it to graſs lands; it is evident that it may exiſt in ſuch over-quantities, or be ſo retained in or upon ſoils, as to prove not only highly injurious to the growth of the crops, whether of grain or graſs, but likewiſe prejudicial to the health of thoſe who inhabit the diſtricts where it is ſuffered thus to become ſtagnant; it therefore becomes the buſineſs of the farmer, in ſuch caſes, to attempt the removal of thoſe prejudicial exceſſes of moiſture before he commences any other operations for the purpoſe of improving ſuch lands; as, without fully accompliſhing this object in the firſt inſtance, all his future exertions will be of but little avail. This may, in ſome inſtances, be accompliſhed by means of draining; a practice, the ſucceſsful execution of which in a great meaſure depends on a proper knowledge of the ſtructure of the earth, and of the various ſtrata of which it is compoſed, as well as of their relative degrees of poroſity or capability of admitting or rejecting the paſſage of water through them; and likewiſe the modes in which water is formed and conducted from the high or hilly elevations that preſent themſelves on the ſurface of the globe, where originally formed. It has been clearly ſhewn, by ſinking large pits and digging into them, that they are moſtly compoſed of materials lying in a ſtratified order and in oblique or ſlanting directions downward; ſome of which ſtrata, from their nature and properties, are capable of admitting water to percolate or paſs through them, while others do not allow it any paſſage, but force it to run or filtrate along their ſurface without penetrating them in any degree, and in that way to conduct it to the more level grounds below till it becomes obſtructed or dammed up by meeting with impervious materials of ſome kind or other; when it is readily forced up into the ſuperincumbent layers, where they happen to be open and porous, ſoon rendering them too wet for the purpoſes of agriculture. But where they are of a more tenacious and impenetrable quality, they only become gradually ſoftened by the ſtagnant water below them, by which the ſurface of the ground is however rendered equally moiſt and ſwampy, though ſomewhat more ſlowly than in the former caſe. It may alſo be obſerved, that ſome of the ſtrata which conſtitute ſuch hilly or mountainous tracts are found to be continued with much greater regularity than others, thoſe which are placed neareſt to the ſurface, at the inferior parts of ſuch hills or elevations, being moſtly broken or interrupted before they reach the tops or higher parts of them, while thoſe which lie deeper or below them at the bottom ſhew themſelves in theſe elevated ſituations; thus that ſtratum which may lie the third or fourth, or ſtill deeper, at the commencement of the valley, may be the moſt ſuperficial, or form the uppermoſt layer, on the ſummits of hills or mountainous elevations. This arrangement or diſtribution of the different ſtrata may have been produced partly by the circumſtances attending the original elevation of ſuch mountainous regions, and partly from the materials of the original exterior ſtrata being diſſolved and carried down into the valley by ſucceſſive rains, and other cauſes, and thus leaving ſuch as were immediately below them in an expoſed and ſuperficial ſtate in theſe elevated ſituations.

But in whatever way, or from whatever cauſes it may have happened that thoſe ſtrata which are placed at conſiderable depths at the bottoms of hills, and other more elevated regions, preſent themſelves and become ſuperficial upon their ſurface, it is evident they frequently prove the means of rendering the grounds below wet and ſwampy. For, from the night dews and the general moiſture of the atmoſphere, being condenſed in much greater quantities in ſuch elevated ſituations, from their greater coldneſs, or other cauſes, than in thoſe level ſurfaces which are below, the water thus formed, as well as that which falls in rain and ſinks through the ſuperficial porous materials readily inſinuate themſelves, and then paſs along between the firſt and ſecond, or ſtill more inferior ſtrata which compoſe the ſides of ſuch elevations, until their deſcent is retarded or totally obſtructed, as has been juſt ſhewn, by ſome impenetrable ſubſtance, ſuch as clay; then becomes dammed up, and the water is ultimately forced to filtrate ſlowly over it, or to riſe to ſome part of the ſurface and conſtitute, according to the particular circumſtances of the caſe, different watery appearances in the grounds below, ſuch as oozing ſprings, bogs, ſwamps, moraſſes, weeping rock, from the water ſlowly iſſuing from various places, or a large ſpring or rivulet, from the union of ſmall currents beneath the ground. This is obvious from the ſudden diſappearance of moiſture on ſome parts of land, while it ſtagnates or remains till removed by the effects of evaporation on others; as well as from the force of ſprings being ſtronger in wet than dry weather, breaking out frequently after the land has been impregnated with much moiſture in higher ſituations and, as the ſeaſon becomes drier, ceaſing to flow except at the loweſt outlets. The force of ſprings or proportion of water which they ſend forth depends likewiſe, in a great meaſure, on the extent of the high ground on which the moiſture is received and detained, furniſhing extenſive reſervoirs or collections of water, by which they become more amply and regularly ſupplied. On this account what are termed bogſprings, or ſuch as riſe in vallies and low grounds, are conſiderably ſtronger and more regular in their diſcharge, than thoſe that burſt forth in the more elevated ſituations on the ſides of eminences. The waters condenſed in the manner deſcribed above on the tops of elevated regions, are ſometimes found to deſcend, for a very conſiderable diſtance among the porous ſubſtances between the different conducting layers of clayey or other materials, before they break out or ſhew themſelves in the grounds below; but it is more frequently the caſe to find them proceeding from the contiguous elevations into the low grounds that immediately ſurround.

The nature and regularity of the ſtratum of materials on which the water proceeding from the ſummits of hills has to filtrate and ſlide upon, muſt conſiderably influence its courſe, as well as the effects which it may produce on ſuch lands as lie below, and into which it muſt paſs; as where it is of the clayey, ſtiff, marly, or impervious rocky kinds, and not interrupted or broken by any other kind of materials of a more porous quality, it may paſs on to a much greater diſtance, than where the ſtratum has been frequently broken and filled up with looſe porous materials, in which it will be detained, and of coure riſe up to the ſurface. It is for the moſt part on the clayey, ſtiff, cloſe, marly, and unfractured ſtony ſtrata, that water is conducted from the hills and more elevated grounds into the plains and valleys which are below them. Theſe ſorts of ſtrata extend to very different depths in different ſituations and diſtricts, as has been frequently noticed in the digging of pits and the ſinkink of deep wells, and other ſubterraneous cavities. The clayey ſtrata are, however, in general, found to be more ſuperficial than thoſe of the compact, tenacious, marly kinds, or even thoſe of a firm uninterrupted rocky nature, and ſeldom of ſuch thickneſs. They have, nevertheleſs, been obſerved to vary greatly in this reſpect; being met with in ſome places of a conſiderable thickneſs, while in others they ſcarcely exceed a few inches. The intervening porous ſubſtances or ſtrata, where clay prevails, are found for the moſt part to be of either a gravelly or looſe nature. Stiff, marly ſtrata, which approach much to the quality of clay, though in ſome inſtances they may preſent themſelves near the ſurface, in general, lie concealed at conſiderable depths under the true clayey, and other layers of earthy or other materials: they have been diſcovered of various thickneſſes, from eight or ten feet to conſiderably more than an hundred. The intervening materials, where ſtrata of this nature are predominant, are moſt commonly of the more ſandy kinds, poſſeſſing various degrees of induration, ſo as in ſome caſes to become perfectly hard and rocky, but with frequent breaks or fiſſures paſſing through them. The looſe, friable, marly, ſtrata, are capable of abſorbing water, and of admitting it to filtrate and to paſs through them.

It may be concluded from this view of the nature and arrangement of the various ſtratified materials that conſtitute the earth, and the manner in which water is formed on the more elevated and hilly ſituations, and brought down from them, that the vallies, and more level grounds below, muſt conſtantly be liable to be overcharged with moiſture, and, as has been already ſhewn, to become in conſequence ſpouty, boggy, or of the nature of a moraſs, accordingly as they may be circumſtanced in reſpect to their ſituation, the nature of their ſoils, or the materials by which the water is obſtructed and detained in or upon them.

Where lands have a ſufficient degree of elevation to admit of any over-proportion of moiſture readily paſſing away, and where the ſoils of them are of an uniform ſandy or gravelly and uninterrupted texture, ſo as to allow water to percolate and paſs through them with facility, they can be little inconvenienced by water coming upon or into them, as it muſt of neceſſity be quickly conveyed away into the adjacent rivers or ſmall rivulets in their vicinity. But where grounds are in a great meaſure flat, and without ſuch a degree of elevation as may be ſufficient to permit thoſe over-proportions of moiſture that may have come upon them from the higher and more elevated grounds, either in the way that has been ſhewn above; or from the overflowing of rivers and ſmaller ſtreams of water that may paſs through or near them, and from the falling of heavy rains, to readily paſs away and be carried off; and where the ſoils of the land are compoſed or conſtituted of ſuch materials as are liable to admit and retain the exceſſes of moiſture that may in any of theſe ways come upon them; they muſt be expoſed to much injury and inconvenience from the retention and ſtagnation of ſuch quantities of water, and conſequently require artificial means to drain and render them capable of affording good crops, whether of graſs or grain; and, laſtly, lands of valleys and other low places, as well as in thoſe caſes where the level tract on the ſides or borders of large rivers and of the ſea, from the peculiarity of their ſituations, and their being compoſed in a great meaſure of porous or ſpungy materials, formed by the diſſolution and decay of various coarſe vegetable and other matters, which are produced on them, or which have been gradually, for a vaſt length of time, waſhed down and brought into them from the hills and riſing grounds by rains and other cauſes, or depoſited by means of floods ſo as to form different degrees of accumulation according to the difference of ſituation or other circumſtances, muſt alſo frequently be ſubject to great injury and inconvenience from their imbibing and retaining the water that may be thus forced to flow up or into or upon them, either through the different conducting ſtrata from the hills and mountainous elevations in the neighbourhood, or the porous materials of the ſoils; as in theſe ways they may, as we have already ſeen, be rendered ſwampy, and have bogs or moraſſes produced in them in proportion to the predominancy of the materials by which the water is abſorbed and dammed up, and the peculiarity of the ſituation of the lands in reſpect to the means of conveying it away. On theſe grounds, beſides a knowledge of the nature and inclinations of the various ſtrata that compoſe the interior parts of the earth, it is clear that, in order to properly perform the buſineſs of draining, attention ſhould not only be paid to the diſcrimination of the differences in regard to the ſituation of the lands, or what is commonly denominated drainage level, but alſo to the nature, diſtribution and depths of the materials that conſtitute the ſoils or more ſuperficial parts of them, as upon each of theſe ſome variety in reſpect to the effects ariſing from water retained in them may depend.

But though there may be conſiderable diverſity in the effects which water produces in or upon lands from theſe different cauſes, wetneſs of land, ſo far as it reſpects agriculture, and is an object of draining, may generally depend on the two following cauſes: firſt on the water which is formed and collected on or in the hills or higher grounds, in the manner which has been explained, filtrating and ſliding down among ſome of the different beds of porous materials that lie immediately upon the impervious ſtrata, forming ſprings below and flowing over the ſurface, or ſtagnating underneath it: ſecondly, on rain or other water becoming ſtagnant on the ſurface, from the retentive nature of the ſoil or ſurface-materials, and the particular nature of the ſituation of the ground. The particular wetneſs which takes place in different ſituations, in the forms of bogs, ſwamps, and moraſſes, for the moſt part proceeds from the firſt of theſe cauſes, but that ſuperficial wetneſs which takes place in the ſtiff, tenacious, clayey ſoils with little inclination of ſurface, generally originates from the latter. From the ideas which have been ſuggeſted reſpecting the nature and formation of the different ſtrata that compoſe the earth, and of the manner in which water ſlides, filtrates, or paſſes down, among or between them, and forms ſprings, which, according to circumſtances, render the grounds below boggy, ſwampy, or too wet for the purpoſes of agriculture, it is evident that the beſt and moſt certain, as well as the moſt expeditious method of draining, in ſuch caſes, muſt be that of intercepting the deſcent of the water or ſpring, and thereby totally removing the cauſe of wetneſs. This may be done when the depth of the ſuperficial ſtrata, and conſequently of the ſpring, is not great, which may be previouſly known by the uſe of a draining augre, by making horizontal drains of conſiderable length acroſs the declivities of the hills, about where the low grounds of the valleys begin to form, and connecting theſe with others made for the purpoſe of conveying the water thus collected, into the brooks or runlets that may be near; and as the ſtrata between which the water paſſes down to produce ſuch ſprings, have, for the moſt part, nearly a ſimilarity of inclination with that of the ſurface of the hill or riſing ground, the augre holes of the drains ſhould not, as is the general practice, be made directly downwards, but perpendicularly to the ſurface of the elevation, as in this way, the ſtratum on which the water paſſes down may be more readily dug to, and the water drawn off; or where the ſpring has naturally found itſelf an outlet, it may frequently only be neceſſary to render it larger, and of more depth, which, by affording the water a more free and open paſſage, may evacuate and bring it off more quickly, or ſink it to a level ſo greatly below that of the ſurface of the ſoil, as to prevent it from flowing into or over it.

But where the ſprings, from the great thickneſs of the upper ſtratum, are confined at ſuch a depth beneath the ſurface as that they injure it, by rendering it conſtantly moiſt, or by imperceptibly oozing through it, but afford no marks of any particular outlets; and where a drain cannot be cut ſo deep as to come to them, either on account of the great difficulty of doing it, or the expence that muſt attend it, or where the level of the outlet will not allow of its being cut to that depth, it will be neceſſary, after cutting ditches in the way that has been juſt explained, to perforate the ſoil beneath by means of a boring inſtrument conſiderably deeper, ſo as to reach the ſpring, and thus give free vent to the water collected below; a method of practice which ſeems long ago to have been ingeniouſly ſuggeſted by Dr. Anderſon, and ſince more fully and particularly applied by Mr. Elkington. Where this can be effectually accompliſhed, ſuch a number of perforations ſhould be made, as will allow the confined water to paſs readily into the drains, and be conveyed by the connecting ditches to the adjoining ſtreams of the neighbourhood: in theſe caſes the water coming freely into the drains, ſeveral feet below the moiſt ſurface of the land, and being then conducted away, will not be forced up through the ſuperincumbent materials of the ſoil, to the ſurface which is ſo much higher.

As in caſes of this kind, where after boring in this manner, the water breaks forth with conſiderable violence, it may ſometimes be apt to bring up with it ſuch quantities of ſand or other ſubſtances, as may block up the holes and prevent the free exit of the water, it may be neceſſary to apply the augre frequently in order to remove it. A ſtriking inſtance of this kind is related in the Philoſophical Tranſactions, where on the ſinking of a well four feet wide, and 236 feet deep, and then boring ſome feet deeper with a five inch borer, ſo much ſand was forced up by the impetuoſity of the water that broke forth as to fill the well, and which on being cleared away by buckets in its liquid ſtate, ſuffered the water to flow over the ſurface in the quantity of forty-ſix gallons in a minute.

There may be ſtill other ſituations of lands, as where the uppermoſt ſtratum is ſo thick as not to be eaſily penetrated, or where the ſprings formed by the water paſſing from the higher grounds, may be confined beneath the third or fourth ſtratum of the materials that form the declivities of hills or elevated grounds, on account of ſo many of them becoming deficient on their tops, or more elevated parts, and by this means lie too deep to be penetrated to, by the cutting of a ditch, or even by boring: and ſtill from the water being obſtructed by the different materials forming the plains below, it may be forced up to the ſurface, and produce different kinds of injurious wetneſs.

In ſuch caſes, the common mode of cutting a great number of drains to the depth of five or ſix or more feet acroſs the wet moraſſy grounds, and afterwards covering them in ſuch a manner, as that the water may ſuffer no interruption in paſſing away, may be practiſed with advantage, as much of the prejudicial exceſs of moiſture may by this means be collected and carried away, though not ſo completely as by falls.

As water is ſometimes found to be conveyed from the hills and high grounds at no great depth beneath the ſurface of the land upon thin layers of clay which have underneath them ſand ſtone, or other porous or fiſſured ſtrata to a conſiderable depth, by perforating theſe thin layers of clay in different places, the water which flows along them may frequently be let down into the open porous materials that lie below them, and the ſurface land be thus compleatly drained. In theſe ſituations of land where moraſſes and other kinds of wetneſſes are formed in ſuch low places and hollows as are conſiderably below the beds of the neighbouring rivers, they may probably in many inſtances be effectually drained by arreſting the water as it paſſes down into them from the higher grounds, and after collecting it into them, conveying it away by pipes or other contrivances at ſuch high levels above the wet lands as may be neceſſary: or where the water that produces the miſchief can by means of drains cut in the wet ground itſelf, be ſo collected as to be capable of being raiſed by means of machinery, it may in that way be removed from the land. The drainage of thoſe extenſive tracts of land that in many diſtricts lie ſo greatly below the level of the ſea can only be effected by the public, and by means of locks erected for the purpoſe of preventing the entrance of the tides, and by wind-mills and other expenſive kind of machinery, conſtructed for the purpoſe of raiſing the ſtagnant water.

It is well obſerved by a philoſophical author, that it might be a noble work, worthy of the attention of a government that wiſhes to increaſe the quantity of nutriment, and conſequent population and happineſs of the country, to employ proper engineers, with labourers in ſuch number, as to environ with ditches, every moraſſy diſtrict of whatever extent, as lies below the level of the tides, as the fens of Lincolnſhire and Cambridgeſhire; ſuch ditches, he further remarks, ſhould be cut at the feet of the adjacent riſing grounds, or of eminences ſurrounded with fens, like iſlands in a lake, ſo as to intercept the well ſprings and land floods, and convey the water, thus collected above the level of the moraſs, into the ocean.

The ſuperficial wetneſs of lands which ariſes from the ſtiff retentive nature of the materials that conſtitute the ſoils, and the particular circumſtances of their ſituation, is to be removed in moſt caſes by means of hollow ſuperficial drains judiciouſly formed, either by the ſpade or plough, and filled up with ſuitable materials where the lands are under the graſs ſyſtem, and by theſe means, and the proper conſtruction of ridges and furrows, where they are in a ſtate of arable cultivation. Having thus explained the manner in which ſoils are rendered too wet for the purpoſes of agriculture, and ſhewn the principles on which the over proportions of moiſture may, under different circumſtances, be the moſt effectually removed, we ſhall proceed to the practical methods which are to be made uſe of in accompliſhing the buſineſs in each caſe.

Methods of draining boggy land.

In the drainage of wet or boggy grounds ariſing from ſprings of water beneath them, a great variety of circumſtances are neceſſary to be kept in view. Lands of this deſcription, or ſuch as are of a marſhy and boggy nature, from the detention of water beneath the ſpongy ſurface-materials of which they are compoſed, and its being abſorbed and forced up into them, are conſtantly kept in ſuch ſtates of wetneſs as are highly improper for the purpoſe of producing advantageous crops of any kind; they are, therefore, on this account, as well as thoſe of their occupying very extenſive tracts in many diſtricts, and being, when properly reclaimed, of conſiderable value, objects of great intereſt and importance to the attentive agricultor. Wet grounds, of theſe kinds, from the nature of their ſituations, and the modes of draining them, are arranged by a late practical writer under three diſtinct heads; firſt, ſuch as may be readily known by the ſprings riſing out of the adjacent more elevated grounds, in an exact or regular line along the higher ſide of the wet ſurface: ſecond, thoſe in which the numerous ſprings that ſhew themſelves are not kept to any exact or regular line of direction, along the higher or more elevated part of the land, but break forth promiſcuouſly throughout the whole ſurface, and particularly toward the inferior parts, conſtituting ſhaking quags in every direction, that have an elaſtic feel under the feet, on which the lighteſt animals can ſcarcely tread without danger, and which, for the moſt part, ſhew themſelves by the luxuriance and verdure of the graſs about them: third, that ſort of wet land, from the oozing of ſprings, which is neither of ſuch great extent, nor in the nature of the ſoil ſo peaty, as the other two, and to which the term bog cannot be ſtrictly applied; but which, in reſpect to the modes of draining, is the ſame. In order to direct the proper mode of cutting the drains, or trenches, in draining lands of this ſort, it will be neceſſary for the operator to make himſelf perfectly acquainted with the nature and diſpoſition of the ſtrata compoſing the higher grounds, and the connection which they have with that which is to be rendered dry: this may, in general, be accompliſhed by means of levelling, and carefully attending to what has been already obſerved reſpecting the formation of hills and elevated grounds, and by inſpecting the beds of rivers, the edges of banks that have been wrought through, and ſuch pits and quarries as may have been dug near to the land. Ruſhes, alders, buſhes, and other coarſe aquatic plants, may alſo, in ſome inſtances, ſerve as guides in this buſineſs; but they ſhould not be too implicitly depended on, as they may be cauſed by the ſtagnation of rain-water upon the ſurface, without any ſpring being preſent: where the impervious ſtratum that lies immediately beneath the porous, has a ſlanting direction through a hill or riſing bank, the ſurface of the land below that level will in general be ſpungy, wet, and covered with ruſhes on every ſide, while the higher ſides of it will be found to deviate very ſlightly from a level in any part round it; in this caſe, which is not unfrequent, a ditch, or drain, properly cut on one ſide of the hill or riſing ground, may remove the wetneſs from both, as ſhewn in the plan: but where the impervious ſtratum drops or declines more on one ſide of the hill or elevation than the other, the water will be directed to the more depreſſed ſide of that ſtratum; the effect of which will be, that one ſide of ſuch riſing ground will be wet and ſpungy, while the other is quite free from wetneſs.

In the practical management of draining land it will be neceſſary, after this, to determine which of the places, at which water iſſues forth on the ſurface, if there be more than one, is the real or principal ſpring; and that from which the other outlets are fed, as upon this muſt depend the direction of the ditch or drain, ſince by removing that the others muſt, of courſe, be rendered dry. When on the declivity, or ſlanting ſurface of the elevated grounds, from which the ſprings break forth, they are obſerved to burſt out at different levels, according to the difference of the wetneſs of the ſeaſon; and where thoſe that are the loweſt down continue to run, while the higher ones are dry, it is in general a certain indication that the whole are connected, and proceed from the ſame ſource, and conſequently, that the line of the drain ſhould be made along the level of the lowermoſt one, which, if properly executed, muſt keep all the others dry But if, as has been the too frequent practice, the drain was made along the line of the higheſt of the outlets, or places where the water breaks forth, without being ſufficiently deep to reach the level of thoſe below, the overflowing of the ſpring would rarely be carried away, and the wetneſs proceeding from that cauſe be removed, while the main ſpring ſtill continuing to run, would render the land below the level of the bottom of the drain ſtill prejudicially wet, from its diſcharging itſelf lower down over the ſurface of the ground. Thus, ſays the author mentioned above, it was the cuſtom, until Mr. Elkington ſhewed the abſurdity of the practice for drainers to begin to cut their trenches wherever the higheſt ſprings ſhewed themſelves between the wet and the dry ground, which not being of a depth ſufficient to arreſt and take away the whole of the water, others of a ſimilar kind were under the neceſſity of being formed at different diſtances, to the very bottom of the declivity, which being afterwards in a great meaſure filled with looſe ſtones, merely conveyed away portions of ſurface water, without touching the ſpring, the great or principal cauſe of the wetneſs.

DRAKE, *Sir* Francis, in *Biography*, a very eminent navigator, and naval commander, was born of obſcure parents, near Taviſtock, in Devonſhire, about the year 1545. He was the eldeſt of twelve ſons, and was devoted to the ſea-ſervice at an early period. He was taken under the care and protection of ſir John Hawkins, a diſtant relation, and roſe to the rank of captain when he had attained the age of twenty-two years. At the age of eighteen he was purſer of a ſhip trading to Biſcay: at twenty he made a voyage to Guinea, and in two years afterwards he was promoted to the command of a ſhip called the Judith. In this capacity he greatly diſtinguiſhed himſelf againſt the Spaniards, in the gulf of Mexico, and participated largely in all the glorious actions of his commander, ſir John Hawkins. With him he returned to England high in reputation, but without having improved his fortune in the ſmalleſt degree. He had, however, acquired an inveterate enmity for the Spaniards, which he harboured to the lateſt hour of life. He accordingly projected an expedition againſt that people in the Weſt Indies, which did not afford him the advantages which he expected. This was in 1570. In the year 1572 he ſet out again with two ſhips of 75 and 25 tons burden, manned with leſs than four ſcore perſons; yet with this pigmy force he ventured to ſtorm the town of Nombre de Dios, on the iſthmus of Darien, in which he received a wound. He afterwards attacked and took Vera Cruz, on the ſame iſthmus, which proved to him a ſource of great wealth. Among other property, he fell in with, and took 50 mules, laden with ſilver, of which his men carried away all that they were able, and buried the reſt. In the proſecution of theſe enterprizes, he was aſſiſted by the Indian nations, which, like himſelf, bore great enmity to the Spaniards. Satisfied, at length, with what he had acquired, he embarked with his treaſures for England, and arrived ſafe at Plymouth in the ſummer of 1573. It ſhould, however, be mentioned, that previouſly to his leaving the American coaſt, he remunerated his Indian friends, and to their prince, Pedro, he preſented a handſome cutlaſs, which was very highly eſteemed. Pedro, in return, gave him four large wedges of gold, which Drake, with true generoſity, threw into the common ſtock, with this emphatic obſervation; "Thoſe who bear the charge of ſuch uncertain undertakings on my credity, ought to ſhare the utmoſt advantages they produce." On his return, he ſettled in the moſt honourable manner with the owners of the ſhips, and then employed the money remaining to himſelf in fitting out three frigates for the ſervice of government in Ireland. In this buſineſs Drake ſerved as a volunteer, and by his zeal and prudence, as well as by generoſity, he recommended himſelf at court, to which he was introduced by ſir Chriſtopher Hatton. He had long deſired to make a voyage to the South ſea, and now an opportunity offered, by which he truſted he ſhould be able to attain the object of his ambition. He implored the queen to grant him her permiſſion for the purpoſe: this ſhe readily conceded to a man of ſo high a reputation, and Drake quickly found means to aſſemble a ſmall fleet of five veſſels, of from 100 to 15 tons burden, manned with 164 men. With this force, and with a mind above all common obſtacles, he ſailed from Falmouth Dec. 13, 1577. On the 27th, his ſquadron anchored off Mogadore, an iſland near the coaſt of Barbary: and a friendly intercourſe was commenced with the Moors, whoſe good will Drake was anxious to conciliate, as well for his own ſake, as for the good of his country. After a ſhort ſtay here, he proceeded to Cape Blanco, ſeizing all the Spaniſh veſſels that fell in his way, and in the month of January he arrived at, and anchored off, the Cape de Verd iſlands.

Being diſappointed of a ſupply of proviſions, by the interdiction of the Portugueſe, Drake proceeded on his voyage, and paſſed St. Jago on the 31ſt. From this iſland three cannon were diſcharged at his fleet, but none of the ſhot proved fatal. In revenge Drake ſeized upon a Portugueſe veſſel laden with wines; from which he took the pilot Nuno de Sylva, and diſmiſſed the others. Nuno, from his knowledge of the American coaſt, proved of the moſt eſſential ſervice in the courſe of the voyage. Our commander had been furniſhed with full powers by the queen, which powers extended even to the lives of thoſe under his controul; and it has been much doubted whether in one inſtance, which we ſhall mention, he did not exerciſe the authority delegated to him with a ſeverity unworthy of a great mind. Mr. J. Doughty, the ſecond in command, on board his own ſhip, was accuſed of diſreſpect and even mutiny; he was tried and convicted of offences, which by the naval law are capitally puniſhed. Drake, however, gave him the choice of the manner in which he would ſuffer for the crimes ſaid to have been committed by him. The terms offered were either immediate execution; or to be left on the deſolate continent with the proſpect of a lingering death through want of the common neceſſaries of life; or to be carried back priſoner to England there to abide a due courſe of law. Doughty made choice of the firſt, and he was accordingly beheaded, after having received the ſacrament in company with the commander. Here, as in a thouſand other inſtances, which hiſtory records, the religion of Jeſus, which ought to conciliate men, and lead them to the ſublimeſt acts of forgiveneſs, was called to ſanction a deed which cannot but be diſcreditable to him from whoſe authority the ſentence of death iſſued; and whoſe apparent regard to juſtice in the caſe of Doughty is believed to have been dictated by revenge for a private affront. Drake was not, however, called to account for the act on his return, and may therefore be regarded as having acted juſtly, though certainly without any attention to mercy.

Drake, after the fatal deed had been executed, proceeded to, and paſſed the ſtraits of Magellan; and with his own ſhip ſolely proceeded along the coaſts of Chili and Peru, capturing all the Spaniſh veſſels that he could meet with. He then coaſted California and North America as far as the 48th degree, in the hope of finding a paſſage to the Atlantic, but being diſappointed, he landed and took poſſeſſion, in the name of his ſovereign, of the country which he named New Albion. Having careened his ſhip, he boldly ſet ſail acroſs the Pacific ocean, and in leſs than ſix weeks reached the Molucca iſlands, and touched at Ternate. Thence, by Java and the Cape of Good Hope, he proceeded homewards, and arrived at Plymouth on Nov. 3, 1580, having completed the circumnavigation of the globe in two years ten months and twenty days. He was the firſt commander in chief who had performed this exploit, Magellan having died before his return. Drake came back very rich, and the expedition became a ſubject of much intereſting diſcuſſion. The Spaniſh ambaſſador made complaints of him as a pirate, and reclaimed the plunder which he had taken: this opinion was likewiſe maintained by many of his own countrymen who thought the prizes were of much leſs conſequence to the nation than the commerce which was likely to be interrupted by the procedure. Others, however, were too much elated with the reputation for valour and ſkill which redounded to Engliſhmen from the enterpriſe. The court ſcarcely knew which ſide to eſpouſe; at length, in the ſpring of 1581, the queen gave a ſanction to Drake's conduct by dining on board of his ſhip lying at Deptford, and conferred upon him the honour of knighthood, telling him, at the ſame time, that his actions did him more honour than his title. The populace joined in reſounding their favourite's praiſe, and his ſhip was extolled for having matched in its courſe the chariot of the ſun. Sir Francis now took for his device the terraqueous globe, and to his motto, "Divino Auxilio," he added, "Tu primus circumdediſti me." The ſhip in which he had made the expedition was preſerved many years at Deptford as a ſingular curioſity, and when almoſt rotten with age, a chair was made out of the materials and preſented to the univerſity of Oxford.

Elizabeth having come to an open breach with Spain, Drake was ſent, in 1585, with a fleet of twenty ſail, having a body of land forces on board, to attack the Spaniſh ſettlements in the Weſt Indies. Several iſlands yielded to his prroweſs. Two years after he was ſent to Liſbon, but receiving information that the Spaniards were aſſembling a fleet at Cadiz, for the purpoſe of invading England, he ſailed into the enemy's port, and burned and deſtroyed ten thouſand tons of ſhipping, excluſive of all their warlike ſtores. After this he engaged with ſome London merchants, and gaining intelligence of a rich carrack from the Eaſt Indies expected at Tercera, he inſtantly ſailed thither, and captured it. By this prudent act he gave as much ſatisfaction to his employers by the profits which accrued to them, as he had done to the ſtate by his various ſucceſſes. In 1588, he was advanced to be vice-admiral under lord Effingham Howard, and diſtinguiſhed himſelf in the deſtruction of the Spaniſh armada. In the conflict he captured a large galleon commanded by Don Pedro de Valdez, who ſurrendered without the ſhew of reſiſtance to the terror of his name. His ſquadron had the chief glory in this action. In the next year a fleet was ſent under Drake, with a body of land forces, commanded by ſir John Norris, for the purpoſe of reſtoring Don Antonio to the throne of Portugal. Here a diſagreement between the commanders of the different ſervices proved fatal to the enterpriſe. Drake juſtified himſelf before the council, and his plea was accepted, but he unqueſtionably loſt ſome credit in the affair. After this, in conjunction with Hawkins, he propoſed another expedition againſt the Spaniards in the Weſt Indies: the project was reſolved on, and they embarked with twenty-ſeven veſſels and nearly 3000 men. During the delay, occaſioned by ſome untoward circumſtances, intelligence was received that the plate fleet had arrived in Spain, except one galleon which had put into Porto Rico, and this they ſuffered to ſlip out of their hands. Vexation threw Hawkins into a fever which terminated his life in November. On the day after his deceaſe Drake made a deſperate attack upon the port and ſhipping of Porto Rico, which, though very deſtructive to the Spaniards, proved ultimately unſucceſsful. From this period Drake met with ſcarcely any thing but diſappointment, which preyed ſo much on his mind, as to render him incapable of almoſt every exertion, and at length to put an end to his mortal exiſtence. He died near the town of Nombre de Dios, January 1596, in the fifty-firſt year of his age. According to Fuller, "He lived by the ſea, died on it, and was buried in it." And in reference to the misfortunes by which the laſt periods of his life were marked, he adds, "We ſee how great ſpirits have mounted to the higheſt pitch of performance, afterwards ſtrain and break their credit in ſtriving to go beyond it." "He was," according to the eſtimate of a more modern biographer, "a man upon the whole of eſtimable private character: though ſomewhat rough and boaſtful, yet careful of thoſe under his command, courteous and humane towards thoſe whom the fortune of war threw into his power, juſt and generous in his dealings, ſober and religious. He poſſeſſed a natural eloquence, and though without the advantages of education, acquitted himſelf with credit on public occaſions. He was eminently ſkilled in all the branches of his profeſſion, and with ſo much courage and ability did he conduct his enterprizes, that ſcarcely any name among naval adventurers ſtood ſo high, not only in his own country but throughout Europe, as that of ſir Francis Drake." Biog. Brit.

Drake, James, M. D. fellow of the College of Phyſicians, and of the Royal Society, publiſhed, in 1707, what he calls "A New ſyſtem of Anatomy," in two volumes in 8vo. It is principally taken from Cowper, but as the plates, which are neatly engraved, are on a reduced plan, it was more within the reach of ſtudents, and would have been uſeful, if the work had been leſs theoretical. He lived, however, to ſee it paſs through three editions. The laſt, which was publiſhed in 1737, under the title of "Anthropologia nova," is in three volumes 8vo. In impoſthumes in the maxillary ſinus, he adviſes to draw one of the dentes molares, to give vent to the matter. The deſcription of the internal noſtrils, and of the cavities entering them, are new, as are alſo the plates of the viſcera of the abdomen. Haller Bib. Anat.

Drake, in *Geography*, a harbour in California, ſo called after ſir Francis Drake, who diſcovered and took poſſeſſion of California for queen Elizabeth. N. lat. 28° 15′. W. long. 111° 39′.

Drake's *iſland*, or *St. Nicholas*, an iſland in Plymouth ſound. N. lat. 50° 21′ 30″. W. long. 4° 20′.

DRAKENA Radix, in *Botany*, Cluſ. Exot. 83, is the root of *Dorſtenia Contrayerva*, which ſee.—*Dorſtenia Drakena* of Miller, Willd. Sp. Pl. v. 1. 683, is however a different ſpecies, having oval receptacles, and entire-edged leaves. Miller informs us that the roots of both theſe and of *D. Houſtoni*, are brought over and uſed indifferently in medicine or dyeing.

DRAKENBORCH, Arnold, in *Biography*, profeſſor of rhetoric and hiſtory in the univerſity of Utrecht, was born in that city on the firſt of January 1684. He ſtudied under Grævius and other celebrated critics, after which he went to Leyden, and in 1706 took his degree of doctor of laws at Utrecht. In 1716, he ſucceeded Burmann, one of his own tutors, as profeſſor in that univerſity, and in the diſcharge of the duties of his office he diſplayed great learning, and a profound knowledge of ancient literature. He publiſhed many original works, and undertook the duties of an editor in others. Among theſe was an edition of "C. Silii Italici Punicorum," libri xvii. 4to. which he laboured to render as perfect as poſſible. Beſides the notes which he added as illuſtrative of the text, he cauſed engravings to be made of various ſubjects of antiquity, which cannot fail to throw light upon things that were regarded as obſcure. He alſo gave an edition of Livy in 7 vols. 4to. together with a life of the hiſtorian. In the biography, he takes occaſion to enumerate all the preceding editors and commentators of this ancient claſſic. This was a work of great labour, and Drakenborch was enabled to enrich his edition by reference to more than 30 MSS. which had never before been employed for the purpoſe. Every thing that could ſerve, in a critical, grammatical, or hiſtorical point of view, for improving and explaining his author, he collected with great diligence. Drakenborch died at Utrecht in 1748. Gen. Biog.

DRAKENDORF, in *Geography*, a village of the duchy of Saxe-Gotha in Germany, not far from Jena, remarkable for having been the reſidence of the celebrated German poet baron Sonnenberg, who compoſed here his epic poem, entitled "Donatoa."

DRAKENSTEIN, a diſtrict of ſouthern Africa, near the Cape of Good Hope, which forms with Stellenboſch one diſtrict under the juriſdiction of one landroſt, although they have diſtinct hemraaden or councils. After deducting the ſmall diſtrict of the cape, Stellenboſch and Drakenſtein include the whole extent of country from cape L'Aguillas, the ſouthermoſt point of Africa, to the river Kouſſie, the northern boundary of the colony; a line of 380 miles in length; and the mean breadth from eaſt to weſt is about 150 miles; comprehending an area, after ſubtracting that of the cape diſtrict, equal to 55 thouſand ſquare miles. Twelve hundred families are in poſſeſſion of this extenſive diſtrict, ſo that each family, on an average, has 46 ſquare miles of land. The greater part, however, of this extenſive ſurface, is of little value, as it conſiſts of naked mountains, ſandy hills, and Karroo plats. But a portion of the remainder compoſes the moſt valuable poſſeſſions of the whole colony; whether they be conſidered as to the fertility of the ſoil, or to the temperature of the climate, or to their proximity to the cape, which, at preſent, is the only market in the colony, where the farmer has an opportunity for the diſpoſal of his produce. Drakenſtein and its environs conſiſt of a fertile tract of country, ſituated at the foot of the great chain of mountains, at the diſtance of between 30 and 40 miles from the cape. The whole extenſive valley is well watered by the Berg river and its numerous branches: the ſoil is richer than in moſt parts of the colony, and the ſheltered and warm ſituation is particularly favourable to the growth of the vine and different kinds of fruit. A ſub-diviſion, called Little Drakenſtein, occupies the middle of the valley, and contains many ſubſtantial farms, moſt of which are freehold property; ſo that the two Drakenſteins, and the next ſubdiviſion, called Franſche Hoeck, or the French corner, ſupply two-thirds of the wine that is brought to the cape market. The ſubdiviſion laſt mentioned is ſituated in the S. E. angle of the valley among the mountains, and took its name from the French refugees who ſettled there when they fled to the country after the revocation of the edict of Nantz. To them the colony has been indebted for the introduction of the vine. The produce of the country conſiſts chiefly of wine and fruits. The village of Paarl is ſituated at the foot of a hill that ſhuts in the valley of Drakenſtein on the weſt ſide. It conſiſts of about 30 habitations, with intermediate orchards, gardens, and vineyards, forming a ſtreet from half a mile to a mile in length. About the middle of the ſtreet is the church, a neat octagonal building, covered with thatch, and near it the parſonage-houſe, with garden, vineyard, fruit-groves, and a large tract of very fine land. Dell Joſephat and Waagen-Maaker's valley are two ſmall dales encloſed between the hilly projections that branch out towards the north or upper end of the valley of Drakenſtein; in theſe dales the beſt oranges, peaches, and other fruits are produced; and the wine is of the beſt quality. Groeneberg, another ſubdiviſion, is the largeſt of the projecting hills that run acroſs the northern extremity of the valley, and the ſoil is productive in fruit, wine, and corn. The whole valley, comprehending the above detailed ſubdiviſions, is comparatively ſo well inhabited, that few animals, in a ſtate of nature, are now to be found upon it. Of hares, however, there is no ſcarcity; and two ſpecies of buſtards, the red-winged and the common partridge, and quails are in great plenty. The antelope and other animals are found on the hills towards the northern extremity of the valley. The inhabitants are annoyed with wolves, hyænas, and jackals, which deſcend in the night from the neighbouring mountains. Barrow's Travels in Southern Africa, vol. ii.

DRAM. See Drachm.

Drams. See Cordials.

Dram-*road*, in *Inland Navigation*, the ſame with railway or *tram*-road. See Canal.

DRAMA, in *Geography*, a town of European Turkey, in the province of Romania; 16 miles N. E. of Emboli.

Drama, in *Poetry*, a piece, or poem, compoſed for the ſtage.

The word is Greek, δραμα, which literally ſignifies *action;* becauſe in dramas, or dramatic poems, they act, or repreſent actions, as if they really paſſed.

A drama, or as we popularly call it, a *play*, is a compoſition either in proſe or verſe, conſiſting, not in the ſimple recitation, but in the actual repreſentation of an action.

Our dramas are, tragedies, comedies, operas, and farces.

Some critics take the book of Canticles for a drama, or dramatic poem; others maintain the ſame of the book of Job. See each of thoſe articles. Some ſcrupulous authors would reſtrain drama to ſerious pieces, as tragedies; but with reſpect to the etymology, a comedy is as much a drama, as a tragedy.

The primary parts of the drama, as divided by the ancients, are the protaſis, epitaſis, cataſtaſis, and cataſtrophe. The ſecondary parts are, the acts and ſcenes. The acceſſary parts are, the argument, or ſummary, the prologue, chorus, mimus, ſatura, and atellana. Laſtly the epilogue, which pointed out the uſe of the piece, or conveyed ſome other notice to the audience in the poet's name.

DRAMATIC, in *Poetry*, is an epithet given to pieces written for the ſtage.

This kind of poetry has, among all civilized nations, been conſidered as a rational and uſeful entertainment; and as it is employed upon the light and the gay, or upon the grave and affecting incidents of human life, it divides itſelf into the two forms of *comedy* or *tragedy*, which ſee reſpectively. See alſo Poetry.

For the laws of dramatic poetry, ſee Action, Character, Discovery, Fable, Unity, &c.

Dramatic *Machinery*. In the earlier ages, although dramatic entertainments were very popular, eſpecially among the Grecians and Romans, more attention ſeems to have been paid to the genius and labour of the poet, than to that of the mechaniſt or decorator. The names of Æſchylus, Ariſtophanes, Terence, Plautus, and many others, have reached us, while thoſe of the mechanics employed (if there were ſuch) have ſunk into oblivion. Whether the mechanical and decorative taſte of the ancients was equal to the genius of their poets, it is wholly foreign from the deſign of this article to inquire. In the preſent ſtate of dramatic repreſentation we find, by experience, that Cinderella, and Mother Gooſe, generally faſcinate the ſpectators more than even the moſt eminent works of Shakſpeare. If this be a proof of decay or perverſion of literary taſte, it is alſo at leaſt a very ſtrong one of the progreſs of the mechanical arts, and of the effect which they produce upon the public mind even in matters of amuſement. Of all the branches of architecture, few (if any) have been eſteemed more difficult or uncertain, than the conſtruction of the interior part of a theatre. The architect, beſides the general knowledge incidental to his own immediate profeſſion, would require at leaſt a conſiderable acquaintance with the principles of optics and acouſtics to enſure his ſucceſs; and unfortunately this taſk has been too frequently committed to perſons who, although perhaps good architects and mechanics, were totally ignorant of both theſe ſciences. The latter ſcience is ſtill ſo imperfectly underſtood, that great difficulty muſt remain in this part of the buſineſs; the optical part is not ſo arduous, and a degree of theoretical knowledge, combined with attention to its practical application, will enable the architect who conſtructs the interior of a theatre to avoid defects, too common in moſt of thoſe which have been hitherto executed.

The interior of a theatre is generally, and apparently with juſtice, divided into two departments. That which is before the curtain, and which contains the audience or ſpectators, and that which is behind, and which ought to be ſo conſtructed as to place the whole performance in the moſt favourable point of view, and to afford to the performers and artiſts employed the greateſt facilities of executing their reſpective profeſſional duties with correctneſs and effect. To the latter of theſe departments this article is confined.

Before entering into any deſcription of the moving parts of the machinery, it may be proper to notice thoſe parts of the architectural work, which muſt be adapted to receive and ſupport them. Of theſe the firſt, and perhaps moſt important, is the

Conſtruction of the Stage.

The ſtage of a theatre is of an oblong or rectangular form, and is conſtructed as an inclined plane, the back part being more elevated than the front. It is uſual to allow one inch of perpendicular aſcent for every 36 inches of length from the front to the back of the ſtage. Thus the acute angle formed between the flooring or inclined plane, and a line drawn from the front to the back part, and parallel to the horizon, will be 1° 24′ 29″. This inclination is conſidered to be of advantage to the viſion lines, ſuppoſed to come from the eye of a ſpectator in the front of the houſe, to any given point in the ſtage. It particularly places it in the power of the architect, to keep the back part of the pit lower, than could be done without injuring the viſion, were the flooring of the ſtage horizontal. This muſt be a conſiderable object, eſpecially in large theatres, where there are many tiers or rows of boxes, and where the galleries muſt of neceſſity be conſtructed at a great altitude, above the level of the front of the ſtage. As it is alſo found, that cloth of every deſcription (eſpecially woollen) has a conſiderable effect in diminiſhing the tranſmiſſion of ſound, it is conſidered proper to keep the whole audience in the pit as low as poſſible without impeding the viſion, that their cloaths may produce leſs of this effect upon the ſounds which iſſue from the ſtage and the orcheſtra. A greater declivity might perhaps be of uſe in this reſpect, but here the architect muſt limit himſelf to ſo much as will not prove injurious to the action of the performers upon the ſtage, eſpecially the dancers.

The ſtage of a theatre, like other wooden floors, conſiſts of plank laid upon croſs joiſts, and where the dimenſions of the ſtage are large, theſe joiſts muſt be ſupported by croſs beams and upright poſts to prevent the flooring from ſpringing or yielding too much, as in the common operations of practical carpentry applied to flooring, and entirely depending on the ſame geometrical laws. In conſtructing the joiſts and framing, the architect muſt in the firſt place conſider the number of apertures which ought to be made for the purpoſe of conducting the buſineſs of the ſtage with propriety; the dimenſions and diſpoſition of theſe apertures; and the eaſieſt and moſt economical way of forming others to ſuit that ſucceſſion of novelty which ſeems to be the prevalent taſte of the preſent day. In adapting his joiſting and frame-work to anſwer theſe purpoſes, will conſiſt his chief difficulty. The conſtant changes and improvements

ments which take place, render it impoſſible to aſcertain any preciſe mode of doing this, but the general way will be conſidered under the ſection of this article; *Apertures of the ſtage*, compriſing the foot-lights, traps, flaps, and ſliders—to theſe we now proceed.

Apertures of the Stage.

The firſt aperture in the ſtage immediately behind the orcheſtra, and in front of the proſcenium and curtain, is that for raiſing and lowering the foot lights, both for the purpoſes of trimming the lamps, and of darkening the ſtage when required. It is marked by the letters A, A, *fig.* 1, *Plate* IX. *Miſcellany*, which is a horizontal plan of a ſtage 60 feet in length, and 25 feet in breadth at the curtain line. In this plan, the lines which repreſent the ſide walls of the theatre are too much contracted, for it is neceſſary to give at leaſt eight or ten feet of additional room for the performers and ſcene-ſhifters, behind each wing. The letters B, B, denote the line which forms the front of the ſtage behind the orcheſtra.

The next apertures are the ſide traps, of which any convenient number may be conſtructed. Four of theſe are exhibited in the plan, and are diſtinguiſhed by the letters E, E, E, E. In the middle are two larger traps. The firſt, at F, is of an oblong form from ſix to ſeven feet in length, and from three to four feet in breadth. It is moſt frequently uſed for the grave ſcene in Shakſpeare's tragedy of Hamlet.

The trap marked by the letter G is generally ſquare, and is chiefly uſed for the ſinking of the cauldron in the tragedy of Macbeth. Behind theſe, in large theatres, where many changes of the ſcenery are frequently required, there are a number of longitudinal apertures acroſs the ſtage, which are covered by planks moveable upon hinges, ſo that by throwing them back, the ſtage may be opened in a moment. The uſe of theſe is to allow the flat ſcenes to ſink through the ſtage, when required. Three of theſe will be found in the plan, at the letters H, H, H, and are known by the name of *flaps*.

In the late Theatre Royal of Covent Garden, much of the ſcenery, not in immediate uſe, was kept in the cellar under the ſtage. For the purpoſe of raiſing and lowering theſe ſcenes with facility, other apertures were made, and cloſed with ſquare or rectangular pieces of wood, which could be placed or diſplaced in a few minutes: theſe were called ſliders, and a plan of one is given at the letter I.

Framing of the Traps.

It was uſual to produce the aſcent and deſcent of the foot lights by the agency of a perſon placed in the cellar under the ſtage. This might have anſwered the purpoſe of lowering the lamps for trimming ſufficiently well, but the partial darkening of the ſtage required a more minute attention. For this reaſon, it was found proper to convey the mechanical power to the place where the prompter ſtands, that the lamps might be raiſed or ſunk, either by himſelf, or by a perſon immediately under his inſpection. A framing of this kind, conſtructed, with a ſlight variation, from a plan of Mr. George Sloper, of Covent Garden, and ſimilar to what was uſed there, is repreſented in *fig.* 2.

This figure is a tranſverſe elevated ſection of the ſtage, as it would be viewed by a ſpectator ſeated about the middle of the pit. The two ſide walls of the theatre, under the ſtage, are repreſented by the letters L, L; the aperture, where the horizontal frame which ſupports the lamps riſes, is marked A A, as in *fig.* 1. The horizontal frame M M ſlides upon two upright poſts, under the ſides of the aperture A A, and from both ends cords, paſſing over two pullies O, O, are fixed to a large wheel N, placed in a ſtout framing, which is omitted to prevent confuſion in the figure. The weight of the frame M M, and the lamps, is counterpoiſed by a weight, ſuſpended by a cord paſſing over the pulley R. Upon the ſame axis with the large wheel N, is a ſmall wheel, and what is called by mechanics an endleſs line, paſſing round this, is guided over the directing pullies P, P, P, to the ſmall barrel or cylinder Q, which being turned by the prompter, or an aſſiſtant, the lights are elevated or depreſſed at pleaſure, without entering the cellar under the ſtage, except when trimming the lamps may be neceſſary. The difference of the diameters of the wheel N, and the ſmall wheel on the ſame axis, ſerves merely to increaſe the power, and diminiſh the velocity of the aſcent and deſcent of the lights, upon the common mechanical principle of the wheel and axle.

The traps are worked under the ſtage, by an apparatus attached to each, and ſimilar in all, according to the dimenſions of the reſpective apertures. That correſponding to the aperture F, in *fig.* 1, is repreſented by *figs.* 3 and 4. *Fig.* 3, has a tranſverſe elevation, like *fig.* 2. At the ends of the aperture are two upright poſts V, V, upon which the trap ſlides. The trap conſiſts of a horizontal board fitted to the aperture above, and under this is another, with grooves to fit the poſts V, V, ſo that the horizontal poſition of the trap may be preſerved while riſing and ſinking. Theſe are repreſented at S. In front of the poſts V, V, are two others U, U, to carry a cylinder T, turned by a winch to raiſe or ſink the trap, and ſecured by a catch and ratchet wheel. The trap, if neceſſary, may alſo be counterpoiſed, but this is ſeldom, if ever, done.

Fig. 4, is a profile elevation of the ſame machinery, which will further illuſtrate the relative poſitions of the poſts V and U, and the way in which the cords by which the motion is communicated, paſs from the trap to the band. The reference letters are the ſame in both figures. The cords are generally made faſt to the beams or joiſts, at the roof of the ſtage cellar, and paſs over a pulley at each end of the trap, to double the power of the perſon who turns the winch. Beſides the moving traps, each aperture is cloſed by a board ſupported by an upright piece of wood, or ſimilar contrivance, when the traps are not at work.

No machinery whatever is permanently attached to the flaps or ſliders, for as theſe apertures ſerve generally for the paſſage of the flat ſcenes through the ſtage, the machinery muſt depend upon the particular effect which it is neceſſary to produce. The flat ſcenery is generally raiſed by a crane, unleſs a very rapid aſcent or deſcent be required, when it may be done by the application of a counterpoiſe.

Diſpoſition of the Stage Lights.

There is, perhaps, no department of a theatre where ſo much pains ought to be taken, as in the diſpoſition of the lights, for upon this, in a very great degree, depends the effect of the ſcenery, however nicely the perſpective may have been executed by the painter, and every optical illuſion calculated to aſtoniſh or amuſe the ſpectator. It was formerly the cuſtom to light the ſtage by a large chandelier, or frame of lamps ſuſpended in the middle of the proſcenium, and elevated or depreſſed at pleaſure. This ſtill prevails in many parts of the continent, and even in Britain, is very generally uſed to illuminate the ring, or area of thoſe theatres, where ſeats of horſemanſhip, and other athletic exerciſes, are exhibited.

It ſeems obvious, that the ſuſpenſion of a chandelier directly in the view of the ſpectator, muſt materially deteriorate the effect of an exhibition, which can only be conſidered as excellent in the degree in which it is a faithful copy of nature. When ſuſpended over the proſcenium of a large theatre, it muſt alſo greatly impede the viſion of all ſpectators ſeated in the upper parts of the houſe. Theſe inconveniences induced the late Mr. Garrick, when patentee of the old Theatre Royal of Drury-lane, to remove the chandelier and ſubſtitute the frame of lamps now diſtinguiſhed by the appellation of *foot lights,* and this improvement has been adopted in all other regular theatres in the Britiſh iſlands.

But although the adoption of the foot lights removes the objections to the chandelier, they are ſtill very far from producing that diſpoſition of light and ſhade, which would be very deſireable to increaſe the effect both of the ſcenery and of the countenances of the performers. The glare of light in the front, and parallel to the ſtage, beſides the ſmoke which the lamps, however clean and nicely trimmed, always produce, inverts every ſhadow, and throws the ſhade upwards inſtead of downwards upon the performers' face. The moſt experienced profeſſional men aſſign this as the reaſon, that the face of a performer muſt be ſo highly coloured to produce an effect in the front of the houſe, as to appear abſolutely ridiculous to a ſtranger unconverſant with the buſineſs, if admitted into the green-room, or behind the ſcenes. The limits of this article will not admit of going farther into detail upon this ſubject, nor indeed have we any eſtabliſhed facts to proceed upon. All mechanical experiments neceſſarily involve a certain expence, while their ſucceſs is merely ſpeculative, and it is much better, in every caſe, to aſcertain the extent of the improvement practically than theoretically. The diſpoſition of the lights of a theatre, however, ſtill ſeems to afford very ample ſcope for the exerciſe of the talents of an expert and ſkilful optician.

To give a ſufficient light to the ſtage ſide lights are uſed, as well as foot lights: theſe are generally placed between the wings, to turn upon a hinge, for the purpoſe of darkening the ſtage when neceſſary. A plan of theſe, which is very ſimple, will be found in *fig.* 5. The apparatus conſiſts merely of an upright poſt, to which is attached a piece of tinned iron, forming two ſides of a ſquare, and moveable upon joints or hinges, and furniſhed with ſhelves to receive the lamps or candles. That which gives light to the ſtage is repreſented by 1, and the poſition in which the ſide lights are placed, when the ſtage is partially darkened, by 2. Side lights are placed between every ſet of wings, on both ſides of the ſtage.

Beſides the foot and ſide lights, which are permanent, a number of occaſional lights are diſpoſed at times on different parts of the ſtage, to give effect to tranſparencies, and for other cauſes, of which, as they muſt be varied according to circumſtances, no particular account can be given. They muſt be left entirely to the genius and taſte of the perſons who conduct the buſineſs of the ſtage.

Diſpoſition of the Scenery.

The ſcenery of a theatre conſiſts of the flat ſcenes which form the termination of the perſpective acroſs the ſtage, and the ſide ſcenes, or wings, which are diſpoſed upon each ſide of the ſtage ſo as to be ſhifted as often as may be neceſſary, and to afford opportunities for the actors to come upon the ſtage, or quit it, at any of the intervals between the reſpective ſets. Beſides theſe, there are ſcenes which may be occaſionally placed and diſplaced, ſuch as the fronts of cottages, caſcades, rocks, bridges, and other appendages, requiſite in the repreſentation of particular dramas. Theſe are generally called pieces.

The flat ſcenes are of three kinds: the firſt of theſe are drops, or curtains, where the canvas is furled or unfurled upon a roller, placed either at the top or bottom of the ſcene. A difference of opinion exiſts as to the placing of the roller, which, as it is a mere matter of taſte, may probably never be determined—both ways are uſed in the London theatres. The rollers, in either caſe, are made to revolve by means of cords tightened or ſlackened as may be neceſſary; and when the ſcenes are large it is uſual to wind them up by means of a cylinder and a winch, as in the trap machinery.

Although the drop ſcenes are the moſt ſimple, it is neceſſary ſometimes to have recourſe to thoſe ſcenes which are called flats. In theſe the canvas is ſtretched upon wooden frames, which are generally conſtructed in two pieces, ſo as to meet in the middle of the ſtage, the junction being in a perpendicular direction. The ſide frames are moved in grooves, compoſed of parallel pieces of wood fixed upon the ſtage, and ſo conſtructed that they may be removed with facility from one place to another. The upper part of the framing is alſo confined by a groove, to retain the perpendicular poſition of the flat ſcene. Theſe are ſometimes conſtructed, to ſave room, upon joints, by which they may either be lowered to the horizontal poſition, or drawn up to the ſide walls. In this reſpect their conſtruction is pretty ſimilar to that of a common draw-bridge. This plan was uſed in the late Theatre Royal, Covent Garden, where they were called flys. The principal uſe of the flats is where apertures, ſuch as doors, windows, chimney-pieces, &c. are wanted in the ſcene, which may be opened and ſhut as required; theſe are called, in the technology of a theatre, *practicable* doors, &c., becauſe, when not to be uſed, they may be painted upon a drop ſcene. A third kind of ſcene is the profiled or open *flat.* This is uſed for woods, gateways of caſtles, and ſuch purpoſes: it is framed exactly like the other, and the only difference conſiſts in parts of the ſcene being left open to ſhew another behind, which terminates the view.

A very important part of the ſcenery of a theatre is the wings. Theſe alſo are ſtretched upon wooden frames, and ſlide in grooves fixed to the ſtage. In ſome large theatres they are moved by machinery, in others by manual labour. The diſpoſition of the grooves will be ſeen at the letters K, K, in *fig.* 1. In this figure are nine ſets of wings, the front only of which are marked by the reference letter. The wings, like the flats, whether moved by the hand or by the aid of machinery, uſually ſtand upon the ſtage. The plan of moving the wings of the late theatre of Covent Garden, and that of the Theatre Royal of Glaſgow, invented by the writer of this article, are repreſented in *Plate* X.

Fig. 1, is a tranſverſe elevated ſection of the ſtage cellar, and ſtage of a theatre, where the wings are moved by a cylinder, or barrel under the ſtage, as was done at Covent Garden. D, D, are the ſide walls of the houſe; at A is a ſtrong horizontal beam of wood, ſuch as builders generally call *ſleepers,* laid upon the floor of the cellar under the ſtage. Of theſe there muſt be a ſufficient number to ſerve as railways for the frames of all the wings to run upon: four of theſe frames are repreſented and diſtinguiſhed by the letters B B, C C. The frames B, B, are in front of thoſe marked C, C. Each frame runs upon two ſmall wheels, to diminiſh the friction, and all paſſing through longitudinal apertures in the ſtage, which ſerve as guides, riſe to a ſufficient height above the ſtage to ſupport the wings which are attached to them in front, ſo as to be quickly removed, and others ſubſtituted. The line of the ſtage is repreſented at E. Two frames at each ſide of the ſtage only were uſed for each ſet of wings. At F is a long cylinder, or barrel of wood, revolving upon iron axles, and extending from the front to nearly the back of the ſtage, ſo as to move all the wings at once. It will appear, by inſpecting the plate, that the cords, or endleſs lines, paſſing from each frame round the barrel F, and over the directing pulley H back to the ſame frame, are ſo diſpoſed that when the upper part of the barrel is moved towards the right, the front frames B, B, will move forward upon the ſtage, and the back frames C, C, will be withdrawn. In this ſtate they are repreſented in the figure. When the motion of the barrel is reverſed, that of the frames will alſo be inverted; the back frames will advance, and the front ones will recede. When a change of ſcenery is requiſite, the wings are taken off the frames which are out of the view of the ſpectators, and thoſe fixed on which are to be next diſplayed. Upon the barrel F is a wheel, moved by a pinion G, by means of the handle I, to give motion to the barrel, and increaſe the power. A horizontal fly wheel, like that of a jack, was alſo added, but in ſo ſhort a motion it is not probable that it could be of great advantage.

Fig. 2, is an elevation of the machinery by means of which the wings of the new ſubſcription Theatre Royal of Glaſgow are moved, and is the only plan of the kind hitherto attempted. It may be thought ſtrange that any deviation ſhould have been made in this theatre, from the plans adopted in the Theatres Royal in London: the reaſons are the following. Before plans for moving the machinery had been procured, the architectural part of the houſe was finiſhed, and three apartments upon each ſide under the ſtage having been fitted up for dreſſing-rooms, there did not remain ſufficient room to conſtruct the barrel and apparatus to advantage in the ſtage cellar, which was ſufficiently occupied by the footlights and trap framings already deſcribed. It became neceſſary, therefore, either to alter the houſe, or to abandon the idea of working the wings by machinery, unleſs another place could be found where the machinery might be placed to advantage, without interfering with that ſpace behind the ſcenes allotted to the performers and ſervants of the theatre. In every theatre it is neceſſary to have platforms at each ſide above the ſtage, and between theſe a temporary flooring, for the purpoſe of hanging up, taking down, or moving the flat ſcenery. Theſe ſide platforms are diſtinguiſhed by the letters K, K, and the intermediate moveable flooring by L in *fig.* 2. This ſuggeſted the idea that the barrels might be placed upon one of theſe platforms, and the wings moved above inſtead of below. But had the moving lines been attached to the upper parts of wings reſting on their baſes, every motion of the barrel muſt have overturned thoſe wings, or at leaſt have made them totter, and impeded their motion. To obviate this it was thought expedient that the wings, inſtead of reſting upon the ſtage, ſhould be hung from above, the baſis being ſo near to the ſtage as to appear to every ſpectator to reſt upon it, although really ſuſpended over it. Upon this general principle ariſing, as moſt inventions do, from a caſe of immediate neceſſity, the machinery which ſhall now be deſcribed was planned and executed.

Under the platform K were placed horizontal boards upon their edges, ¾ of an inch in thickneſs and ſeven inches deep; theſe correſponding to the number of the wings to be uſed, were ſeparated at each end by ſquare pieces of board, of the ſame thickneſs, to keep them aſunder; at each end the whole were bound together by a claſp of iron, O, which paſſing upwards through the platform, was ſecured by wedges paſſing through the arms of the claſp; by means of theſe wedges the claſp, and all the wings ſuſpended from it, could be raiſed, ſhould the platform yield in any part. The claſps, horizontal boards, and intermediate pieces, were ſecured by a ſcrew-bolt paſſing through the whole. The horizontal pieces of board ſerved as rail-ways for the ſuſpended wings to move upon, and were ſeven feet in length within the claſps; from theſe the wings were ſuſpended by ſheers of iron, in each of which was placed a ſmall friction roller reſting upon the board, and the lower part of the ſheers was ſcrewed to the wing, ſo that its baſe might be nearly an inch clear of the ſtage. Between the pieces of wood which ſeparate the rail-ways in front were pullies of about ſix inches diameter, two of which are repreſented at P P; a cord attached to a ſtaple in the top of the ſheers of each wing, and paſſing over each of theſe pullies, connected the wing with one of the barrels above at F. When the barrel was turned theſe cords neceſſarily pulled forward the wing to which each was attached, and thus the wings were brought forward. To allow the wings to recede, another cord, attached to the ſheers, was conducted over the directing pullies H, H; and from the other end a weight was ſuſpended ſufficient to overcome the friction and pull the wing back whenever the cords attached to the barrel were ſlackened. The frame M, which carried the barrels, conſiſted of upright poſts of wood about four inches ſquare, and the horizontal rails for carrying the barrels were of caſt iron with braſs buſhes for receiving the axles or journals of the barrels. The barrels were ſolid pieces of fir, ſix inches diameter, and hooped with iron at each end; the longeſt, which moved ſix wings on each ſide of the ſtage, was divided into three pieces, and the journals connected by coupling boxes. Eight barrels were uſed, four of which were placed as repreſented in the figure, and the other four above upon the rail at M; becauſe the barrel, when pulling forward the wings, was obliged to raiſe all the weights for making them recede; a counterpoiſe, equal to the ſum of all theſe weights, was placed upon the barrel in an oppoſite direction. To increaſe the power each barrel had a wheel and pinion on one end, exactly ſimilar to what is repreſented at F and G in *fig* 1; the pinion containing one-third part of the teeth in the wheel of courſe trebled the power, and thus one man was able to work 12 wings at the ſame time with ſufficient velocity, for the wings always advanced or receded more quickly than the drop ſcenes could be raiſed or ſunk. The direction of the cords will be very obvious by inſpecting the figure, two barrels with the counterpoiſes being corded.

For raiſing and lowering the drop-ſcenes another framing was conſtructed carrying 12 ſhort barrels, a profile ſection of which, with one barrel, is repreſented at N. When the drop-ſcenes were pulled up the barrel was ſecured by a ratchet-wheel and catch.

Although this machinery was conſtructed rather to correct an error in the general conſtruction of the theatre than for any other reaſon; it appears, after four years trial, to poſſeſs ſome important advantages over the plans of the London theatres, whilſt it is fair to ſtate that it is equally liable to ſome objections. As it was conſtructed in a hurried manner, the practical part was not executed ſo perfectly as might have been wiſhed; all the directing pullies were made of wood, and the grooves to receive the cords by no means ſufficiently deep to prevent them from ſlipping occaſionally, which muſt have frequently interrupted the motion of the wings. For this reaſon the counterpoiſe weights were ſubſtituted for the double or endleſs line; and this was more neceſſary, becauſe the cordage being new, it was perfectly evident that the natural ſtretch would in a few days render it quite unſerviceable in this reſpect, unleſs greater care had been taken than is generally to be expected. This machinery, with very little attention, has been found to anſwer the purpoſe remarkably well. Its advantages over that uſed in Covent Garden ſeem to be the following;

The frames which carry the ſcenes by the plan *fig.* 1, reſting upon the floor of the ſtage cellar, require a ſtrength of framing to keep them ſteady, which both renders them heavy to move and involves a very great expence for the timber and workmanſhip; beſides this, many people muſt be employed to change the wings upon the frames when drawn back, and in this reſpect no ſaving of labour can ariſe, and the only advantage gained by the machinery is regularity of motion. The hanging wings of the Glaſgow theatre are greatly lighter, and might be much more ſo than they are, for the whole frame-work was finiſhed upon the preſumption that they muſt reſt upon their baſes, as in the caſe of other wings. But it will at once occur, that a much greater ſtrength of frame-work will be neceſſary for a ſcene upwards of 20 feet high, and reſting upon its baſe, than for one ſuſpended from above, where the force of gravitation acts in a contrary way, and which requires no other power than what is neceſſary to diſtend the canvas. Add to this, the weight of a framing paſſing through grooves in the ſtage and running upon a rail-way nearly 20 feet below, and without exactly meaſuring the dimenſions of the wood, which muſt always depend upon thoſe of the theatre, the diſproportion of the one plan to the other will appear enormous. In the working of the wings according to either of theſe plans the ſuperiority alſo evidently reſts with the latter. A perſon or perſons under the ſtage are ſituated in a moſt inconvenient place for obſerving the conduct of the drama, and regulating operations to forward its effect. On a platform above every thing is eaſily viſible, and common attention to what paſſes below is all that is neceſſary. In the London theatres, as alſo in moſt reſpectable provincial ones, a whiſpering tube is placed, to convey ſounds from the prompter to thoſe employed above, for their occaſional government; this tube is entirely ſimilar to a common ſpeaking trumpet.

The defects of the hanging machinery, as conſtructed at Glaſgow, ought alſo to be noticed. The rail-ways, upon which the wings move, were found ſometimes apt to warp, and had of courſe ſome tendency to interrupt the motion of the wing; this might be eaſily remedied by making the rail-ways of caſt-iron, and if the upper edge ſhould be well poliſhed the friction would be very ſmall indeed.

In a provincial theatre, where a certain ſet of wings are almoſt conſtantly uſed, the plan of ſcrewing the ſheers which carry the pullies to the wings may anſwer very well; it is, however, certainly more deſirable that means ſhould be deviſed for altering the wings with greater ſpeed than can be done by the drawing of ſcrew-nails. Many plans may be contrived to anſwer this purpoſe; one, which may do ſufficiently well, is repreſented in *figs.* 1 and 2, *Plate* XI.

Fig. 1, is a profile elevation of the ſuſpending apparatus and upper part of the wings as in *fig.* 2, *Plate* X. B is the platform above; A, A, the hanging ſupporters, with wedges to raiſe or ſink the whole as may be proper. C is the railway which in this inſtance is ſuppoſed to be of caſt iron. E is a pair of ſheers or clutch of malleable iron, through which is an axle to carry a ſmall friction wheel on each ſide. F, F, are fractions of the wings, ſuſpended by ſcrews or bolts and cutters, ſo as to be eaſily changed. The cordage and barrels may be either as in the former plate, or the endleſs line may be ſubſtituted, if precautions are taken to prevent the cords from ſlipping off the directing pullies.

Fig. 2, is a tranſverſe elevation of the ſame apparatus, taken directly behind the wings as they advance or recede, and the various parts are diſtinguiſhed by the ſame letters of reference as in *fig.* 1.

The object of this apparatus is, in the firſt place, to enſure the regularity of the motion of the wings; and in the ſecond to effect this motion by as few ſervants as poſſible. The hanging part of all the diviſions between the five wings repreſented may be of caſt iron, and the projecting parts under the friction rollers may be either caſt as *feathers*, or in ſeparate pieces, and joined by counter-ſunk ſcrews. The intermediate pieces to preſerve the diſtances, where the bolt D paſſes through, may be of well-ſeaſoned plank.

By theſe means, and the application of the double rollers, an interval is left by which any wing may be ſpeedily removed, without unfixing a ſingle ſcrew or bolt; and the moving cords, being merely hooked to the wing, may be inſtantly unfixed and placed upon hooks in the ſuſpending apparatus, as repreſented in *fig.* 1, until a new wing is placed on the railway. At the ſame time, by uſing caſt iron, the whole may be compreſſed into ſo ſmall a ſpace, as to have all the wings, neceſſary for an evening repreſentation, fitted in their places before the exhibition commences, unleſs in very extraordinary caſes.

Beſides the permanent machinery, which is always in uſe, many occaſional engines muſt be uſed to ſuit particular pieces. The limits of this article will not admit of going much into detail reſpecting theſe; nor is it neceſſary.

The mechaniſt, whoſe chief aim is to produce continual novelty, muſt depend much more upon the fertility of his own genius, than upon antecedent plans. We ſhall therefore cloſe the article, with ſhort deſcriptions of a few miſcellaneous ſpecimens, which will be found in the remaining figures of *Plate* XI.

Fig. 3, repreſents the common method of executing a ſea ſcene. A certain number of horizontal axes being placed acroſs the ſtage, with croſs boards properly painted and cut or profiled, when turned upon their reſpective centres, produce the appearance of water, which may be repreſented either as tranquil or ſtormy as the occaſion requires.

To give the appearance of ſhips or boats, a very ſimple apparatus will ſuffice. A plan of a ſmall boat is given in *fig.* 4.

A frame of wood, moving upon friction wheels, is repreſented by the letters A, A, upon this the boat is placed upon an axis at B. From the aftermoſt part of the boat, a cord, paſſing over the pulley C, is conducted behind the ſcenes. The bow or fore part of the boat being made heavier than the after-part or ſtern, the cord, by being lightened and ſlackened alternately, will move the boat upon the axle B, and give it a motion very ſimilar to that produced by the natural undulation of the waves. If the friction wheels are covered with cloth or liſt, and the axles ſmoothly turned and well oiled, the noiſe from friction will be avoided, which often deſtroys the illuſion when boards without wheels are puſhed acroſs the ſtage. The frame A is drawn acroſs between the axles in *fig.* 3, and all that is under the ſurface of the water (repreſented at D,) is concealed by a painted board. Two ſtops may be placed upon the carriage to regulate the vibration of the boat, as repreſented in the figure.

Fig. 5, is a plan of a machine to produce the oblique aſcent or deſcent of a car, horſe, or any other body, above the ſtage. Upon a croſs bar of wood A, A, paſſing between the platforms, and ſufficiently high to be concealed from the ſpectators, is a box or frame B moving upon rollers. A cord F, attached to this frame, is wound upon a barrel upon the platform. Another cord G, attached to any fixture upon the oppoſite ſide, and paſſing over a pulley in the box B, ſuſpends the car C. When the cord F is wound upon the barrel, the car will aſcend in the direction of the dotted line D, and when unwound will deſcend in the ſame line by its own gravity. The cord E will keep the car or other body ſteady. This is merely another application of the principles, inveſtigated under the article DIAGONAL *motion*, and were the deſcent required to imitate the parabolic curve of a projectile, it might be effected by conſtructing the barrel like the ſpiral of a watch, the diameters for the convolutions of the cord F being accurately calculated, and another barrel conſtructed to regulate the deſcent of the ſuſpending cord G. The cords are very ſlender and painted black, to elude the eye of the ſpectator. The lights alſo are ſtrong in front, and dim behind, to aſſiſt the optical deception. To give the cords ſufficient ſtrength without increaſing their diameter, they are ſpun of the beſt hemp, mixed with braſs wire well annealed. Thoſe uſed at Covent Garden for the flying horſes in the *Pantomimic Spectacle* of Valentine and Orſon, whoſe flight was effected by an apparatus ſimilar to that in the figure, although leſs in diameter than a common quill, were ſaid to poſſeſs ſufficient ſtrength to ſuſpend a ton weight.

Fig. 6, is an apparatus, rather optical than mechanical. It is deſigned to give the effect of a full moon, and was uſed with great ſucceſs at Drury Lane. The front view is diſtinguiſhed by the numeral 1; the profile by 2. It is a conical caſe of tin, the leſſer diameter of which is a concave reflector at A. The greater diameter, at B, is covered with taffeta, or any tranſparent coloured cloth, to give the ſhade required, and a lamp is ſuſpended within the caſe, which is perforated in many places to admit the air. Simple as this apparatus is, it gives a very ſtriking reſemblance of a full moon when ſuſpended by three cords, and when the back part of the ſtage is darkened.

Fig. 7, is a plan of one of thoſe quick tranſitions of ſcenery, which are uſed in pantomimes or other pieces, where an aſſimilation to the agency of magic is attempted. Any number of perpendicular cylinders being placed upon the ſtage to revolve eaſily; let theſe be covered with canvas of ſufficient length to reach from each cylinder to that neareſt to it. When the canvas is rolled upon the cylinders and painted, they will aſſume the appearance of pillars placed in a room or hall, and a ſcene placed behind will be ſeen through the intervals. By pulling the cords at A, the canvas unwinding from each cylinder and reaching to the next, will almoſt inſtantaneouſly change the appearance of the pillars into that of a flat ſcene, and the former appearance may be as inſtantaneouſly reſtored, either by the action of weights, as in the figure, or by a power acting in a contrary direction. Cords, ſimilar to thoſe at A, muſt be placed at the bottom in the direction of the dotted line B, to unroll the canvas equally, and the pivots at top and bottom muſt be concealed.

Fig. 8, is a ſection of thoſe double flat ſcenes, which are alſo uſed to produce inſtantaneous changes. The whole ſcene being covered with pieces of canvas, framed and moving upon hinges, one ſide is painted to repreſent a certain ſcene, and the other to repreſent one totally different. The ſection marked 1 ſhews theſe pieces when elevated above the joints; that marked 2 ſhews them when ſuſpended below. The contrivances for moving them are very various. In general, however, they are kept in the elevated ſituation by catches, which being ſuddenly relieved, they fall by their own weight.

DRAMATIC *Muſic* of the Greeks. Ariſtotle tells us, in his "Poetics," that muſic, μελοποιεα, is an eſſential part of tragedy; but how it became eſſential, this philoſopher does not inform us. M. Dacier has endeavoured to ſupply this omiſſion, by ſuggeſting, that cuſtom and a natural paſſion implanted in the Greeks for muſic, had incorporated it into their drama. Indeed Ariſtotle calls it, in the ſame work, "the greateſt embelliſhment that tragedy can receive." And innumerable paſſages might be quoted from other ancient writers, to prove, that all the dramas of the Greeks and Romans were not only ſung, but accompanied by muſical inſtruments.

However, many learned critics, not reflecting upon the origin of tragedy, and inſenſible, perhaps, to the charms of melody, have wondered how ſo intelligent a people as the Greeks could bear to have their dramas ſung. But as antiquity is unanimous in deriving the firſt dramatic repreſentations at Athens from the dithyrambics, or ſongs, ſung in honour of Bacchus, which afterwards ſerved as choruſſes to the firſt tragedies, we need not wonder at the continuation of muſic in thoſe choruſſes, which had been *always* ſung. Nor will the cuſtom of ſetting the epiſodes, as the acts of a play were at firſt called, appear ſtrange to ſuch as recollect that they were written in *verſe*, and that *all verſe was ſung*, particularly ſuch as was intended for the entertainment of the public, aſſembled in ſpacious theatres, or in the open air, where it could only be heard by means of a very ſlow, ſonorous, and articulate utterance.

It is true that tragedy is an imitation of nature; but it is an exalted and embelliſhed nature; take away muſic and verſification, and it loſes its moſt captivating ingredients. Thoſe who think it unnatural to *ſing* during diſtreſs, and the agonies even of death, forget that muſic is a language that can accommodate its accents and tones to every human ſenſation and paſſion; and that the colouring of theſe on the ſtage muſt be higher than in common life, or elſe why is blank verſe, or a lofty and figurative language, neceſſary.

The ſtage cannot ſubſiſt without exaggeration; as verſe is the exaggeration of common ſpeech, ſo muſic is that of verſe; in like manner exaggerated geſture becomes dancing. In the ſame manner as it becomes neceſſary on the ſtage to allow of ſmall deviations from truth and nature in favour of the poet and the actor, whoſe writings and ſpeech are ſomewhat more inflated when the buſkin is on, than at other times. Marmontel, in the Encyclopedie, art. Declamation, ſays, "For the ſame reaſon as a picture, which is to be ſeen at a diſtance, requires bolder ſtrokes and higher colouring, the theatrical voice muſt be pitched higher, the language be more lofty, and the pronunciation more accentuated, than in ſociety, where we communicate our ideas with more facility, but always in proportion to the perſpective; that is to ſay, in ſuch a manner that the tone of voice ſhould be ſoftened and diminiſhed to the degree of nature, before it arrives at the ear of thoſe to whom it is addreſſed."

The *marks*, *echeia*, or vaſes, the accompaniments of the *cithara*, and *flutes*, *equal* and *unequal*; all which, ſingly and collectively, prove the declamation of the Greeks and Romans to have been muſical, and regulated like the recitative of modern operas, by a notation.

DRAMATIC *Muſic* of the Romans. Livy, lib. vii. cap. 2. gives a kind of hiſtory of the Roman drama, which, as well as the Grecian, was inſeparable from muſic. The Romans, indeed, were later in cultivating arts and ſciences than any other great and powerful people; and none of them ſeem to have been the natural growth of the ſoil, except the art of war; all the reſt were brought in by conqueſt. Before their acquaintance with the Greeks, they had all their refinements from the Etruſcans, a people very early civilized and poliſhed. The dramas of Plautus, Terence, and other early dramatic writers, invented nothing, their plays were all tranſlations from the Greek, and probably ſung or declaimed to Grecian muſic. Vitruvius ſpeaks of no other than was uſed in the theatres. Cicero, in his ſecond book of Laws, tells us, that before Greece and her arts were well known to the Romans, it was a cuſtom for them to ſend their ſons for inſtruction into Etruria. And thence they had the firſt ideas, not only of religion, but of poetry, painting, ſculpture, and muſic, according to the confeſſion of their own hiſtorians.

Beſides the obligations which the Romans had to the Etruſcans and Greeks for their taſte and knowledge in the fine arts, the conqueſt of Sicily, 200 years before the Chriſtian era, contributed greatly to their acquaintance with them. Fabricius gives a liſt of ſeventy Sicilians who have been celebrated in antiquity for learning and genius; among whom we find the well known names of Æſchylus, Diodorus Siculus, Empedocles, Georgius, Euclid, Archimedes, Epicharmus, and Theocritus. Among theſe, the Romans might have had tragedy from Æſchylus; comedy from Epicharmus, and muſic from Empedocles.

DRAMATIC *Muſic*, attempted in England, previous to the Italian opera. All theatrical repreſentations and public amuſements having been ſuppreſſed by the parliament, in 1647, no exhibition was attempted till 1656, when ſir William D'Avenant's "Entertainment of Declamation and Muſic after the Manner of the Ancients," ſeems to have eſcaped moleſtation more by connivance than the protection of government. For though Ant. Wood has aſſerted, that ſir William D'Avenant had obtained leave to open a theatre for the performance of operas in the Italian language, during the protectorſhip, when all other theatrical exhibitions were ſuppreſſed; "becauſe being in an unknown tongue they could not corrupt the morals of the people;" yet on a careful ſcrutiny into the validity of the fact, it ſeems to be wholly a miſtake. Ant. Wood, at this time, had never been in London, and ſeems but little acquainted with its amuſements at any time.

Being in poſſeſſion of the firſt edition of ſir William D'Avenant's "Entertainment" performed at Rutland-houſe, and printed in 1657, the year after, we ſhall give an account of the manner in which it was diſpoſed and arranged, from the work itſelf; which informs us, that "after a flouriſh of muſic, the curtains are drawn and the prologue enters," who ſpeaks in Engliſh verſe, and talks of the Entertainment being an opera, the only word that is uttered in the Italian language throughout the exhibition. He deſires the audience, indeed, to regard the ſmall theatre as "their paſſage, and the narrow way, to our Elyſian field, the opera." But not a line of this introduction is ſet to muſic, either in recitative or air; though, after it has been ſpoken, and the curtains are again cloſed, "a conſort of inſtrumental muſic, adapted to the ſullen diſpoſition of Diogenes, being heard awhile, the curtains are ſuddenly opened, and, in two gilded roſtras, appear Diogenes the cynic, and Ariſtophanes the poet—who declaim againſt and for publique entertainments by moral repreſentations." Then in two proſe orations that were *ſpoken*, not ſung, public exhibitions are cenſured and defended in the ſtyle of that celebrated philoſopher and comic writer.

Operas are, indeed, frequently mentioned and deſcribed: Diogenes, manifeſtly alluding to the ſplendid manner in which they were then exhibited in Italy, when he ſays, "Poetry is the ſubtile engine by which the wonderful body of the opera muſt move. I wiſh, Athenians! you were all poets, for then if you ſhould meet, and with the pleaſant vapours of Leſbian wine, fall into profound ſleep, and concur in a long dream, you would every morning enamel your houſes, tile them with gold, and pave them with aggots!"

When the cynic has finiſhed his declamation, "a conſort of muſic, befitting the pleaſant diſpoſition of Ariſtophanes, being heard, he anſwers him," and defends operas, their poetry, muſic, and decoration, with conſiderable wit and argument. After which the "curtains are ſuddenly cloſed, and the company entertained by inſtrumental and vocal muſic, with a ſong."

"The ſong being ended, a conſort of inſtrumental muſic, after the French compoſition, being heard awhile, the curtains are ſuddenly opened, and in the roſtras appear ſitting a Pariſian and a Londoner, in the livery robes of both cities, who declaim concerning the pre-eminence of Paris and London."

When the Frenchman has finiſhed his Philippic againſt our capital; after "a conſort of muſic, imitating the waites of London, he is anſwered by the Londoner." In neither of theſe harangues is the opera mentioned, which, as yet, had not found its way into either capital. When the Engliſhman has terminated his defence, there is another ſong; an epilogue; and, laſtly, a flouriſh of muſic; after which the curtain is cloſed, and the entertainment finiſhed.

At the end of the book we are told, that "the vocal and inſtrumental muſic was compoſed by Dr. Charles Colman, captain Henry Cook, Mr. Henry Lawes, and Mr. George Hudſon."

By this account it appears, that the performance was neither an Italian, nor an Engliſh, opera. That there was no recitative, and but two ſongs in it, the reſt being all declaimed or ſpoken, without the leaſt aſſiſtance from muſic. It ſeems, indeed, as if ſir William D'Avenant, by this Entertainment, as it was called, had ſome diſtant deſign of introducing exhibitions ſimilar to the Italian opera, on the Engliſh ſtage, for which theſe declamations were to prepare the way.

Pope tells us, that "The Siege of Rhodes," "by ſir William D'Avenant, was the firſt opera ſung in England."

"On each enervate ſtring they taught the note
To pant, or tremble, through an eunuch's throat."

What foundation our great poet had for this opinion, we know not, unleſs he truſted to the looſe aſſertion of Langbaine, who, in "An Account of the Engliſh dramatic poets," ſays, that the Siege of Rhodes, and ſome other plays of ſir William D'Avenant, in the times of the civil wars, were acted in *ſtilo recitativo*.

The firſt performance of the Siege of Rhodes was at Rutland-houſe, in 1656. It was revived in 1663, and a ſecond part added to it. In the prologue the author calls it "our play," and the performers, *players*, not ſingers. The firſt part is divided into five entries, not acts; each preceded by inſtrumental muſic. But we can find no proof that it was ſung in recitative, either in the dedication to lord Clarendon, in the folio edition of 1673, or the body of the drama.

It was, indeed, written in rhyme, which, after the Reſtoration, became a faſhion with theatrical writers, probably to imitate the French, and gratify the partiality of Charles II. for Gallic amuſements. Such dramas were called heroic plays, and the verſe dramatic poeſy.

Upon the whole, it ſeems as if this drama was no more like an Italian opera than the maſques, which long preceded it; and in which were always introduced ſongs, choruſes, ſplendid ſcenes, machinery, and decorations. But if we might believe Mr. Pope, in the lines juſt cited, this opera, as he calls it, was not only ſet to recitative and florid muſic, but ſung by eunuchs!

Downes, the prompter, tells us, that in 1658, ſir William D'Avenant exhibited another entertainment, entitled "The Cruelty of the Spaniards in Peru," expreſſed by vocal and inſtrumental muſic, and by art of perſpective in ſcenes. Theſe ſcenes and decorations, according to Downes, were the firſt that were introduced (on a public ſtage) in England. Roſcius Anglicanus. Mr. Malone (Sup. to Shakſpeare) imagines that Cromwell, from his hatred to the Spaniards, may the more readily have tolerated this ſpectacle.

In another piece, however, of ſir William D'Avenant's, "The Playhouſe to be let," a muſician who preſents himſelf as a tenant, being aſked what uſe he intended to make uſe of it? replies, "I woold have introduced heroique ſtory in *ſtilo recitativo*." And upon being deſired to explain himſelf further, he ſays, "recitative muſic is not compoſed of matter ſo familiar, as may ſerve for every low occaſion of diſcourſe. In tragedy, the language of the ſtage is raiſed above the common dialect; our paſſions riſing with the height of verſe; and vocal muſic adds new wings to all the flights of poetry."

In the third act of this piece, which we are told was in *ſtilo recitativo*, we have the hiſtory of ſir Francis Drake expreſſed by inſtrumental and vocal muſic, and by art of perſpective in ſcenes, &c.

Such were the firſt attempts at dramatic muſic to Engliſh words in this country, long before the muſic, language, or performers of Italy were employed on our ſtage.

The word opera ſeems, however, to have been very familiar to our poets and countrymen, during the chief part of the laſt century; *ſtilo recitativo* was talked of by Ben Jonſon, ſo early as the year 1617, when it was a recent innovation even in Italy. After this it was uſed in other maſques, particularly ſcenes of plays, and in cantatas, before a regular drama, wholly ſet to muſic was attempted.

But the high favour to which operas had mounted in France by the united abilities of Quinault and Lulli, ſeems to have given birth to ſeveral attempts at dramatic muſic in England.

Sir William D'Avenant dying in 1668, while his new theatre in Dorſet Gardens was building, the patent, and management, devolved on his widow, lady D'Avenant, and his ſon Mr. Charles, afterwards Dr. D'Avenant, well known as a political writer and civilian, who purſued ſir William's plans. The new houſe was opened in 1671; but the public ſtill more inclining to favour the king's company at Drury-lane than this, obliged Mr. D'Avenant to have recourſe to a new ſpecies of entertainments, which were afterwards called dramatic operas, and of which kind were the Tempeſt, Macbeth, Pſyche, Circe, and ſome others, all "ſet off," ſays Cibber, "with the moſt expenſive decorations of ſcenes and habits, and with the beſt voices and dancers."

"This ſenſual ſupply of ſight and ſound," continues he, "coming in to the aſſiſtance of the weaker party, it was no wonder they ſhould grow too hard for ſenſe and ſimple nature, when it is conſidered how many more people there are, who can ſee and hear, than can think and judge."

Thus men without taſte or ears for muſic ever comfort themſelves with imagining that their contempt for what they neither feel nor underſtand is a mark of ſuperior wiſdom, and that every lover of muſic is a fool. This is the language of almoſt all writers on the ſubject. The ingenious author of the "Biographica Dramatica" tells us, that "the preference given to D'Avenant's theatre, on account of its ſcenery and decorations, alarmed thoſe belonging to the rival houſe. To ſtop the progreſs of the public taſte, and divert it towards themſelves, they endeavoured to ridicule the performances which were ſo much followed. The perſon employed for this purpoſe was Thomas Duffet, (a writer of miſerable farces,) who parodied the Tempeſt, Macbeth, and Pſyche; theſe efforts were, however, ineffectual." This is fair and hiſtorical; but after ſaying that "the duke's theatre continued to be frequented;" when he adds, "the victory of ſound and ſhew over *ſenſe* and *reaſon* was as complete in the theatre at this period, as it has often been ſince," it ſeems as if ſenſe and reaſon had for a moment quitted this agreeable, and, in general, accurate and candid writer. Opera is an alien that is obliged ſilently to bear the inſults of the natives, or elſe ſhe might courteouſly retort, that nonſenſe *without* muſic is as frequently heard on the Engliſh ſtage, as with it on the Italian; indeed, when Metaſtaſio is the poet, who will venture to ſay that either good ſenſe or good poetry is baniſhed from the ſtage?

But it does not clearly appear, becauſe muſic and decorations were added to Shakſpeare's Tempeſt and Macbeth, that one theatre was in greater want of ſenſe at this time than another. We have ſeen the dramas as they were altered by Shadwell and ſir William D'Avenant, and in the latter find that little was curtailed from the original play, or ſung, but what is ſtill ſung, and to the ſame muſic ſet by Matthew Lock, of which the rude and wild excellence cannot be ſurpaſſed. In the operas, as they were called, on account of the muſic, dancing, and ſplendid ſcenes with which they were decorated, none of the fine ſpeeches were made into ſongs, nor was the dialogue carried on in *recitative*, which was never attempted on our ſtage during the 17th century, throughout a whole piece. Indeed, it never fully ſucceeded in this, if we except the Artaxerxes of the late Dr. Arne; whoſe muſic, being of a ſuperior kind to what our ſtage had been accuſtomed, and better ſung, found an Engliſh audience that could even tolerate *recitative*. In the cenſure of theſe muſical dramas, which has been retailed from one writer to another, ever ſince the middle of Charles the ſecond's reign to the preſent time, the ſubject ſeems never to have been candidly and fairly examined; and, indeed, it appears as if there had been no great cauſe of complaint againſt the public taſte for frequenting ſuch repreſentations, particularly thoſe written by Shakſpeare, in which the principal characters were performed by Mr. and Mrs. Betterton, as was the caſe in Macbeth, though muſic, machinery, and dancing were profuſely added to the treat.

DRAMATICO, STYLO. See STYLE.

DRAMATURGIA, *Ital.* the title given to a book compiled by Leo Allatius, or Allacci, in 4to. containing a chronological liſt of all the dramas, whether for declamation or muſic, which had been publiſhed in Italy from the invention of the preſs to 1667. A new edition of this uſeful catalogue was publiſhed at Venice, with a continuation, to 1755. The authors of words and muſic, the printers, dates of the ſeveral editions, and places of publication, are all ſpecified. See LEO ALLATIUS.

DRAMBURG, in *Geography*, anciently *Draweburg* and *Drageburg*, a ſmall town of Pruſſia, in the new mark of Brandenburg, chief place of the circle of the ſame name, ſituated on the river Drage, from which it derives its name, and which runs through both the new and the old town; it is 6 miles ſouth of Falkenburg.

DRAMME, a river of Denmark, which flows into the weſt ſide of the bay of Chriſtiania. See the next article.

DRAMMEN, a ſmall town of Norway, in the dioceſe of Chriſtiania, or Aggerhuus, on the river Eger, at the place where it falls into the lake, or rather river Drammen, which empties itſelf into the bay of Chriſtiania. That part of the town which is on the Eger is alſo called Eger, and is remarkable for ſeveral iron-works.

DRAN, HENRY FRANCIS, LE, in *Biography*, born at Paris in 1685, received his education under his father, Henry Le Dran, who had acquired conſiderable reputation as an operator, particularly in amputating, or taking out cancers of the breaſt. Under his auſpices our young ſurgeon ſoon came into repute, and turning his thoughts principally to the operation of lithotomy, which he performed in the lateral method, as practiſed by Cheſelden, he was enabled to make ſome valuable improvements in the art. Theſe he communicated to the public in his "Paralele des differentes manieres de tirer la Pierre hors de la Veſſie," printed in 1730, 8vo., to which he added a ſupplement in 1756, containing the reſult of his later practice. The work was well received, has been frequently reprinted, and tranſlated into moſt of the modern languages. It contains alſo a deſcription of the urinary paſſages, of the urinary bladder in ſitu, cum arteriæ pudendæ trunco et ramis, accurately depicted. "Obſervations de Chirurgie auxquelles ou a joint pluſieurs reflections en faveur des Etudiens," 1731, Paris, 2 vols. 12mo. Theſe have alſo been frequently reprinted, and contain numerous valuable practical obſervations. "Traité ou reflections tirees de la pratique ſur les playes d'Armes a feu," Paris, 1737, 12mo. The reſult of his practice as an army ſurgeon, commendable for the bold and deciſive methods of treatment made uſe of in the moſt dangerous caſes, and for the general ſucceſs with which they were attended. "Traité des Operations de Chirurgie," Paris, 1743, 12mo. To the tranſlation of this work into Engliſh, by Gataker, Cheſelden made ſome valuable additions. "Conſultations ſur la plupart des Maladies qui ſont du Report de la Chirurgie," 1765, 8vo. A work well calculated for the inſtruction of ſtudents in ſurgery. The author alſo ſent ſeveral obſervations of conſiderable merit to the academy of ſurgeons, which are publiſhed in their memoirs. He died, at a very advanced age, in 1770. Haller. Bib. Chir. Gen. Biog.

Dran, in *Geography*, a river of Germany, which runs into the Drave; 4 miles S. of Pettau, in the duchy of Stiria.

DRANCE, a river of Switzerland, which runs into the Rhône, near Martigny, in the Valais.

DRANGÆ, in *Ancient Geography*, a people of Aſia, in the Perſide, placed by Pliny towards the ſource of the river Indus.

DRANGIANA, a province of Aſia, in the Perſide, being one of the provinces of Alexander the Great in Aſia. It was bounded on the weſt by Carmania, on the north by Aria, on the eaſt by Arachoſia, and on the ſouth by Gedroſia.

DRANGOWSKY, in *Geography*, a ſmall town of Pruſſia, in Samland, not far from Tilſit, the inhabitants of which are almoſt all of the Roman Catholic church.

DRANK, a name given by our farmers to the great wild oats. Theſe are often very troubleſome to the ploughed lands, eſpecially after wet ſeaſons and much froſt. Many, to deſtroy this weed, ſow the land with black oats, which being ripe much ſooner than the ſeeds of this plant, are cut down before it can ſow itſelf for another year; eſpecially if they are cut a little the earlier, which will do them no harm, if they be ſuffered to lie a while upon the ground afterwards, for the grain to ſwell before they are carried in. But, in general, when ploughed lands begin to run to theſe weeds and thiſtles, it is a token to the farmer that it is time to fallow them, or elſe to ſow them with hay-ſeed, and make paſtures of them. The ſowing beans upon a land ſubject to theſe weeds is alſo a good method, becauſe the farmer may ſend in his ſheep when they are about three inches high, which will eat up the drank, and all the other weeds, and will not hurt the beans. The general method is to put twenty ſheep to an acre; but they muſt be put in only in dry weather, and not left too long.

DRANSES, called *Trauſes* by Herodotus, in *Ancient Geography*, a people of Thrace, who are ſaid to have wept at the birth of their children.

DRANSFELD, in *Geography*, a ſmall town of Germany, in the duchy of Calenberg, which formerly conſtituted a part of the electorate of Hanover, but at preſent is a province of the new kingdom of Weſtphalia. It is ſituated between Minden and Göttingen.

DRAPERY, in *Painting*. The word drapery denotes all kinds of ſtuffs, or cloths, diſpoſed in folds. When applied to the clothing of figures, it is ſometimes made to include all the various materials, of whatever ſubſtance, with which men are accuſtomed, either from neceſſity or decency, to cover or enfold their bodies, and alſo all the ornaments which taſte and luxury have adopted to enrich the dreſs, according to the ideas of different nations, and the faſhions of different ages. In this extenſive ſenſe Reynolds ſpeaks of it, when he ſays, that "we make no difficulty of dreſſing ſtatues of modern heroes, or ſenators, in the faſhion of the Roman armour, or peaceful robe; and we go ſo far as hardly to bear a ſtatue in any other drapery." It alſo comprehends all hangings, curtains, &c. and other adjuſtments, made by means of ſtuffs or cloths of any kind, in the ſcenery of a picture, whether apartments or other; but, in this laſt point of view, it muſt be recollected, that it is not the name nor ſubſtance, but the *diſpoſition* of thoſe materials, that brings them under the denomination of *drapery*. Cloths of any kind may be made to fill whatever portion of his compoſition the painter may find ſuitable to his purpoſe, but unleſs they be diſpoſed in folds, they are ſtill cloths only, and not drapery.

Drapery then, ſtrictly regarded, conſiſts in the diſpoſition of folds; and the ſkilful diſpoſition of folds, whether for clothing or other uſe, conſtitutes the *art* of drapery.

The art is to be conſidered, as it regards form, character, coſtume, and expreſſion. In the general compoſition of a picture, drapery is connected with *coſtume* and *character:* as an object of ſtudy in a ſingle figure, the *beauty of drapery* ſtands deſervedly next in rank to *beauty of form*, as it not only powerfully co-operates with the latter, but is even found to be at times capable of enhancing its value, by artful management and partial concealment; and it is alſo capable of aſſiſting *expreſſion*, as far as it is diſplayed by the action of the figure. In the naked form, and in the diſpoſition of the drapery, Reynolds obſerves, the difference between one artiſt and another principally conſiſts.

As the art of drapery has never yet been theoretically treated in our language, the following principles and rules, extracted from the writings of Leonardo da Vinci, Lomazzo, Mengs, Reynolds, Watelet, and Dupiles, will offer inſtruction from the beſt ſource that can be found, *viz.* from profeſſional obſervations. It would be eaſy, by combining theſe obſervations, to produce the diſplay of a general ſyſtem; but a far greater advantage, it is conceived, will be afforded to the reader, by giving the particular authorities, whenever any paſſage is ſufficiently cloſe to the original ſources, to admit of ſuch confirmation.

The ſkill of drapery is chiefly compriſed in three things, *viz.* 1. The order of the folds. 2. The diverſity of ſtuffs. 3. The variety of colours in the ſtuffs.

Of the Order of the Folds.

'In clothed figures, the principal effect of draperies ſhould be to make us underſtand what they cover; in ſuch a manner, that the outward character of the form, and the accuracy of proportions, may generally appear through them, as far at leaſt as probability will allow. For this purpoſe, the greateſt maſters of the art have ſet the example of firſt drawing their figures naked, and afterwards diſpoſing the drapery on them, in order that the eye may ſtill imagine it ſees, or can trace, what is concealed by the caſt of the draperies.' Dupiles.

'The draperies with which the painter clothes his figures ought to have their folds adjuſted to ſurround the limbs they are intended to cover in ſuch a manner, that in the enlightened parts there may not be any folds with dark ſhadows, nor in the maſſes of ſhade any, receiving too great a light; they ſhould go *gently* over, *deſcribing* the parts, but not cutting the limbs with hard lines acroſs, nor with ſhadows that ſink in deeper than the part itſelf can be ſuppoſed to admit. In fact, the drapery ſhould be ſo ſuited to the body, that it ſhould no where appear *uninhabited*, or like an empty bundle of cloth *that has loſt the man* from within; a fault into which many painters have fallen, who, enamoured of a profuſion of folds, have ſo enveloped and encumbered their figures, that they ſeem to have forgotten the real deſign of clothes, which is to dreſs and ſurround the parts of the body gracefully wherever they touch, and not to blow them out like bladders at every projection of the limbs on which the light falls. I do not deny the propriety of introducing ſome full and handſome folds, but let them be placed on thoſe parts of the figure where the action of the limbs, and the poſition of the body under them, naturally gather the drapery together.'

'Above all, be careful to vary the quality and quantity of folds in compoſitions of many figures, ſo that if ſome have large and broken folds produced by thick woollen cloth, others, being dreſſed in thinner ſtuff, may have them narrower and ſmoother; ſome ſharp and ſtraight, others ſoft and undulating.' Leonardo da Vinci on Compoſition.

'Folds, well imagined, give much ſpirit to any kind of action, becauſe their motion implies motion in the acting limb, which ſeems to draw them forcibly, and moves them more or leſs as the action is more or leſs violent.'

'Folds ſhould be great or large according to the quality and quantity of the drapery; and when, from the ſlightneſs of the ſtuffs, it becomes requiſite to uſe much folding, it muſt be ſo grouped that the chiaro-ſcuro may not ſuffer by it.'

'Folds deſigned from mere practice, without applying to nature, are proper only for a ſketch or firſt deſign. In perfecting his work, the painter ſhould always conſult the ſtuffs themſelves, becauſe in them the folds are true, and the lights agreeable to the nature of the ſtuffs.'

'To give a complete air of truth, draperies ought to be ſet either on a *layman* as large as life, or on the life itſelf; but care muſt be taken that they diſcover nothing of the immoveableneſs of the layman. Some painters make uſe of *ſmall* laymen, which they dreſs either with thin ſtuffs or wet paper; but this method cannot be uſeful for *finiſhing*, becauſe the ſtuffs, on account of their ſize, not having the ſame weight as on the larger *laymen* or the *life*, cannot ſhew the folds in their true ſhapes.'

'Light, flying draperies become none but figures in great motion, or in the wind.'

'Rich ornaments form a part of the beauty of draperies when uſed with diſcretion.' Dupiles.

'Many painters prefer making the folds of their draperies with acute angles, deep and preciſe; others with angles ſcarcely perceptible; and ſome with no angles at all, but inſtead of them certain curved lines.'

'That part of the drapery, which is fartheſt from the place where it is gathered, will moſt approach its natural ſtate. Every thing naturally inclines to preſerve its primitive form, and for this reaſon: when a ſtuff or cloth, of equal thickneſs, is conſtrained by ſome fold to relinquiſh its flat ſituation, it obſerves the laws of force at the point of its greateſt conſtraint, and as it is continually making efforts to return to its natural ſhape, the parts, moſt diſtant from that point, reaſſume moſt of their primitive ſhape by ample and diſtended folds. For example, let A B C be the drapery juſt mentioned; A B the place where it is folded or reſtrained. It was ſaid that the part fartheſt from its point of reſtraint would return moſt to its primitive ſhape; therefore, C being the fartheſt, will be broader and more extended than any other part.' See *fig.* 1, *Plate* XII. *Miſcellany*.

'Draperies ought not to be rendered confuſed by numerous folds; on the contrary, there ought to be folds only where the drapery is held up by the hands or arms, and the reſt ſhould be left to fall without conſtraint. The folds ſhould, moreover, be ſtudied from nature, and varied in conformity with the materials of which the drapery is compoſed; they ſhould never be copied from models dreſſed in paper or thin leather, as is the deluſive cuſtom of many painters.'

'In thoſe parts where the figure is fore-ſhortened, there ought to be introduced a greater number of folds than in any others, and they ſhould all ſurround the fore-ſhortened parts in a circular form. *Example.*—Let the eye be at E; L M will have the middle of the circular folds removed farther from the eye than at the extremities. In N O, on the other figure, the outlines of the circular folds will appear ſtraight, becauſe they are directly oppoſite to the eye, but in P Q quite the contrary, as in L M.' See *fig.* 2, *Plate* XII.

'The folds of draperies, whatever be the motion of the figure, ought always to ſhew, by the flow of their lines, the action and attitude of the figure ſo clearly, as to leave no doubt in the mind of the beholder, in regard to the true poſition of the body. Let there be no fold which breaks the form by appearing to cut into the ſurface of what it covers; and if the figure be repreſented as covered with ſeveral garments one above the other, let not the upper one appear as if it covered the ſkeleton only, but let it expreſs a thickneſs of folds conſiſtent with the number of the garments beneath.'

'Folds, ſurrounding the limbs, ought to diminiſh in thickneſs near the extremities of the parts which they ſurround.' L. da Vinci.

Beſides theſe rules of method in the diſpoſal of folds, the painter ſhould be watchful to avail himſelf of thoſe beauties, which accident frequently lays before him, in the caſting of his draperies. There may be a happineſs, an air of nature in the firſt *throw* of a piece of drapery, which art can more eaſily interrupt than improve. In this caſe, "there is a danger," ſays Reynolds, "in touching or altering a fold of the ſtuff, which ſerves as a model, for fear of giving it, inadvertently, a forced form; and it is perhaps better to take the chance of another throw than to alter the poſition in which it was at firſt accidentally caſt."

But there are, moreover, in nature, many ſituations of garments, or other cloths, into which it is not in the power of the artiſt to caſt any throw of drapery in ſuch a manner as to allow him opportunities of accurate ſtudy: ſuch, for inſtance, are the light waving, or agitated folds, occaſioned by rapid motion, wind, &c. In all ſuch inſtances, as he cannot reach what is abſolutely true, he muſt take care that he adopt *the probable*, and avoid every fold that is evidently contradictory to the action, and, of courſe, impoſſible in nature; in doing which he muſt rely on his own knowledge, previouſly obtained by a diligent attention to nature in all her various appearances. See NATURE.

It has been the invariable practice of the painters of the Italian ſchools, from the time of Raffaele to the preſent day, at the beginning of any great work, after firſt ſettling the diſtribution and attitudes of the figures, to ſet the draperies on the life, or on ſmall models, and to make finiſhed, or, at leaſt, highly ſtudied, drawings from them, and afterwards, from thoſe drawings, to paint the draperies of their pictures. Numerous preparatory ſtudies of drapery, executed in this manner for well known works of the moſt celebrated maſters, are found in almoſt every collection of Italian drawings. Felibien relates, that Annibale Caracci uſed to make his ſcholars caſt drapery for his works on living models, and make correct drawings from them, by which means he obtained the firſt deſign of his drapery from nature; and that he then, from thoſe drawings, ſet his draperies on the layman, in order to paint them at leiſure.

Of Diverſity of Stuffs.

Among the many things that are capable of affording pleaſure in a picture, variety of ſtuffs is certainly entitled to conſideration; but it is a point which has been eſtimated very differently by different ſchools. The Venetian and Flemiſh ſchools have appeared to maintain, by their practice, that it is not enough that draperies ſhould be variouſly caſt, but that the ſtuffs themſelves ſhould be of various ſorts, to the full extent of which the ſubject would admit. 'Wool, linen, cotton, ſilk, as they are manufactured a thouſand ways, afford the artiſt a wide field for choice; by which means he may introduce a great variety into his works, the more neceſſary, as it avoids a tireſome repetition of folds of the ſame kind, eſpecially when many figures are introduced into one ſubject. Some ſtuffs naturally make broken folds, others more ſoft and round; ſome ſtuffs are rough-wrought, others ſmooth and gloſſy; ſome are thin and tranſparent, others more ſolid and ſubſtantial; and this variety, whether diſperſed among ſeveral figures, or collected in one, agreeably to the ſubject, never fails to produce delight to the eye.'

The Roman, Florentine, and Bologneſe ſchools, on the contrary, have made a general uſe of the ſame kind of ſtuff (particularly in hiſtorical painting) for the drapery of every figure in the picture. They conceived this ſyſtem of dreſſing their figures to be conſiſtent with the dignity of hiſtory and poetry, which are always degraded by individual repreſentations.

In theſe opinions ſir Joſhua Reynolds ſeems entirely to coincide, and every where conſiders variety of ſtuffs as inimical to the true ſtyle of hiſtory. In his "Journey to Holland and Flanders," that great painter has remarked, on a picture of the "Death of Cleopatra," painted by Laireſſe, that the ſtyle of the work (otherwiſe good) was degraded by the naturalneſs of the white ſattin, which is thrown over her. The picture, ſays ſir J., "is as highly finiſhed as a Vanderwerf, but in much better ſtyle, excepting the drapery, which is not equal to Vanderwerf. Vanderwerf painted what may be truly called drapery; this of Laireſſe is not drapery, it is white ſattin."

The ancient ſculptors have been believed to have made uſe of wetted linen for the drapery of their ſtatues, (although the great ſubtileneſs of modern dreſſes might well put this belief in doubt,) and their drapery is moſtly uniform in *kind.* Modern ſculptors, and particularly of the Flemiſh ſchool, have introduced a greater variety of ſubſtances in drapery; but the art of a painter is, for the moſt part, miſapplied, when he imitates the drapery of ſculpture.

Of Variety of Colours in the Stuffs.

'Nothing contributes more to the harmony of the whole together, in moſt pictures, than the different colours of drapery, which are within the range of the painter's choice. With this view, he ſtudies the value of each colour when entire, their effect when placed by one another, and their different degrees of accord when broken.' Dupiles.

Drapery, conſidered under this head, is capable of affecting the general tone of the impreſſion made on the ſpectator by any picture. It may contribute to inſpire a ſolemn and mournful, or a gay and cheerful ſentiment. But as under this head drapery is merely an organ of colour, and partakes, in common with every other part of compoſition, of the power of aiding and enriching the general effect, by the colouring of the picture, this diviſion of the ſtudy of drapery muſt be referred to the art of colouring.

General Uſes of Drapery.

'Few perſons, at leaſt among thoſe who are uninitiated in the myſteries of the painter's art, can imagine of what importance drapery is in the compoſition of a picture. The art with which the drapery is caſt frequently forms the ground-work of the harmony of the whole work, both as it relates to colour and chiaro-ſcuro, and to the general arrangement of the compoſition. In regard to colour and chiaro-ſcuro, in order to comply with every thing which the laws of harmony require, the painter finds an ample reſource in the liberty he poſſeſſes, of giving to his different draperies ſuch colours as connect and harmonize with the other objects repreſented in his work, and thus preventing any diſcord between the parts (ſee HARMONY): in addition to which, having it in his power to diſpoſe of his folds in ſuch a manner that as they ſhall either receive a full light, or light diminiſhed, more or leſs, or be entirely in ſhadow, he can, by the turn of a fold, recal the light to any of thoſe parts where it is neceſſary, or take it away by the interpoſition of more projecting folds.' Watelet in the French Encyclopedie.

'The painter has the ſame power, by means of drapery, over the harmony of compoſition, or general arrangement of his ſubject, as he has over the colouring and chiaro-ſcuro. If he has ſeveral groups to manage, he *ties* them, as it were, together by drapery, employing it to fill the void ſpaces, which would otherwiſe cut them off from each other, and thus ſuſtaining the attention of the ſpectator on the principal object, by giving it greater conſiſtence and extent, ſerving for its baſe and ſupport.'

'The ſame art contributes to the expreſſion of the characters and the paſſions of the perſons repreſented; a truth which no one will doubt, who reflects how greatly the idea we form of any one, who preſents himſelf before us, is enhanced or diminiſhed by the garb in which he appears. In every imitation, therefore, of human appearances, the mode in which each figure is clothed, will concur with the paſſion expreſſed in that individual, in ſtrengthening the idea we conceive of his general character.' Watelet in the French Encyclopedie.

This will preſently be ſhewn more fully under a ſubſequent head.

Relation of Drapery to Coſtume.

Amidſt the comprehenſive range of objects which the ſtudies of a painter embrace under the article of *Coſtume,* or the uſages of different nations, dreſs conſtitutes a feature ſo readily and familiarly palpable, that it has ſometimes, in vulgar uſe, obtained the appellation of the whole; and a picture ſaid to be *in the coſtume* of a country, has been thought to mean little elſe than that the figures are dreſſed in the faſhion of that country. Were this really the fact, the importance of drapery, relatively to coſtume, would be of the higheſt degree; but the caſe is far otherwiſe. Coſtume, as it regards painting, includes every external circumſtance by which the eſpecial and characteriſtic habits of any people, the

the Mores Gentium, can be expreſſed to the eye. Every object of nature and art is preſſed into the ſervice under this deſcription, and whatever incidental appearances denote the period, the genius, the manners, the laws, the taſte, the character, the climate, or the cultivation of a country, all forms animate or inanimate, the Palms of Syria and the Pyramids of Egypt, the Lion and the Sphinx, are conſidered, in the works of painters, as parts of the coſtume of nations, in the different regions of the earth. The "Battles of Alexander," by Le Brun, are celebrated in the French ſchool for the great diſtinctions of coſtume, which the painter had the ability to introduce in the combatants of different nations; diſtinctions, which are aſſerted to have been, in great meaſure, aſcertained by the hues and phyſiognomy of the reſpective warriors, and by the characters of the horſes; for the ſake of accuracy, in which latter point, in regard to the Perſians, he had procured drawings of horſes by an expreſs commiſſion from Aleppo. Nicolo Pouſſin, alſo, has been admired for his nice attention to coſtume in all the ſubordinate arrangements of his pictures, by the introduction of appropriate trees, animals, and buildings; an excellence which contributed to obtain for him the appellation of "Peintre des Gens d'eſprit."

It is evident, therefore, that in this extenſive ſcale of alluſion, dreſs, the tranſient idol and victim of faſhion, aſſumes a very inferior ſhare of conſequence; and for this reaſon, a rigorous adherence to its minutiæ can ſeldom be required in painting.

At the ſame time, common ſenſe directs one diſtinction to be carefully preſerved, *viz.* that in drapery, as in every other object of imitation, whatever denotes a general and eſſential principle, conformable to the dictates of nature, is by no means to be diſpenſed with. In the repreſentation of a ſultry climate, for inſtance, it would be a contradictory abſurdity to cloath the figures with thick cumberous garments; and, in a cold climate, with thin airy ones. Equally abſurd would be the introduction of two dreſſes, known poſitively to belong to different ages and nations, among a ſet of figures, who, being of the ſame ſpot and time, ought all to wear cloathing of the ſame kind. But beyond this general deference to eſſential points, every thing ſeems to be under the abſolute controul of the painter. The repreſentation of events, which have actually happened in our own time, can alone have any pretenſion to confine his choice.

A juſt knowledge, therefore, and attention to coſtume, forms a neceſſary part of the ſtudy of drapery. In portraiture, the obſervance of coſtume may be conſidered ſo important, that, unleſs when it obſtructs the general deſign of the work, none but the moſt indiſpenſable preventions ſhould ever be ſuffered to interfere with it. This is particularly the caſe in the portraits of eminent men, in which every form of drapery, once worn by the hero of the time, nay, even the minuteſt ornament, becomes valuable to future ages. But, in the compoſition of hiſtorical drapery, it is evident that accuracy of coſtume ought by no means to be carried to the ſame degree of ſtrictneſs. "To ſteer a proper courſe in this reſpect," ſays Watelet, "the painter ſhould equally avoid a blind obedience to the judgment of the mere antiquarian, and of the devotee of modern faſhions. If he conſults the latter, he will, for inſtance, dreſs Cyrus either in Greek or Roman garments, or partly in both, as chance ſhall direct, and Cato, revolving in his mind the immortality of the ſoul, and raiſing his dagger that he may not ſurvive the freedom of the republic—in a night-gown and ſlippers. On the other hand, the former, who paſſes life in fathoming the depths of obſcure erudition, and in whom the taſte for the arts and the pleaſurable ſenſations they are capable of producing, are ſtifled in their birth, will expreſs a diſguſt, at finding a braſs nob wanting in the armour of the Horatii, far ſurpaſſing the feelings excited in his breaſt by the moſt lively repreſentation of the action. The middle courſe which the painter ought to keep, is to give to every nation, to the Romans for example, the dreſs worn in the moſt renowned period of the ſtate; he cannot be required to employ the long and painful reſearches, neceſſary to acquaint him with every ſhade of faſhion, which luxury may have introduced among that celebrated people. He will be ſtill more at liberty, when the ſubject of his work is taken from remote times and nations, whoſe cuſtoms are leſs known to other countries and other ages. I will add, that a painter is more excuſable when, without conſulting the *coſtume*, he gives his figures *ideal* draperies, than when he clothes them in the dreſs of any other nation than their own." Encyclopedie.

Various characters of drapery, adopted by the Italian maſters.

'In the compoſition of draperies, three things are to be conſidered, in order to make them excellent and juſtly proportioned, according to the figure on which they are caſt. Firſt, they muſt be, in regard to their folds, of ſuch a quality, as to ſuit exactly the perſons who wear them; ſecondly, they muſt every where *follow* the parts of the *nudo*, which is under them; and thirdly, they muſt be governed by their ſituation, complying with, or following, the *nudo*, but not beyond proper bounds.'

'In regard to the firſt point; the painter ſhould ſtudiouſly vary the drapery, and the airs of his folds in all his figures, adapting his ſtuffs to the nature and character of the perſons repreſented. If the dreſs is that of a philoſopher, or a prophet, he will learn to make it full and large; and the fewer folds he introduces the better. This has been ſeen in the practice of Michael Angelo, in the "Prophets" and "Sybils" painted in the cieling of the chapel which contains his work of "The Laſt Judgment," as well as of Raffaelle, in many inſtances, and of Polydore, whenever he had occaſion to repreſent figures of that kind; becauſe, if the folds had been made ſmall, they would not have correſponded with the gravity of demeanour and majeſtic ſtature of ſuch figures. On the other hand, the perſon of a Nymph, or other young female, neceſſarily requires light drapery, capable of being moved with every breeze, and forming ſmall folds, ſuch as denote a texture of drapery, ſuited to her nature and quality. Drapery, of the ſame kind, has been judged moſt appropriate to angels alſo, as we ſee in the works of Gaudentio, Leonardo, Boccacini, and Mazzuolino, ſuch drapery being beſt adapted to the nature and quality of thoſe beings. And, for this reaſon, they have clothed them with thin tranſparent veils, and light garments wrapped round them, with ſmall and minute folds, but ſpreading wider from time to time, according to the turn of the figure.'

'Drapery, with folds neither ſo few and weighty as the former, nor ſo crowded and narrow as the latter, is ſuited to men of elevated character and matrons of a ſuperior claſs; ſuch, for inſtance, as the Virgin Mary, the diſciples, and others of that kind. The painters moſt eminent for draperies of this ſort were Leonardo, Raffaelle, and Gaudentio; the laſt of whom added to the excellence of his draperies an exact repreſentation of their various ſubſtances. After theſe, the moſt excellent in this kind of drapery was Andrea del Sarto; and in the German ſchool, Albert Durer and Bernardo of Bruſſels.'

'Regard muſt alſo be paid to the rank and condition of the characters repreſented, to which the garments and reſpective ornaments ſhould be adjuſted. Jewels, embroidery, ſilk robes, and rich brocades, are well ſuited to princes, queens, and others of the ſame rank, but not at all to thoſe whoſe beſt ornament is modeſty of demeanour; ſuch as ſaints, the Virgin, &c.; whom many painters, and Mazzuolino, for inſtance, have dreſſed with pearls and jewels in their heads; and it was even at one time the cuſtom to repreſent them with embroidered garments and borders inwoven with gold; a cuſtom which, on all accounts, cannot be too much cenſured.'

'The ſecond point regards the folds following the *nudo*, and every where correſponding with the figure under them. This ſort of drapery is more artificial than natural, and was adopted by Michael Angelo to diſplay his knowledge; whence, availing himſelf of the great power he poſſeſſed in the diſplay of the form and the connection of all the limbs, he has given an inſtance, in the Pauline chapel in the Vatican, of a perfect repreſentation of the *nudo* in a clothed figure. This divine painter was deſirous alſo to demonſtrate by ſuch an example the difficulty of attaining this manner, as well as his own unwearied induſtry in attempting every method of clothing his figures.'

'Raffaelle, and the others whom I have mentioned, have ſet better and ſafer examples of the moderation which was propoſed as the third point of conſideration; *viz.* that the drapery ſhould follow the *nudo*, but not to exceſs.'

'Many other ſorts of drapery have been adopted by Bramante, Andrea Mantegna, and others who have copied them, from models clothed with paper and linen glued on.'

'Beſides theſe, there have been introduced ſeveral intricate ſyſtems of drapery, which ought all to be carefully avoided; and, in particular, a certain confuſed mode of folds, (as different as any can be from the drapery of Raffaelle,) diſcovering neither order, beginning, nor end in the various parts, but the whole garment a chaos of white taffetas, velvets, and brocades, drawn up into numberleſs minute folds. I do not ſay that this fault is found in *an extreme degree* in the draperies of Titian, Giorgione, and Giovanni Bellino; but it is eaſily to be ſeen that they have not expreſſed the action of the figure with the preciſion introduced by the manner of clothing of Raffaelle, Gaudentio, and others above-mentioned.' Lomazzo dell'Arte della Pittura.

The drapery of Albert Durer was, in Sandrart's judgment, ſuperior to that of any other painter, both on account of its breadth and of the total abſence of all but the moſt neceſſary and natural folds; and he aſſerts 'that it became a ſtandard for imitation, not only to the Germans, but even to ſome of the moſt celebrated cotemporary maſters of the Italian ſchool.' Thoſe beauties for which he praiſes it need not be queſtioned: it carefully diſplays the figure, and appears to flow, by a ſort of happineſs, with the direction of the limbs; but the ſharp angular contraction of the folds, which gives Albert Durer's drapery an appearance of being ſuddenly *pinched in*, inſtead of folded, is a fault which can, at preſent, hardly be overlooked, as being neither natural nor happily artificial.

In a latter period of the Italian ſchool two great maſters of the art of drapery, Guido and Carlo Maratti, have ariſen to eclipſe the fame of all preceding painters, except Raffaelle. Guido, in his picture of the "Doctors of the Church revolving the Queſtion of the immaculate Conception," and in his ſtill more celebrated "Aurora," has left examples of the moſt perfect beauty, propriety, and character of drapery. In the former work, the light folds of unſullied whiteneſs of the drapery of the Virgin, mildly and generally illuminated by aërial ſplendours, and the larger foldings and graver hues of the garments of the doctors, are equally deſerving our admiration. In the latter, he has exemplified all that is light, airy, elegant, and graceful in female drapery, caſt or falling into folds by the force of motion or air.

In the picture of the "Doctors of the Church" it is to be remarked, that Guido has entirely laid aſide all reference to coſtume, although he did not want precedents for the dreſſes of the principal perſons repreſented; and that the draperies are as purely ideal in that picture as in his other work of poetical imagination, the "Aurora."

It is remarkable, in the progreſs of the Italian ſchool, that, in proportion as the ſtyle of art deteriorated, attention to drapery continued to gain an aſcendancy.

In Guido, from the varied beauties which he gave to his drapery, from the union of lightneſs, ſoftneſs, and breadth in his folds, drapery firſt became a predominant feature of hiſtorical deſign. Pietro da Cortona, who corrupted art, clothed his female figures in the moſt ſeductive variety of attire. Andrea Sacchi's great work, in the church of St. Romualdo, the fourth wonder of Roman painting, derived the greater portion of its praiſe from the powerful management of the drapery in the dreſſes of the religious characters introduced in it; and in the time of his ſcholar, Carlo Maratti, the whole ſtudy of painting conſiſted ſcarcely in any thing beſides drapery.

Of the draperies of Raffaelle, Correggio, and Titian.

'In ſpeaking of drapery, it is impoſſible to withhold the higheſt eulogium from Raffaelle. In his firſt works he followed the manner of his maſter, Pietro Perugino, in the diſpoſition of his folds, as in all other points. He ſomewhat improved his ſtyle from the works of Maſſaccio, and much more from thoſe of Frà Bartolomeo di San Marco. Afterwards, on ſeeing the works of the ancients, he abandoned altogether the ſchools of thoſe maſters, and adopting ſuch rules as he formed from the ſtudy of the antique for the natural diſpoſition of his draperies, he acquired that admirable taſte by which his folds are diſtinguiſhed.'

'He obſerved, that the ancients conſidered drapery not as a principal part of their work, but as an acceſſory merely; that their aim was to clothe, but not to conceal the *nudo*; that they did not cover their figures with ſcraps of cloth, but with good uſeful drapery, neither prepoſterouſly ſcanty nor redundant, but proportioned to the character, ſize, and action of each figure. He ſaw that they made large folds to correſpond with the large parts of the human body, and that they did not break thoſe parts with ſmaller accidents, or when compelled to do ſo by the nature of the drapery, that they introduced ſmall folds of little elevation, to prevent them from appearing principal. Guided by their example, Raffaelle alſo gave grandeur to his draperies, by avoiding all ſuperfluous folds, and placing the pleatings at the joints and bendings of the limbs, without, in any degree, thereby ſhortening the appearance of the figure.'

'The ſhape of Raffaelle's folds was regulated by a proportionate adjuſtment to the part of the body over which they were caſt; if that was large, he placed a large maſs of folds on it, and where the part was foreſhortened, he made the ſame number of folds, but all foreſhortened. In his early works he uſed to mark the limbs, under looſe and hanging draperies, on one ſide only, but he afterwards corrected this method and marked them on both. When the drapery was detached from the body, he made the folds wide and open, that they might have no appearance of any limb under them.'

'He did not examine his folds with a view to chooſe out the moſt beautiful, but to adopt ſuch as would moſt clearly mark the parts of the body which they covered. He gave his folds as many various ſhapes, as there are muſcles on the ſurface of the human body; never however making them entirely round, nor ſquare, becauſe the folding of drapery does not, in its nature, admit of ſquare forms, unleſs when they are divided into two triangles. Over the hollows he caſt large folds and pleatings, but never put two of the ſame ſize cloſe together, nor of equal ſtrength and breadth.'

'His flying draperies are admirable, becauſe they are all plainly moved by one common cauſe, the wind. They appear neither *drawn out*, nor *hung up;* and one fold contraſts another agreeably to the natural quality of the drapery.'

'In ſome places he brings in ſight the hem or border of the garment, to denote its being really adapted to the body. He makes no folds, that cannot be accounted for, either as reſulting from their own weight, or from the action of the limb, to which they correſpond. Sometimes, it is even diſcernible in what form they muſt have been previous to that which they ſeem to have firſt taken, and it appears, from this circumſtance, that, even in his draperies, the great object of his purſuit was Expression. It is eaſy to diſtinguiſh, in many of his folds, whether the arm or leg on which they are formed, ſtood forward or behind, previous to the ſituation in which he ſhews it, and whether the limb has been altered by contracting or extending it.'

'In the principal movement of the figure, he obſerved, that when the drapery covers the half of a limb, it marks the other half by croſſing it obliquely in a triangular form, and that folds take this form more generally than any other, becauſe whatever drapery is carried acroſs to one ſide or the other muſt neceſſarily bend and grow narrow in one part, and ſpread in another; and this gives it a triangular ſhape.'

'I have already remarked that Raffaelle, after the example of the ancients, conſidered drapery as an accidental circumſtance, and that great painter, I now add, conſidered the human figure, and the motions of the limbs, as the only juſt cauſes of the different directions of his garments, and of the variety of the folds in them; deeming it, moreover, expedient to conceal the ſtudy and choice, employed on the occaſion.'

'In the ſame manner that Raffaelle directed every circumſtance to *expreſſion*, Correggio kept always in view the *agreeable*, or what was *pleaſing*. He very early quitted the manner of his predeceſſors in art, and as, in general, he painted his figures from ſmall models, which he clothed with pieces of cloth or paper, he ſought every where for *maſſes*, and, in thoſe maſſes, for what was pleaſing, in preference to the truth of individual folds; and by theſe means his draperies are at once large and light, but with very indifferent folds. When he painted from the life, he ſometimes choſe his folds very ill, and often concealed or broke the form of the body under them. As to the reſt, he made his draperies of moſt beautiful and juicy hues, often introducing dark colours, to give a greater brightneſs to his *fleſh*.'

'Titian painted his draperies, as he did moſt other objects, from imitation merely; he made them ſufficiently beautiful, ſtrongly reſembling nature, and with great brightneſs and relief of colour. His linen, in particular, is moſt eminently clear and ſparkling, entirely, however, without choice in the folds, and exactly as he found it in the object before him; on which account he ought not to be imitated in this point.' Mengs, ſobre la belleza y guſto en la pintura.

Drapery of the Ancients.

As far as any authority can be found, which we may venture to repeat, the invention of the art of drapery was of a later date among the Greeks than that of form. We read that light and ſhade, and colour, had been ſucceſſively added to the at firſt ſimple outline, before we meet with the name of the painter, who diſcovered the method of imitating the folds of drapery. That the ſtudy of this ſubject was afterwards carried to an equal degree of excellence with the other parts of the art of painting, is moſt probable; the proof reſts on the faith of hiſtory.

Of the drapery of the Greek painters, ſo extolled by writers and critics, we have few examples, beyond the pictures diſcovered at Herculaneum; all of which were probably executed by inferior artiſts, and appear to be but ſlight hints of thoſe ſuperior ſources of excellence from which they muſt have deſcended. The greateſt number of theſe pictures repreſent female figures, whoſe drapery is light, airy, eaſy, exquiſitely taſteful, and adapted to the entire diſplay of the figure beneath it. Several inſtances alſo occur, in the outer garments both of male and female figures, in which the drapery is of a larger and heavier caſt, with broad folds, but equally well adjuſted with the former, for ſhewing with preciſion the intent of the action, or the quieſcent poſture of the limbs.

If we may truſt to the reports of Pliny, reſpecting the excellencies of the Greek painters, the curtain painted by Parrhaſius, in his conteſt for pre-eminence with Zeuxis, however confined an idea it may give us of the ſcope of graphic excellence at that period, at leaſt demonſtrates, that the painter was ſkilled in the imitation of the natural appearances of drapery. But no examples of this kind are come down to us. From thoſe paintings, which we ſee, of the Greek ſchool, we can only aſcertain, that the ſame principle of order in the folds, which prevails in the diſpoſition of drapery in their ſtatues, appears to pervade alſo the productions of their pencil; the ſame beauty of method every where predominates; while the juſt diſtinctions, which ſeparate the repreſentations of painting from thoſe of ſculpture, are at the ſame time to no inconſiderable extent, forcibly, judiciouſly, and ſyſtematically preſerved. The flow of the folds is fuller, more free, and, in proper places, detached from the object that ſupports them. Although they every where convey the diſtinct idea of the form, they no where cling to the body; and they furniſh a ſufficient, though unregarded leſſon to thoſe painters, who, in ſome of the modern ſchools, and particularly in the French ſchool, have abſurdly imagined that they were imitating the beauty of antique draperies, when they made their pictures reſemble antique ſtatues. 'The diſpoſing of the drapery,' ſays Reynolds, 'ſo as to appear to cling cloſe round the limbs, is a kind of pedantry which young painters are very apt to fall into, as it carries with it a reliſh of the learning acquired from the ancient ſtatues, but they ſhould recollect there is not the ſame neceſſity for this practice in painting as in ſculpture.'

In the flying draperies of nymphs and other dancing figures, the pictures of Herculaneum exhibit the moſt acknowledged ſpecimens of excellence, in the artful diſpoſition of folds of that deſcription, never afterwards approached by any painter, unleſs by Raffaelle and Guido.

Other modes of Drapery.

Beſides the ſuperior ſtyle of drapery adopted by the ancients, by Raffaelle (ſo well deſcribed by Mengs,) by thoſe mentioned in the precepts of Lomazzo, and by their ſucceeding diſciples, another diſtinct claſs of drapery remains to be noticed, conſiſting in an union of the *pictureſque* with *coſtume*, by a bold diſpoſition of real dreſſes of a particular time, without regard to their formal adjuſtment; and by treating them in every reſpect, with the ſame freedom that would attend the diſpoſal of draperies merely ideal. In this mode of repreſenting hiſtorical draperies, Paul Veroneſe, and, next to him, Rubens, have ſet the moſt conſpicuous examples. They have, with a ſtrict local adherence to the coſtume of dreſs, generalized particular forms into ample maſſes, rendered minutiæ ſubſervient to the increaſe of the whole effect, and, withal, made them the inſtruments of ſo impoſing and delightful ſplendour, as precludes all ſeverity of reflection on the incongruities ariſing from their practice.

The ſource of this example, in the Venetian ſchool, is to be traced to the celebrated picture by Titian, repreſenting the murder of St. Pietro Martyre. The bold poetic uſe, there made of the formal religious dreſs, particularly in the figure running away, freed the art at once from its ſuppoſed inability of uniting force and grandeur of imagination with attention to coſtume in dreſs, and led his followers to attempts of the ſame nature, which, under the guidance of leſs powerful judgment, often rendered their works a kind of carricature in hiſtory, or little better than an hiſtorical maſquerade.

Raffaelle is well ſaid, by a French writer, to have been the beſt painter of *drapery*, and Paul Veroneſe the beſt painter of *ſtuffs*.

There can be no drapery more faulty in painting or ſculpture, than that which, in either art, affects to reſemble the productions of the other. It is not to be denied, that in the higheſt of all examples of ſculpture, the works of Phidias, ſuch drapery is to be found, as from its ſoftneſs and breadth (founded on a knowledge of principles poſſeſſed only by himſelf), may ſafely be transferred to painting. Such, for inſtance, is the drapery of the two females ſitting together, in the collection brought from Athens by the earl of Elgin, in which every quality of beauty of form and character is combined. But without this conſummate knowledge, the experiment, whenever it has been made, has been generally unſucceſsful. Painting, imitating the drapery of ſculpture, has produced garments of ropes; and ſculpture, imitating that of painting, has left it doubtful if it deſigned to repreſent clothes or rocks.

The requiſite diſtinction between the proper management of drapery in painting and in ſculpture, is moſt inſtructively exemplified in the practice of that great maſter of both arts, M. Angelo Buonaroti. Du Freſnoy has juſtly pointed out this diſtinction: the large folds, he remarks, and maſſy garments, with which the prophets, in the Siſtine chapel, are inveſted, are confeſſedly ſuch as correſpond with the powers of painting, and peculiarly adapted to the awful character of the perſons who wear them: but, in the monument of Julius II., in the church of San Pietro in Vincoli, the ſtatue of Moſes, although by the character of the perſon repreſented, it evidently takes the ſame claſs as the figures of the prophets, has nothing of the ſame kind of drapery. The dreſs is caſt cloſer round the limbs, the folds are thinner, narrower, and, in every reſpect, ſuch as the properties of ſculpture render neceſſary, for the juſt expreſſion of the forms of the figure.

Detached Draperies.

The uſes of drapery, in balancing the parts of a compoſition, or in uniting and tying the whole together, have already been noticed; and examples are to be ſeen in numerous works of almoſt every painter. In the conduct of this part of the art, the ſame rules which have been applied to the foldings of drapery connected with the human figure, will hold good, though in a ſubordinate degree, when applied to all draperies detached from the figure, and in ſome meaſure independent of it. Drapery, on whatever object it falls, ſtill bears an eſſential relation to that object, and will, by the nature of its folds, more or leſs expreſs the nature of its ſupport; and it muſt, in painting, be adjuſted accordingly.

But, large maſſes of drapery, almoſt wholly detached and independent, have ſometimes been ſo powerfully employed by the painter, as to conſtitute a predominant feature of his compoſition. Two moſt eminent inſtances of this uſe of drapery are, the famous "Deſcent from the Croſs" by Rubens, and the no leſs famous "Table Cloth" by Titian. In both of theſe pictures, the principal effect of light is formed by the diſplay of an extended piece of linen, which, in the former, involves the greater portion of the compoſition, and, in the latter, forms the foremoſt and moſt attractive object. With theſe inſtances, however, of drapery, (if it may properly be ſo called) the ſtudy of the art is little connected, in any other point than in its power of aſſiſting colour, and effect of chiaro-ſcuro in general. The diſtinction of the parts of the drapery ſeems here to have had very little ſhare in the painter's thoughts; their object being effect, and not folds; and all draperies of ſuch a nature muſt, therefore, ſtrictly ſpeaking, be referred to the articles *Colour* and *Effect*, as ſubordinate branches of thoſe heads.

This article cannot be better cloſed than by the brief, comprehenſive remarks of our inimitable Reynolds. They are, as follows, in his fourth diſcourſe delivered at the Royal Academy:

‘In the ſame manner as the hiſtorical painter never enters into the detail of colours, ſo neither does he debaſe his conceptions with minute attention to the diſcriminations of drapery. It is the inferior ſtyle that marks the variety of ſtuffs. With him, the clothing is neither woollen, nor linen, nor ſilk, ſattin, or velvet; it is drapery; it is nothing more.’

‘The art of diſpoſing of the folds of drapery makes a very conſiderable part of the painter's ſtudy. To make it merely natural is a mechanical operation, to which neither genius or taſte is required; whereas, it requires the niceſt judgment to diſpoſe the drapery, ſo that the folds have an eaſy communication, and gracefully follow each other, with ſuch natural negligence as to look like the effect of chance, and at the ſame time, ſhew the figure under it to the utmoſt advantage.’

‘Carlo Maratti was of opinion, that the diſpoſition of drapery was a more difficult art than even that of drawing the human figure; that a ſtudent might be more eaſily taught the latter than the former; as the rules of drapery, he ſaid, could not be ſo well aſcertained as thoſe for delineating a correct form.’

‘This, perhaps, is a proof how willingly we favour our own peculiar excellence. Carlo Maratti is ſaid to have valued himſelf particularly upon his ſkill in this part of his art; yet, in him, the diſpoſition appears ſo artificial, that he is inferior to Raffaelle, even in that which gave him his beſt claim to reputation.’

DRAPERY, in *Sculpture*. See SCULPTURE.

DRAPETES, in *Botany*, ſo named by ſir Joſeph Banks and Dr. Solander. Δραπέτης, *a runaway ſervant*, may allude to the fugacious nature of the flowers, concerning which, however, we have no information, or to the ſtation of the plant in a remote country, far away from its more gorgeous or elegant ſuperiors, *Daphne*, *Gnidia*, &c. of the ſame natural order. Lamarck, who firſt publiſhed this genus, leaves the name unaccounted for. Lamarck in Journ. d'Hiſt. Nat. v. 1. 186. Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Thymeleæ*, Juſſ.

Gen. Ch. *Cal.* Perianth coloured, funnel-ſhaped, regular, four-cleft; its ſegments upright, lanceolate, bearded, nearly equal. *Cor.* none, except the calyx be taken for ſuch.

Stam. Filaments four, thread-ſhaped, equal, longer than the calyx, inſerted into its tube; anthers ovate, of two cells. *Piſt.* Germen ſuperior; ſtyle very ſhort; ſtigma not obſerved. *Peric.* a dry drupa, inveſted with the permanent baſe of the calyx. *Seed* ſolitary, ovate, pointed.

Eſſ. Ch. Calyx funnel-ſhaped, coloured, four-cleft. Corolla none. Stamens projecting. Drupa dry, ſuperior, with one ſeed.

D. *muſcoſus*, Lamarck in Journ. d'Hiſt. Nat. v. 1. 189. t. 10. f. 1, the only known ſpecies, grows among rocks by the ſea-ſide at Staten Land, flowering in December or January, where it was gathered by the eminent botaniſts abovementioned, as well as by Commerſon and Mr. A. Menzies. The *ſtems* are perennial and ſomewhat ſhrubby, though not above three inches high, very ſlender, and thread-ſhaped. They are branched, forming tufts, leafy in their upper part, beſet with ſcars in the lower, where former leaves have been. *Leaves* imbricated, oppoſite, croſſing each other in pairs, ſmall, ſeſſile, obovate, obtuſe, concave, entire, veiny, externally briſtly, deciduous, without ſtipulas. *Flowers* very ſmall, in ſtalked, terminal, ſolitary little heads, each ſtalk hairy, inveſted with a ſheathing deciduous leaf, and at length becoming near an inch long. The head conſiſts of four or five flowers, each on a very ſhort partial ſtalk, which is crowned with numerous white frigid briſtles, encompaſſing the baſe of the flower, like an involucrum, or additional calyx, but they are exactly like the general pubeſcence of the plant, and do not, in our opinion, make a part of the fructification, though Lamarck reckons them "hairs of the receptacle," according to the analogy of *Dais*. *Calyx* white, externally hairy, very ſlender at the baſe. *Stamens* about twice as long as the ſegments of its border, capillary, ſpreading. The flowers and fruit paſs away, leaving the ſtalks crowned with the ſilvery permanent tufts of the hairs above deſcribed.

DRAPSACA, in *Ancient Geography*, a town in or near Bactriana, according to Arrian, and ſuppoſed by Ortelius to be the ſame with *Drepſa*, which Ptolemy makes the metropolis of Sogdiana.

DRASON, a town of Aſia, in Phrygia.

DRASTIC, from δραω, *I act*, a ſtrong and powerful medicine; more particularly, a purgative that works with ſpeed and vigour; as jalap, ſcammony, and the other ſtronger cathartics.

DRASTOGA, or Drastoca, in *Ancient Geography*, a town of Aſia, towards the ſources of the river Dargomanes, in the country of Paropaniſus. It was bounded on the north and weſt by a mountain of this name.—Alſo, a town of Aſia, in India, on this ſide of the Ganges; placed by Ptolemy in the country called Goriœa.

DRATIGENA, a country of Aſia, ſo called by Polybius, who ſays, that Antiochus took poſſeſſion of it, and made it his winter-quarters. Some have thought that it is miſtaken for Drangiana.

DRAUCA, a town of the iſland of Crete.

DRAUDIUS, George, a German, author of a work entitled "Bibliotheca Claſſica," in two huge volumes 4to. Frankfort, 1625; in which are inſerted the titles of all kinds of books. It is merely a crowded catalogue of all the works which had appeared at the Frankfort fairs; but they are not well arranged, or very eaſily found, and the errors are innumerable. However, many have been corrected in later editions, and though ſtill incorrect, it is a very uſeful catalogue, particularly for German books, and muſical publications.

DRAVE, in Latin *Dravus*, in *Geography*, a conſiderable river of Hungary, which, iſſuing out of the province of Stiria in Auſtria, divides Hungary from Sclavonia, and at laſt empties itſelf into the Danube near Darda, below Eſſeek in Hungary.

DRAUGHT, in *Architecture*, is the repreſentation of a building delineated on paper, explaining the various parts of the exterior and interior by means of plans, elevations, and ſections drawn to a ſcale, by which all the parts are repreſented on a plane in the ſame proportions of the different ſides of the intended edifice, or, at leaſt, the proportions may be aſcertained from theſe drawings. The extent of the building, with regard to its horizontal dimenſions, is aſcertained by means of plans. The dimenſions of the vertical faces are generally obtained by the elevations and ſections, and always when the plane of delineation is parallel to theſe faces. The vertical dimenſions of buildings, upon circular and polygonal plans, muſt be found partly from the plans, and partly from the elevations or ſections. Over and above general plans, elevations, and ſections in complex buildings, a ſet of drawings, ſhewing the detail of the ſmaller parts, will be neceſſary.

Beſides theſe drawings, which are uſed in the conducting of the work, perſpective repreſentations for the uſe of the proprietor will alſo be neceſſary, in order that he may form a juſt idea of the edifice which he intends to rear in one or more points of view.

When the ſeveral ſtories of a building differ in their conſtruction, each ſtory requires a ſeparate plan. The ſection is generally taken, parallel to one of the ſides of the edifice, through the moſt complex part of it. In this the ſtair-caſe is commonly ſhewn. Moſt buildings require, at leaſt, two ſections; ſome many more. When the ſides of a building are diſſimilar, as many elevations will be required as there are ſides.

The number, the form, and the diſpoſitions of rooms, are ſhewn by the plans.

He who gives the ſeveral deſigns of a building ought to be well acquainted with the nature of its fabrication, or of conſtruction in general, before he commits his ideas to paper, and to the examination of the public, or otherwiſe he will be liable to cenſure.

Draught-*Horſe*. See Horse.

Draught, in *Mechanics*, the force or power neceſſary to move any machine, as a horſe-mill, waggon, cart, plough, &c. For accurately and conveniently aſcertaining the draught of (or power exerted by) horſes, oxen, men, &c. in drawing, as alſo for determining the direct pull or ſtrain on any rope, chain, &c., various machines have been invented, ſome of which we propoſe to deſcribe under the article Dynamometer, which ſee.

Draught, in *Medicine*. See Potion.

Draught, in *Painting*, &c. See Design.

Draught, in *Trade*, is an allowance made in the weight of commodities; the ſame as clough.

Draught, is alſo uſed ſometimes for a bill of exchange, and commonly for an order for the payment of any ſum of money, due, &c. Then the perſon who gives the order is ſaid to draw upon the other.

Draught, *reduction of a*. See Reduction, and Pentagraph.

Draught-*Compaſſes*, thoſe provided with ſeveral moveable points, to draw fine draughts in architecture, &c. See Compass.

Draught *and Cording of Looms*, ſignifies, among *Weavers*, the art of adapting thoſe parts of a loom which move the warp, to the formation of various kinds of ornamental figures upon cloth. In every ſpecies of weaving, whether direct or croſs, the whole difference of pattern or effect is produced, either by the ſucceſſion in which the threads of warp are introduced into the heddles, or by the ſucceſſion in which thoſe heddles are moved in the working. The heddles being ſtretched between two ſhafts of wood, all the heddles connected by the ſame ſhafts are called a leaf, and as the operation of introducing the warp into any number of leaves is called drawing a warp, the plan of ſucceſſion is called the draught. When this operation has been performed correctly, the next part of the weaver's buſineſs is to connect the different leaves with the levers or treddles by which they are to be moved, ſo that one or more may be raiſed or ſunk by every treddle ſucceſſively, as may be required to effect the pattern required. Theſe connections being made by coupling the different parts of the apparatus by cords, this operation is called the cording. In order to direct the operator in this part of his buſineſs, eſpecially if previouſly unacquainted with the particular pattern upon which he is employed, plans are drawn upon paper, ſpecimens of which will be found in *Plate* XII. *Miſcellany*. Theſe plans are horizontal ſections of a loom, the heddles being repreſented acroſs the paper at A, and the treddles under them, and croſſing them at right angles at B. In *figs.* 1 and 2, they are repreſented as diſtinct pieces of wood, thoſe acroſs being the under ſhaft of each leaf of heddles, and thoſe at the left hand the treddles. In actual weaving, the treddles are placed at right-angles to the heddles, the ſinking cords deſcending perpendicularly, as nearly as poſſible, to the centre of the latter. Placing them at the left hand therefore, is only for ready inſpection, and for practical convenience. At C, a few threads of warp are ſhewn as they paſs through the heddles, and the marks denote the leaf with which each thread is connected. Thus in *fig.* 1, the right-hand thread, next to A, paſſes through the eye of a heddle upon the back leaf, and is diſconnected with all the other leaves; the next thread paſſes through a heddle on the ſecond leaf; the third through the third leaf; the fourth through the fourth leaf, and the fifth through the fifth or front leaf. One ſet of the draught being now compleated, the weaver again begins with the back leaf, and proceeds in the ſame ſucceſſion again to the front. Two ſets of the draught are repreſented in this figure, and the ſame ſucceſſion, it is underſtood by weavers, (who ſeldom draw more than one ſet,) muſt be repeated until all the warp is included. When they proceed to apply the cords, the left-hand part of the plan at B ſerves as a guide. In all the plans upon this plate, excepting one which ſhall be noticed, a connection muſt be formed by cording between every leaf of heddles and every treddle; for all the leaves muſt either riſe or ſink. The raiſing motion is effected by coupling the leaf to one end of its correſpondent top lever; the other end of this lever is tied to the long march below, and this to the treddle. The ſinking connection is carried directly from under the leaf to the treddle. To direct a weaver which of theſe connections is to be formed with each treddle, a black ſpot is placed when a leaf is to be raiſed, where the leaf and treddle interſect each other upon the plan, and the ſinking connections are left blank. For example, to cord the treddle 1. To the back leaf put a raiſing cord, and to each of the other four ſinking cords. For the treddle 2, raiſe the ſecond leaf, and ſink the remaining four, and ſo of the reſt; the ſpot always denoting the leaf or leaves to be raiſed. The *figs.* 1 and 2 are drawn for the purpoſe of rendering the general principle of this kind of plans familiar to thoſe who have not been previouſly acquainted with them; but thoſe, who have been accuſtomed to manufacture and weave ornamented cloths, never conſume time by repreſenting either heddles or treddles as ſolid or diſtinct bodies. They content themſelves with ruling a number of lines acroſs a piece of paper, ſufficient to make the intervals between theſe lines repreſent the number of leaves required. Upon theſe intervals, they merely mark the ſucceſſion of the draught, without producing every line to reſemble a thread of warp. At the left-hand they draw as many lines acroſs the former as will afford an interval for each treddle, and in the ſquares, produced by the interſections of theſe lines, they place the dots, ſpots, or cyphers, which denote the raiſing cords. It is alſo common to continue the croſs lines, which denote the treddles a conſiderable length beyond the interſections, and to mark, by dots, placed diagonally in the intervals, the order or ſucceſſion in which the treddles are to be preſſed down in weaving. The former of theſe modes has been adopted in the remaining plan, upon the plate, but to ſave room the latter has been avoided, and the ſucceſſion marked by the order of the figures under the intervals which denote the treddles.

Some explanation of the various kinds of fanciful cloths, repreſented by theſe plans, may ſerve further to illuſtrate this ſubject, which is, perhaps, the moſt important of any connected with the manufacture of cloth, and will alſo enable a perſon, who thoroughly ſtudies them, readily to acquire a competent knowledge of the other varieties in weaving, which are boundleſs. *Figs.* 1 and 2 repreſent the draught and cording of the two varieties of tweeled cloth wrought with five leaves of heddles. The firſt is the regular or run tweel, which, as every leaf riſes in regular ſucceſſion, while the reſt are ſunk, interweaves the warp and woof only at every fifth interval, and as the ſucceſſion is uniform, the cloth, when woven, preſents the appearance of parallel diagonal lines, at an angle of about 45° over the whole ſurface. When there is no other figure upon the cloth, and the fabric is fine, this produces a very pleaſing effect, and is much uſed, eſpecially in the manufacture of ſilks of various deſcriptions. Tweeling is alſo much employed in the coarſer deſcriptions of cloths made from every kind of material employed in the manufacture. In the linen, it is uſed for ſheeting and many other kinds of houſehold cloths which require durability. Many of the ſtronger kinds of woollen cloths are alſo tweeled. Goods are manufactured in very great variety in Lancaſhire from cotton, and many kinds of fanciful tweeling introduced. A tweel may have the regularity of its diagonal lines broken, by applying the cording as in *fig.* 2. It will be obſerved, that in both figures the draught of the warp is preciſely the ſame, and that the whole difference of the two plans conſiſts in the order of placing the ſpots denoting the raiſing cords, the firſt being regular and ſucceſſive, the ſecond alternate.

Figs. 3 and 4 are the regular and broken tweels which may be produced with eight leaves. This properly is the tweel denominated ſattin in the ſilk manufacture, although many webs of ſilk, wrought with only five leaves, receive that appellation. Some of the fineſt Florentine ſilks are tweeled with ſixteen leaves. When the broken tweel of eight leaves is uſed, the effect is much ſuperior to what could be produced by a ſmaller number, for in this two leaves are paſſed in every interval, which gives a much nearer reſemblance to plain cloth than the others. For this reaſon it is preferred in weaving the fineſt damaſks. The draught of the eight leaf tweel differs in nothing from the others, excepting in the number of leaves. The difference of the cording in the broken tweel will appear by inſpecting the cyphers which mark the raiſing cords, and comparing them with thoſe of the broken tweel of five leaves. *Fig.* 5. repreſents the draught and cording of ſtriped dimity of a tweel of five leaves. This is the moſt ſimple ſpecies of fanciful tweeling. It conſiſts of ten leaves, or double the number of the common tweel. Theſe ten leaves are moved by only five treddles in the ſame manner as a common tweel. The ſtripe is formed by one ſet of the leaves fluſhing the warp, and the other ſet the woof. The *fig.* in the *Plate* repreſents a ſtripe formed by ten threads, alternately drawn through each of the two ſets of leaves. In this caſe, the ſtripe and the intervals will be equally broad, and what is the ſtripe upon one ſide of the cloth, will be the interval upon the other, and *vice verſâ.* But great variety of patterns may be introduced by drawing the warp in greater or ſmaller portions through either ſet. The tweel is of the regular kind, but may be broken, by placing the cording as in *fig.* 2. It will be obſerved that the cording marks of the lower or front leaves, are exactly the converſe of the other ſet; for where a raiſing mark is placed upon one, it is marked for ſinking in the other; that is to ſay, the mark is omitted; and all leaves which ſink in the one, are marked for raiſing in the other: thus one thread riſes in ſucceſſion in the back ſet and four ſink, but in the front ſet four riſe and only one ſinks. The woof, of courſe, paſſing over the four ſunk threads, and under the raiſed one, in the firſt inſtance, is fluſhed above; but where the reverſe takes place, as in the ſecond, it is fluſhed below, and thus the appearance of a ſtripe is formed. The analogy ſubſiſting between ſtriped dimity and dornock is ſo great, that before noticing the plan for fancy dimity, it may be proper to allude to the dornock, the plan of which is repreſented by *fig.* 6.

The draught of dornock is preciſely the ſame, in every reſpect, with that of ſtriped dimity. It alſo conſiſts of two ſets of tweeling heddles, whether three, four, or five leaves, are uſed for each ſet. The left hand ſet of treddles is alſo corded exactly in the ſame way, as will appear by comparing them. But, as the dimity is a continued ſtripe from the beginning to the end of the web, only five treddles are required to move ten leaves. The dornock, being checker-work, the weaver muſt poſſeſs the power of reverſing this at pleaſure. He therefore adds five more treddles, the cording of which is exactly the reverſe of the former; that is to ſay, the back leaves in the former caſe having one leaf raiſed and four ſunk, have, by working with theſe additional treddles, one leaf ſunk and four leaves raiſed. The front leaves are in the ſame manner reverſed, and the mounting is compleat. So long as the weaver continues to work with either ſet, a ſtripe will be formed as in the dimity, but when he changes his feet from one ſet to the other, the whole effect is reverſed, and the checkers formed. The dornock pattern upon the deſign paper, *Plate* A, may be thus explained: let every ſquare of the deſign repreſent five threads upon either ſet of heddles, which are ſaid by weavers to be once over the draught, ſuppoſing the tweel to be one of five leaves: draw three parallel lines, as under, to form two intervals, each repreſenting one of the ſets: the draught will then be as follows:—

4		1		4		1		1		4		1	
	4		4		1		1		1		4		4

The above is exactly ſo much of the pattern as is there laid down, to ſhew its appearance, but one whole range of the pattern is compleated by the figure 1 neareſt to the right hand upon the lower interval between the lines, and the remaining figures nearer to the right form the beginning of a ſecond range or ſet. Theſe are to be repeated in the ſame way acroſs the whole warp. The lower interval repreſents the five front leaves; the upper interval the five back ones. The firſt figure 4 denotes that five threads are to be ſucceſſively drawn upon the back leaves, and this operation repeated four times. The firſt figure 4 in the lower interval expreſſes that the ſame is to be done upon the front leaves, and each figure, by its diagonal poſition, ſhews how often, and in what ſucceſſion five threads are to be drawn upon the leaves, which the interval in which it is placed repreſents.

Dornocks of more extenſive patterns are ſometimes woven with 3, 4, 5, and even 6 ſets of leaves; but after the leaves exceed 15 in number, they both occupy an inconvenient ſpace, and are very unwieldy to work. For theſe reaſons the diaper harneſs is in almoſt every inſtance preferred.

Fig. 7, repreſents the draught and cording of a fanciful ſpecies of dimity, which has been manufactured to great extent, although the prevalent taſte for ſimplicity of pattern of the preſent day has rendered it leſs an object of demand than formerly. In this plan it will be obſerved, that the warp is not drawn directly from the back to the front leaf as in the former examples, but when it has arrived at either external leaf, the draught is reverſed, and returns gradually to the other. The ſame draught is frequently uſed in tweeling, when it is wiſhed that the diagonal lines ſhould appear upon the cloth in a zig-zag direction. This plan exhibits the draught and cording, which will produce the pattern upon the deſign paper in *Plate* A. Were all the ſquares produced by the interſection of the lines denoting the leaves and treddles, where the raiſed dots are placed, filled the ſame as on the deſign, they would produce the effect of exactly one-fourth of that pattern. This is cauſed by the reverſing of the draught, which gives the other ſide reverſed as on the deſign, and when all the treddles, from 1 to 16, have been ſucceſſively uſed in the working, one-half of the pattern will be complete. The weaver then goes again over his treddles in the reverſed order of the numbers, from 17 to 30, when the other half of the pattern will be completed. From this ſimilarity of the cording to the deſign, it is eaſy, when a deſign is given, to make out the draught and cording proper to work it, and when the cording is given to ſee its effect upon the deſign.

Fig. 8, repreſents the draught of the diaper mounting, and the cording of the front leaves, which are moved by treddles. The mounting, which raiſes the leaves of the harneſs, muſt be taken from the deſign paper, in a way ſimilar to that uſed for the draw loom, and as deſcribed in that article. From the plan it will appear, that five threads are included in every mail of the harneſs, and that theſe are drawn in ſingle threads through the front leaves, as deſcribed in the article Diaper. The cording forms an exception to the general rule, that when one or more leaves are raiſed, all the reſt muſt be ſunk, for in this inſtance one leaf riſes, one ſinks, and three remain ſtationary. An additional mark, therefore, is uſed in this plan. The dots, as formerly, denote raiſing cords, the blanks ſinking cords, and where the cord is to be totally omitted the croſs marks × are placed.

Fig. 9, is the draught and cording of a ſpot whoſe two ſides are ſimilar, but reverſed. That upon the plan forms a diamond, ſimilar to the one drawn upon the deſign paper, *Plate* A, but ſmaller in ſize. The draught here is reverſed, as in the dimity plan, and the treading is alſo to be reverſed after arriving at 6, to complete the diamond. Like it too, the raiſing marks form one-fourth of the pattern. In weaving ſpots, they are commonly placed at intervals, with a portion of plain cloth between them, and are generally placed in alternate rows, the ſpots of one row being between thoſe of the other. But as intervals of plain cloth muſt take place, both by the warp and woof, two leaves are added for that purpoſe. The front, or ground leaf, includes every ſecond thread of the whole warp. The ſecond, or plain leaf, that part which forms the intervals by the warp. The remaining leaves form the ſpots; the firſt ſix being allotted to one row of ſpots, and the ſecond ſix to the next row, where each ſpot is in the centre between the former. The reverſed draught of the firſt is ſhewn entire, and is ſucceeded by twelve threads of plain. One-half of the draught of the next row is then given, which is to be completed exactly like the firſt, and ſucceeded by twelve threads more of plain, when one ſet of the pattern being finiſhed, the ſame ſucceſſion is to be repeated over the whole warp. As ſpots are formed by inſerting woof of coarſer dimenſions than that which forms the fabric, every ſecond thread only is allotted for the ſpotting. Thoſe included in the front, or ground leaf, are therefore repreſented by lines, and the ſpot threads between them by marks in the intervals, as in the other plans.

The treddles neceſſary to work this ſpot are in number fourteen. Of theſe, the two in the centre, A, B, when preſſed alternately, will produce plain cloth, for B raiſes the front leaf, which includes half of the warp, and ſinks all the reſt, while A exactly reverſes the operation. The ſpot-treddles, on the left-hand, work the row contained in the firſt ſix ſpot-leaves, and thoſe upon the right-hand the row contained in the ſecond ſix. In working ſpots, one thread, or ſhot of ſpotting-woof, and two of plain, are ſucceſſively inſerted by means of two ſeparate ſhuttles.

Diſſimilar ſpots are thoſe whoſe ſides are quite different from each other. The draught only of theſe is repreſented by *fig.* 10. The cording depends entirely upon the figure, and may be ſupplied by the following ſimple rule: Having ruled the lines which repreſent the heddles, and croſſed them by thoſe repreſenting the treddles, ſquares will be formed ſimilar to thoſe upon deſign-paper. The pattern being drawn upon deſign-paper, let the lines denoting the heddles repreſent the lines of the deſign, from top to bottom of the paper, and the treddle-lines the croſs-lines. Place a raiſing-dot for every ſquare which is coloured on the deſign, and the plan of cording will be correct. It is neceſſary, however, to remark, that when more than one ſquare is included between the ſame parallel-lines, from top to bottom of the deſign, it is needleſs to transfer it more than once to the cording plan, for the treddle, being once marked, will repeat the operation as often as it is preſſed, and, therefore, more than one treddle, for the ſame operation, would only load the loom with uſeleſs and cumbrous machinery. The plain leaves and additional leaves, for placing one row in the boſom of another, are quite the ſame in ſpots, whether ſimilar or diſſimilar. There is, indeed, a ſpot called a paper-ſpot, where all the warp is upon ſpot-leaves, except the intervals, and every ſecond thread of woof is then coarſe. It is undoubtedly ſuperior in effect to the common ſpot; but, as it requires nearly twice the mounting, it is very expenſive, and, therefore, little uſed. Some very beautiful ſpecimens of it are occaſionally imported from India.

Draught-*hooks*, are large hooks of iron fixed on the cheeks of a cannon-carriage, two on each ſide, one near the trunnion hole, and the other at the train, and are called the fore and hind draught-hooks. Large guns have draught-hooks near the middle tranſom, to which are fixed the chains, which ſerve to eaſe the ſhafts of the limbers on a march. The fore and hind-hooks are uſed for drawing a gun backwards or forwards, by men with ſtrong ropes, called draught, or drag-ropes, fixed to theſe hooks.

DRAUNSEN-SEE, in *Geography*, a lake of Pruſſia, in the province of Ermeland, a little to the ſouth of Elbing.

DRAVUS, in *Ancient Geography*, the name of a conſiderable river in Germany, which diſcharges itſelf into the Danube. It is alſo called *Draus* and *Dravis*. Ptolemy ſays, that in his time the Barbarians called it *Daris*. It commenced to the north of the Carnic Alps, ran to the eaſt, watered the towns of Virunum, Pœtovio, Jovia, and Murſa, and joined the Danube, to the eaſt of Cornacum. It is now called the *Drave*, which ſee.

DRAW. A ſhip is ſaid to draw ſo much water, according to the number of feet ſhe ſinks into it.

Thus, if fifteen feet from the bottom of her be under water, or if ſhe ſink into the water fifteen feet perpendicularly, ſhe is ſaid to draw fifteen feet water; and according as ſhe draws more, or leſs, ſhe is ſaid to be of more, or leſs draught; and that this may be more readily known, the feet are marked on the ſtern and ſtern-poſt regularly from the keel upwards. Drawing denotes alſo the ſtate of the ſail, when it is inflated with the wind, ſo as to advance the veſſel in her courſe: and *to keep all drawing* is to inflate all the ſails.

Draw, in *Agriculture*, is ſometimes uſed for a ſpit, or ſpade's-graft, or the depth to which a ſpade, or tool, will cut at once.

Draw, in the *Foreſt Law*. See Dog-*draw*.

Draw, in *Geography*, a town of Perſia, in the province of Segeſtan; 70 miles N.W. of Zareng.

Draw-*back*, in *Commerce*, a rebate, or diſcount, upon the price of commodities, purchaſed on certain conditions. See Rebate and Discount.

Draw-back is more particularly uſed to denote certain duties, either of the cuſtoms, or of exciſe, that are allowed upon the exportation of ſome of our own manufactures, or upon certain foreign commodities that have paid a duty at importation.

The oaths of the merchants importing, or exporting, are required, to obtain the draw-back of foreign goods, affirming the truth of the officer's certificate of the entry, and the due payment of the duties; and theſe may be made by the agent, or huſband of any corporation, or company, or by the known ſervant of any merchant, uſually employed in making his entries, and paying his cuſtoms. (2 and 3 Ann. cap. 9.) With reſpect to foreign goods entered outwards, if leſs in quantity, or value, be fraudulently ſhipped out than is expreſſed in the exporter's certificate, the goods therein mentioned, or their value, are forfeited, and no draw-back is to be allowed for the ſame. Foreign goods, exported by certificate, in order to obtain the draw-back, not ſhipped or exported, or re-landed in Great Britain, unleſs in caſe of diſtreſs, to ſave them from periſhing, which muſt be immediately ſignified to the officers of the cuſtoms, are to loſe the benefit of the draw-back, and are forfeited, or their value, with the veſſels, horſes, carriages, &c. employed in the re-landing of them; and the perſons concerned in re-landing them, or by whoſe privity they are re-landed, or into whoſe hands they ſhould knowingly come, are to forfeit double the amount of the draw-back. (13 and 14 Car. II. cap. 11. 8 Ann. cap. 13.) This is to be paid for within five years after the offence. And the ſeizure of the horſes, &c. may be adjuſted by two or more juſtices of the peace. (6 Geo. I. cap. 21. 8 Geo. I. cap. 18. and 11 Geo. I. cap. 29.) Officers of the cuſtoms conniving at, or aſſiſting in any fraud relative to certificate goods, beſides other penalties, are to forfeit their office, and to ſuffer ſix months impriſonment, without bail, or mainprize; as are alſo maſters, or perſons belonging to the ſhips employed in this buſineſs. (8 Ann. cap. 13.) Bonds given for the exportation of certificate goods to Ireland muſt not be delivered up, nor draw-back allowed for any goods, till a certificate under the hands and ſeals of the comptroller, or collector, &c. of the cuſtoms of ſome port in Ireland be produced, teſtifying the landing, which certificate muſt be produced in ſix months from the date of the bond. (8 Ann. cap. 13. 5 Geo. I. cap. 11. 9 Geo. I. cap. 8. 2 Geo. II. c. 28) See CUSTOMS, DEBENTURES, DUTIES, &c.

DRAW-*bridge*. This conſiſts, in general, of ſeveral boards nailed firmly to a frame, which, being faſtened at one end, by means of ſtrong hinges, to a beam laid horizontally, and parallel to the frame, and being acted upon at its other extremity by means of levers, or by chains worked either by wheels, or by hand; the flat form thus conſtructed, may be raiſed to a perpendicular direction. Draw-bridges are uſually placed over narrow ditches in fortreſſes, or at the ends of great bridges, and eſpecially over the excavations cloſe to the gates; ſo that they may be raiſed, or let down, at the pleaſure of thoſe within the works. Being, for the moſt part, from eight to twelve feet over, they make, when raiſed, a very lofty mantlet, or blind, completely ſhutting up the paſſage; while their abſence from the horizontal poſition in which they formed a part of the bridge, or road-way, cauſes a great gap; ſerving to arreſt the progreſs of parties proceeding to attack the interior.

When draw-bridges are made cloſe on the outſide of gates, the maſonry ought to be ſunk, ſo as to admit the whole depth of the frame to lie within it; elſe the oblique fire from the beſiegers' batteries would act on the edge of the frame, and ſoon render it unſerviceable. Some draw-bridges have fixed iron poſts with chains, ſerving to ſecure paſſengers from accident; theſe are raiſed with the frames; but the generality have only a chain made faſt from the laſt poſt of the bridge, to the poſt on which the lever is balanced: this chain hooks off and on, according as the draw-bridge is raiſed, or lowered. It is alſo uſed on one or both ſides of a canal, dock, &c. See BRIDGE.

DRAW-*gear*, in *Huſbandry*, any kind of harneſs for drawing a waggon, or other carriage.

DRAW-*latches*, in *Engliſh Antiquity*, were thieves and robbers, mentioned in ſtats. 5 Edw. III. c. 14, and 7 Ric. II. c. 5.

DRAW-*loom* is the moſt complicated and extenſive machine, in its operation, uſed in the weaving of ornamented cloth. There is no diverſity of pattern, or figure, however extenſive, which can be brought within the whole range of cloth of the largeſt dimenſions, but may be produced by this uſeful, although expenſive, machine. Draw-looms, in Britain, are uſed for three purpoſes, *viz.* for weaving damaſk, carpets, and the moſt extenſive patterns of ſpotted muſlins. The general principle of all theſe machines is pretty ſimilar, but modifications in their conſtruction take place, according to the particular purpoſes for which they are intended. When patterns become ſo extenſive, that the number of heddles neceſſary for moving the warp in its numerous combinations, could neither be included within any moderate bounds, nor worked by any moderate power, it becomes neceſſary to have recourſe to the draw-loom. Of all the draw-looms, that for weaving fine damaſk is the moſt extenſive; ſome of thoſe in common uſe containing upwards of 120 deſigns, of 10 ſpaces each, which renders them equal to 1200 leaves of the diaper harneſs, or 6000 of the leaves uſed for dornock, dimity, or common tweeling. The general principle of the draw-loom harneſs, and the mode by which the fluſhing is reverſed, is in every reſpect the ſame with that of the diaper, the difference conſiſting ſolely in the ſuperior extent of the former, and the method of mounting and working it. *Fig.* 3. *Plate* XIV. *Miſcellany*, is a perſpective view of the harneſs part of a draw-loom, and the apparatus for working it. The number of harneſs-cords of a draw-loom is ſo great, and they are of neceſſity ſo cloſely crowded together, that any repreſentation of the whole, even if drawn upon a very large ſcale, muſt convey a very inadequate idea of their conſtruction and operation. A few, therefore, only are repreſented at intervals to illuſtrate the way of conſtructing them, and this being once well underſtood, may be extended to any length that conveniency will admit. The harneſs of the draw-loom is not confined by leaves, but every cord carrying a mail for the warp is kept ſtretched by a weight. The mails are the ſame as thoſe of the diaper, *fig.* 2. *Plate* XIV. The weights attached to the harneſs are repreſented at L. A horizontal board, or frame C, is fixed acroſs the loom, and is either perforated with a number of ſmall holes, or divided by wires, or pins, to ſerve as guides to the cords of the harneſs paſſing through them. When the range, or extent of the deſign, has been aſcertained, by counting on the paper the greateſt number of ſquares contained in it from right to left, the harneſs muſt be made to correſpond with this range. Let the range be ſuppoſed to extend to 500 ſquares, and the whole breadth of the warp to contain 10,000 threads. If five threads are to be drawn through each mail, the number of mails compoſing the harneſs will be 2000, and four ranges of the pattern will include the whole breadth. The diviſions in the board C, and the number of pullies in the box, or caſe H, being adapted to this, the operator may proceed to put up his harneſs, which is done as follows: the 1ſt, 501ſt, 1001ſt, and 1501ſt harneſs twines, after being paſſed through their reſpective intervals in the board, or frame C, are to be knotted together at M. A cord being attached to theſe is carried over the firſt pulley in the caſe H, and is made faſt to the piece of wood G, which is generally called the *table*. The 2d, 502d, 1002d, and 1502d, are connected in the ſame way, and the cord attached to them, paſſing over the ſecond pulley, is faſtened to the table as before. The ſame operation is ſucceſſively repeated, until the whole 500 connections are compleated. The cords at B, paſſing over the pullies and faſtened to the table, are called the *tail* of the harneſs. From each cord in the tail a vertical cord deſcends, and is made faſt to a piece of wood K, which is laſhed to a fixture in the floor. Theſe cords, repreſented at D, are called *ſimples*. The draught of the warp through the mails of the harneſs is regularly progreſſive from right to left, as in common tweeling, and the draught, cording, and mounting of the front leaves are exactly the ſame as in diaper. A ſtout perpendicular cord is now ſtretched from the roof to the floor, and made faſt at both ends. This cord is repreſented at I, and the loom is then ready to be adapted to work any pattern, of the range of 500 ſquares, or mails.

The next operation, therefore, is to apply a certain number of ſmall cords, called *laſhes*, and repreſented at E, ſo as to form the particular pattern required. This is called reading on the deſign, and from the complexity of the operation, and the neceſſity of its being accurately done, is performed by two perſons. The firſt of theſe perſons ſelects from the deſign paper the ſimples, to which laſhes are to be ſucceſſively applied; and it is the buſineſs of the ſecond to apply thoſe laſhes according to the inſtructions which he receives from the firſt. To read or ſelect the laſhes in their proper rotation, it is proper to obſerve, that the whole range of ſquares, from right to left, between the extreme points of the pattern, is equal to the whole number of ſimples, and the whole range from top to bottom, to the number of operations which thoſe ſimples are to undergo. The perſon who is to ſelect, therefore, taking the deſign paper, begins at the loweſt ſquare, and counting from the right hand, inſtructs the other to paſs as many ſimples as there are blank ſquares upon the paper, to put laſhes to as many as are coloured, again to paſs the blanks, take the coloured ſquares, and ſo on until he has reached the left ſide of the pattern. When theſe laſhes have been applied, which is done by paſſing each looſely round the ſimples which it is to work, they are knotted together, and attached to the cord I by a loop, ſo that they may ſlide up and down freely, both upon the cord and the ſimples. Proceeding to the ſecond ſquare from the bottom, the ſelection is made in the ſame way, and thus they continue until they have reached the top. The laſhes being now in cluſters upon the cord I, theſe cluſters are connected at convenient diſtances from each other, by ſmall cords repreſented at F, the firſt applied cluſter being loweſt upon the cord I.

The draw-loom being ready for work, the operators may begin to weave. Two perſons are required to work the loom. One of theſe pulls down the firſt ſet of laſhes, the whole being placed high upon the cord I, and by pulling them tight, draws the ſimples with which they are connected clear of all the reſt. Then by graſping theſe ſimples firmly in his hand, and pulling them down, he tightens the tail cords at B, by making them diverge more from a ſtraight line, and of courſe raiſes the mails which are attached to them by the harneſs twines at M. The weaver then works over his front, mounting, as in common tweeling, once, or oftener, if more ſquares than one, upon the deſign, are included between the ſame parallel ſtraight lines from top to bottom. When a change of the harneſs becomes neceſſary, the connecting cord F pulls down the ſecond cluſter of laſhes, upon which the ſame operation is performed as before. By theſe means, the ſimples, however numerous, (and in the caſe we have ſuppoſed they would amount to 500,) are ſelected from each other with the utmoſt accuracy and facility. The ſucceſſive repetition of the ſame operation compleats the pattern, and then it is only neceſſary to puſh the laſhes up again, and begin a new one.

When the mounting of the draw-loom is very extenſive, it would be inconvenient to uſe only one caſe of pullies; for the tail-cords and the frame of this caſe muſt be extended to very inconvenient dimenſions. Beſides this, when ſo many pullies are employed, the tail-cords muſt deviate ſo much from the perpendicular line, that there would be much danger of throwing the cords off the pullies, and ſetting the machine faſt until each cord was replaced. Indeed, to prevent the danger of this, which materially impedes the operation, it is cuſtomary to place guides of wire under the pullies, to confine the cords. But when the mounting is very extenſive, two, and ſometimes three, caſes of pullies are very generally uſed. Theſe are placed parallel to each other, that repreſented at H being the middle one, and an equal number of tail cords are conducted over each. It is alſo uſual to conſtruct more than one ſet of ſimples, that which is to be uſed being laſhed to the floor, while the others are looſe and hung near the roof, until it becomes neceſſary to uſe them in their turns. This, indeed, is very uſeful in working bordered table-cloths, where the whole is frequently the continuation of one deſign, extending ſometimes three yards, or more, in breadth, and five or ſix yards in length.

In an age like the preſent, when ſimplification of proceſs and ſaving of labour have become objects of ſuch general attention, it is not wonderful that plans, which have theſe for their object, ſhould have been adapted to the draw-loom as well as to other machinery. One of theſe, lately introduced at Dunfermline, has been pretty generally adopted, and appears, upon the whole, to have given very conſiderable ſatisfaction. Whether properly or not, it is there known by the name of the patent draw-loom.

The object of the patent draw-loom is, to enable the weaver to change his harneſs, as well as to perform the other neceſſary operations of weaving, and conſequently to ſuperſede the neceſſity of employing a ſecond perſon at the loom. In this loom the tail of the harneſs, inſtead of having its direction changed, by paſſing over pullies, and being carried to one ſide, riſes perpendicularly, and is made faſt to the roof. The ſimples are brought in a horizontal direction to the front of the loom, over the weaver's head. The direction of the ſimples is very ſimilar to that of the tail cords of the diaper-loom, *fig.* 1. The laſhes hang down perpendicularly, ſo that the weaver may pull them with his hand. Upon the tail are knots, placed at equal heights from the floor, and in front of theſe knots is an inſtrument very much reſembling a coarſe comb, or the teeth of a garden rake. This inſtrument moves upon a fulcrum, from which a lever extends over the weaver's head, by depreſſing the end of which he can raiſe the teeth at pleaſure. The ſimples being pulled, the tail is drawn forward, and the knots engaged between the teeth of the comb. The lever being then pulled down, and ſecured by a cord and handle, as in the diaper-loom; the teeth riſe, and carrying the knots along with them, raiſe the harneſs. When a change is required, the teeth are let down, the knots relieved, a ſecond ſet pulled in, and the operation proceeds as before.

This plan has come into very general uſe, and ſeems to meet with much approbation, for thoſe kinds of damaſk where the pattern is not very extenſive. In the others, there is ſtill a diverſity of opinion reſpecting the comparative merits of the old and new plans, which, as the invention is recent, will probably be only decided by experience.

The draw-loom is alſo applied, in moſt inſtances, to the manufacture of carpets. Carpets are not tweeled like diaper or damaſk, but conſiſt of plain or alternate weaving. A carpet conſiſts of two webs of cloth, woven ſeparately and independently of each other, but being woven at the ſame time, particular parts of them are taken through each other, ſo that any part of each web is ſometimes above, and ſometimes below the other. From this it ariſes that when a carpet is turned upſide down, the pattern remains the ſame, but the colours are reverſed, that which formed the ground being now the pattern, and *vice verſâ.*

The front mounting of a carpet draw-loom conſiſts of four leaves, two of which raiſe the web which forms the ground, and the other two that which forms the figure. One ſhot of the woof is inſerted into each web alternately. The eyes of the front mounting are long, like thoſe of the diaper and damaſk, to allow the harneſs to riſe freely. As carpets are woven generally of coarſe dyed woollen yarn, and do not contain much warp, it is unneceſſary, except in very complicated patterns, to uſe ſimples. The laſhes, therefore, hang perpendicularly from the tail, and at the end of each ſet there is a ſmall handle, or as it is called, a *bob.* Theſe paſs through a long horizontal board, perforated ~~with holes~~ to preſerve their regularity, and are arranged in pairs, one bob raiſing the harneſs of the pattern-web, and the other that of the ground-web. To adapt the figure upon the deſign to the application of the laſhes, the inſtructions for the pattern-web are the ſame as in the damaſk; thoſe for the ground-web the ſame exactly reverſed. In the latter, therefore, the blanks upon the deſign are to be taken, and the coloured ſquares paſſed. In this conſiſts the whole difference.

The harneſs of the ſpot draw-loom is exactly the ſame as the damaſk, excepting that the yarn of the warp being much finer, the mails are not uſed, but ſhort eyes of twine ſubſtituted in their places. In the front mounting, alſo, the end is attained by means which, although in effect the ſame, are better adapted to the particular nature of the work. Four leaves of heddles are uſed; but they are mounted, ſo that two leaves will either go together up or down, or in oppoſite directions. The heddles are conſtructed like thoſe for weaving plain cloth, and every thread is drawn through two heddles, being taken through the upper cleft or link of the one, and through the under link of the other. When the two leaves move in the ſame direction, the threads of warp are confined as in the claſp of a common heddle; but when they move in a contrary direction, they preſent all the facility of the long eye in allowing the harneſs to riſe without interruption.

As the time, labour, and materials, neceſſary to mount a draw-loom involve a very conſiderable expence, before any productive return can be attained, it is of the utmoſt importance that the quality of the materials ſhould be good, and that every part ſhould be ſquare, level, and equally ſtretched. Draw-looms will only gradually remunerate thoſe who expend money or labour in fitting them up; and the better they are executed, the quicker and more certain will be the return. A trifling additional trouble or expence to attain thoſe ends will therefore always be found conſiſtent with the ſoundeſt judgment, and trueſt economy.

DRAW-*Net*, a kind of net for taking the larger ſort of wild fowl, which ought to be made of the beſt packthread, with wide meſhes: they ſhould be about two fathoms deep, and ſix long, verged on each ſide with a very ſtrong cord, and ſtretched at each end on long poles.

It ſhould be ſpread ſmooth and flat upon the ground, and ſtrewed over with ſedge, graſs, or the like, to hide it from the fowl; and the ſportſman is to place himſelf in ſome ſhelter of graſs, fern, or ſome ſuch thing.

DRAWER *of a Bill of Exchange*, &c. the perſon who draws the bill upon his correſpondent. See BILL, and EXCHANGE.

DRAWING *a Caſt*, among *Bowlers*. See BOWLING.

DRAWING *Medicines*, or DRAWERS. See EPISPASTIC, and RIPENERS.

DRAWING, *Tooth*. See TOOTH-*drawing*.

DRAWING *of Gold*, or *Silver*, is the paſſing of it through a number of holes in an iron, each leſs than another, to bring it into a wire. See WIRE-*drawing*, and DUCTILITY.

DRAWING *of a Bill of Exchange*, is the writing, ſigning, and giving it to the perſon, who has already paid the value or content thereof, to receive it in another place.

A perſon ſhould never draw a bill of exchange, unleſs he be well aſſured it will be accepted, and paid. See BILL *of Exchange*.

DRAWING, in *Painting*, &c. See DESIGNING, and COUNTER-DRAWING.

DRAWING, the art of repreſenting the appearances of objects by means of appropriate lines or marks formed on ſome convenient ſurface.

Drawing is the baſis of painting and engraving, and an important auxiliary in all the arts of deſign. Strictly it is a modification of painting, from which it differs only in degree, or in the materials employed: in its more finiſhed and perfect examples, it embraces the whole theory of that art, invention, compoſition, chiaro-ſcuro, and even colouring, though the latter ſeems leſs within its proper ſphere, and perhaps conſtitutes their chief or only difference. Yet the friezes of Polidoro in the Vatican, and others painted in oil, are in chiaro-ſcuro, *i.e.* not coloured; neither can the materials be ſaid to afford any very certain technical diſtinction, for we have drawings ſo called in oil, as the ſketches or deſigns of Rubens, Vandyke, and Weſt; and paintings in water, in freſco, and in crayons. It is ſcarcely poſſible, therefore, to fix any preciſe line of diſcrimination between theſe two arts: wherever they approximate, the terms have been uſed indifferently. It may be obſerved, however, that painting, as the higher term, is generally applied to thoſe deſigns which are coloured, and have a greater degree of completion, in whatever vehicle they may be executed.

We ſhall here conſider drawing chiefly in a practical view, as it is uſed by painters, ſculptors, engravers, &c. in making their preparatory ſtudies; conſiſting in various modes of delineating forms, by means of light and dark, without noticing colour, or thoſe more intellectual qualities, which place painting in the ſame rank with poetry. This art holds a ſort of middle ſtation between painting and writing, poſſeſſing ſome of the advantages of both; and from the extent and variety of its range and application, is perhaps one of the moſt pleaſing and moſt uſeful of human inventions.

Drawing may be divided into outline and ſhading. The outline, or contour, repreſents the boundaries of an object, as they appear to terminate againſt the back-ground, and is a ſection of the whole maſs: outlines are alſo uſed for the circumſcription of all the parts, interior as well as exterior. The ſhading expreſſes the projections, cavities, or flatneſs, which form its anterior boundaries.

A correct outline is of the higheſt importance, and the teſt of an intelligent draughtſman, not only as implying that accuracy of eye on which the art is founded, but, in moſt caſes, as conveying the general character of an object at once, without the aid of ſhading, and is therefore itſelf a drawing complete, as far as it goes; for drawing admits of all degrees of abſtraction. The aim of the ſtudent, therefore, ſhould be to acquire the power of copying it faithfully from whatever may be put before him. The materials principally in uſe we ſhall enumerate hereafter. For the firſt eſſays, nothing is better than a piece of black or red chalk placed in a portcrayon: this is to be held ſomewhat like a pen, but ſo as to allow a greater extent of motion both in the fingers and in the wriſt. G. Laireſſe, Mengs, and others, recommend him to begin with making parallel lines, ſtraight and curved, in all directions; to exerciſe himſelf in drawing, without ruler or compaſſes, geometrical figures, into ſome of which all forms may be reſolved; and in copying from good ſpecimens the ſeparate features of the human face. Theſe are well adapted to give firmneſs and flexibility to the hand; to increaſe which the learner ſhould accuſtom himſelf to practiſe upon as large a ſcale as convenient. The difficulty of imitating ſolid bodies would at this time embarraſs rather than improve him, he ſhould therefore endeavour to procure the beſt drawings or prints for his early ſtudy: the latter are uſually leſs eligible than drawings, from having a mode of execution peculiar to engravings, unleſs, as in the illuſtration of this article, they are expreſsly calculated for the purpoſe of examples.

Whatever the object to be drawn, its general form ſhould firſt be ſketched out lightly, that what is found to be amiſs may be the more eaſily removed. Eſtimate as nearly as you can the diſtances of particular points in the original; fix dots at ſimilar diſtances on your paper, which muſt be kept quite ſtraight before you; and then draw your lines carefully to them, beginning at the upper part, and working either from right to left, or in the contrary direction, according to their tendency downwards. Put in the principal diviſions firſt; when theſe are nearly right, mark in the ſmaller parts;

and having got it all together, examine it ſcrupulouſly, paſſing over it with a piece of bread to render the lines more faint, reviſing and retouching them where neceſſary, again and again, till the whole be correct. Compare all the parts of the copy with the original, perpendicularly and horizontally, taking care that they have the ſame inclination, range, and diſtances. A pair of compaſſes may be uſed occaſionally, when the ſtudent is at a loſs, but ſparingly, and by way of proof, after he has done his utmoſt without: habitually ‘the compaſſes ſhould be in the eye.’ Beginners ſhould make their drawings of the ſame ſize as the originals, to exerciſe the eye in meaſuring with exactneſs; but after ſome practice, it will be better to vary from thoſe dimenſions, that they may acquire the power of preſerving ſimilar proportions on a different ſcale, which forms ſo eſſential a part of the dranghtſman's ſkill, and in imitating natural objects is ſo often indiſpenſable. It is not neceſſary that the lines ſhould be of one uniform thickneſs; on the contrary, a delicate variety in this reſpect adds much to the agreeableneſs of the effect: they may alſo be continued a little within the contour, in the hollows, as if purſuing the inflection of the part, which, when done with intelligence, makes a mere outline very characteriſtic. See *Plate* I.

The outlines being completed, the learner may proceed to the ſhadows. In the firſt leſſons theſe ſhould not be too complicated, but indicate only the principal projections. The ſimpleſt method of forming theſe is by repeated lines nearly parallel to the outline: as he advances, and more ſhade is required, theſe lines ſhould be croſſed by other parallels, conſtituting a particular mode of execution called hatching, which is very uſeful, and, with a little practice, expeditious: it is eſpecially neceſſary for engravers in the line manner, but is well calcnlated to give freedom of hand in any ſtyle of drawing. The chief things to be attended to in this are, that the lines conform as much as poſſible to the ſhape of the parts, ſo as to expreſs their various inflections, flatneſs, or roundneſs; that the interſections are not too violent, nor the lines ſo hard as to convey an idea of network; and that they have an harmonious flow and agreement. It has been objected to this kind of handling, that nothing like it is to be ſeen in natural ſhadows: but this is equally true of any other lines or marks that may be adopted for the ſame purpoſe. Hatching was practiſed by all the old maſters, and is a ſort of rythm, which, when well managed, adds a beauty to that of characteriſtic imitation. To this, of courſe, it ſhould always be ſubordinate; if made the *end* inſtead of the *means*, it is abuſed. In this part of his progreſs, the ſtudent will ſtand in need of good examples, to form his hand, that he may be at no loſs to make out ſhadows and middle tints of all degrees, in a proper ſtyle, when he begins to draw from ſolid bodies. Some ſpecimens of hatching may be ſeen in *Plates* II. and III. We ſhall hereafter deſcribe ſome other approved methods of ſhading.

The learner may proceed gradually from the ſeparate features, to profiles, faces, heads, hands, feet, and limbs of the human figure.

The human figure offering, at once, the moſt intereſting and moſt difficult object of imitation throughout nature or art, we ſhall beſtow our chief attention upon this branch of drawing; aſſuring the ſtudent that whatever labour he may devote to it, will turn to his account in any kind of delineation: an eye and hand that can follow with preciſion the variety contained in the human form, will find but little difficulty in copying any thing elſe.

We ſhall begin with the head. Its general proportions may be ſeen *Plate* II. *figs.* 1. and 2. which we ſhall here explain.

In *front*, the head is of an oval form; the face occupies about three-fourths of its length, and is divided into three equal parts; the fore-head, from the roots of the hair to the eye-brows, is one; thence to the bottom of the noſe, another, and from thence to the bottom of the chin, the third. The ear is as long as the noſe, and ranges within the ſame horizontal lines. The eyes are nearly cloſe under the eye-brows, having the length of one eye between them, and about the ſame diſtance between them and the ears, ſo that the whole of this diameter may be divided into five equal-parts: from the corner of the eye to the top of the noſtril, is alſo the length of an eye; the noſe at bottom is rather narrower, and the mouth rather wider than the ſame length. The opening of the mouth is placed at about one-third of the lower diviſion, leaving two-thirds for the under lip and chin. In profile the face is conſtructed on an equilateral triangle.

Much of the beauty of a face depends on the regularity with which the features are arranged on theſe perpendicular and horizontal lines, under whatever aſpect it may be viewed, (ſee *figs.* 4 and 5.) and this can hardly be effected without ſome knowedge of perſpective. Perſpective is, indeed, of ſuch eſſential importance in expreſſing the appearances of all objects, with regard to the fore-ſhortenings of their lines and maſſes, and the ſhadows they project, that it ſhould form a very early part of the artiſt's ſtudy. After drawing the different geometrical figures, he ſhould learn how to put them in perſpective.

When the learner has practiſed long enough from good examples of heads, &c. to have acquired ſome facility in getting in an outline, and a method of making out ſhadows, we ſhould recommend him to begin his ſtudies from the buſt: the ſooner he is able to undertake this, the better, as he will derive much greater benefit from the imitation of one round object, than of many drawings. The placing a model in ſuch a way as to receive the lights and ſhadows favourably being of great importance to the good effect of the copy, he muſt firſt attend to this circumſtance.

If the model be too directly oppoſed to the light, there will be a want of ſhade to give relief to the projections, and to ſhew thoſe varieties which contribute ſo much to the beauty of forms; if too obliquely, there will be a redundancy of ſhadow, and many of the parts will be loſt in obſcurity. In general, the light is beſt which comes from a ſingle window rather on high and on one ſide. The ſhades ſhould lie in maſſes ſoftening into each other, ſo as to diſplay the parts to advantage, and at the ſame time produce an agreeable whole. The buſt ſhould be raiſed to about the level of the eye, and at ſuch a diſtance as to be comprehended by it at one glance. The ſtudent muſt contrive to place himſelf ſo, that the light fall on his paper from the left, otherwiſe his own hand will overſhade it, and muſt be very careful, every time he looks at his model, to view it under preciſely the ſame aſpect.

Having ſecured a good outline, he may proceed to mark in the darkeſt ſhadows, then the next in ſtrength, and laſtly the more delicate half tints.

As he advances, he muſt examine well the direction of all the lines, and the relative proportions of all the diviſions, taking care when he enlarges one part not to encroach upon others, and continue to add or diminiſh where neceſſary, till he have attained the *poco piu*, *poco meno*, the little more or leſs that conſtitutes correctneſs. In finiſhing, the ſame attention muſt be paid to the ſhapes, quantities, and combinations of light, middle tint, ſhadow, and reflexion, as to the diverſities of the outline. The learner will find ſome difficulty in diſtinguiſhing this delicate modulation of light and ſhade, and eſtimating the degree of *tone* belonging to each part, and practice alone can teach him. It may be uſeful however to remark, that he muſt reſerve his greateſt ſtrength of light and dark for the parts moſt prominent; every light muſt be accompanied and ſupported by its ſhade; the middle tint becomes deeper in tone, as it recedes from the light, till it is loſt in the ſhadow, and the outline is ſoftened into the back ground by reflexions from ſurrounding bodies; the contour therefore muſt not be too ſtrongly marked, otherwiſe the extreme parts, which ſhould retire, will come forward. A *breadth*, or extenſion of middle tint, is always deſirable, as it gives repoſe to the eye, and value both to the lights and darks; this, however, belongs to chiaroſcuro, (ſee the article CHIAROSCURO,) one of the great principles of the art of painting, (literally, the ſyſtem of light and dark in a picture or drawing,) ſomething like a gradation, or balance of which, is neceſſary even in the ſlighteſt ſketch, to make it agreeable, inſomuch, that, if it conſiſt of two lines only, they ſhould not be equally ſtrong.

With reſpect to the various modes of execution uſed in finiſhing drawings, each, perhaps, has advantages when ſkilfully managed.

For heads, red or black chalk is generally adopted, and the ſhadows are made out by hatching, or worked cloſely with the point, ſo as to loſe all appearance of lines, in the manner called by the French *égréné*.

Black lead is ſometimes employed in both theſe ways, but leaves a diſagreeable gloſſineſs. Sometimes the ſhadows are laid in with a ſtump (a piece of ſoft leather rolled up tight and cut to a point) rubbed in powdered chalk, and afterwards hatched upon. The paper is frequently coloured of ſome neutral tint, which affords an opportunity of uſing white chalk for the lights, and black, or black and red, for the ſhadows, leaving the paper for the middle tints; in which caſe, care muſt be taken to keep as much of the ground untouched as poſſible, and never to ſuffer the black and white to mix; the lights may be worked juſt in the ſame way as the ſhades. This is an approach to the ſyſtem of painting in crayons.

The ſhadows are ſometimes made out by waſhing, or tinting the paper with Indian ink, ſepia, or biſtre, laid on with a camel's hair pencil, but we recommend it only to thoſe who have made ſome proficiency in drawing.

This may be done in two different ways; the one that of laying down the ſhades as nearly in their places as poſſible, with a tint ſufficiently dark and ſoftening off the edges with a clean pencil and water; when dry, repeating the proceſs, if neceſſary: the other is by working with tints rather lighter than enough, at firſt, in blotches placed near each other; theſe are blended by a faint waſh over the whole, and when *nearly* dry, ſtrengthened by other blotches in the interſtices, and ſo on, gradually giving the ſhades their due force, and ſhape, leaving the paper for the lights. This mode is called *ſtippling*, and in the hand of an artiſt is, perhaps, the beſt, at leaſt for finiſhed drawings: the other produces a very ſmooth appearance, and may be preferable for the amateur; in both caſes it is adviſeable to work with as large a pencil as convenient, and to have plenty of the ſame tint mixed up for uſe. But which-ever of theſe methods of ſhading, or whatever mixture of them may be adopted, is of little importance compared with the fidelity of the imitation. The term *highly finiſhed* drawing is frequently given to one that is merely elaborate in execution, however deficient in ſcience, but is ſtrictly applicable to thoſe drawings only, in which all the parts of the ſubject are given with their true relative force and ſubordination, ſoftneſs and deciſion, and are ſo exactly copied in their various effects of relief, that a ſculptor might model from them; in which, as in nature, you have all the detail, without loſing the predominance of the whole.

In ſhort, the aim of the ſtudent ſhould be to deceive the eye; this, though not the true end of painting, is the end of drawing, as a practical art.

To delienate the human figure, or its members, with any intelligence, an acquaintance with the bones, and external muſcles and their offices, is eſſential, (ſee ANATOMY,) for though practice may enable him to draw with tolerable accuracy any object that is ſet before him, yet the degree of knowledge he poſſeſſes will inevitably appear to the real connoiſſeur. A conſiderable portion of his labours ſhould, therefore, be devoted to this object. When he is thoroughly exerciſed in copying heads, legs, arms, hands, feet, bodies, and entire figures from the beſt drawings he can procure, anatomical and others, and has had a little experience in imitating *caſts* of the parts, he may venture on a figure from the *round*. That he may acquire, along with correctneſs of eye and obedience of hand, ſome improvement in taſte alſo, and an idea of what is grand or beautiful in the human form, it is highly adviſeable to begin with the ſtudy of the *antique*: the ancients have carried ſymmetry to a perfection which cannot be ſurpaſſed; and as caſts or copies of ſome of their fineſt remains are eaſily obtained, they ſhould, by all means, be the firſt models adopted. It will be previouſly neceſſary too, that the ſtudent make himſelf acquainted with the general proportions of the figure. (See PROPORTIONS.) According to Vitruvius, from the crown of the head to the ſole of the foot, ſhould meaſure ten faces; this is about equivalent to ſeven heads and a half in height, which is a good general ſtature, but varies conſiderably according to the age, ſex, or character of the ſubject: The Caſtor by Phidias on Monte Cavallo exceeds eight heads and a half. Some examples of antique ſtatues will be found among the plates belonging to the article SCULPTURE.

The precepts we have given in reſpect to the head are equally applicable to the figure, requiring only to be extended: care muſt be taken to place the model in a light favourable to a diſtinct and harmonious diſplay of the parts, and, to ſee it properly, the ſtudent ſhould be removed from it at leaſt three times its height. The whole muſt be firſt ſketched in a ſlight and general way, beginning with the head; then drawing in the neck, ſhoulders, breaſts, and trunk, as far as the nips; then the upper part of the arms; then the thighs, and ſo on, downwards, connecting every portion with the preceding, and not purſuing any line too far, but returning to the oppoſite ſide, and carrying on the work as much together as poſſible. When it is all got in, ſurvey it collectively, and make alterations in thoſe parts which are moſt defective, till you have caught the character of the figure; then begin again at the head and proceed in the ſame order to correct your firſt lines, ſcrupulouſly comparing every diviſion with the reſt as to ſhape, quantity, and poſition, both horizontally and perpendicularly; and as this is of the utmoſt importance in getting the true ſway or balance of the figure, it will be expedient for the learner to ſuſpend a plumb-line before him when he is in doubt, and to uſe a ruler, or ſome ſuch thing, for the horizontal examination; attending particularly to the inclination of the head, and the range of the ſhoulders, haunches, knees, and feet, and, laſtly, to the grace or expreſſion of the ſubject. Having made your outline as accurate as poſſible, proceed to finiſh your head in the manner already ſhewn, and ſo on with the reſt, taking care to make the *parts* duly ſubordinate to the *whole*, that the object may be one, according to the laws of chiaroſcuro. A bunch of grapes has been given as an apt illuſtration of this, in which each individual grape, being differently ſituated in the maſs, has its particular light, middle tint, ſhadow and reflection, without diſturbing the unity of the group. It may here be obſerved, that, when drawing on a ſmaller ſcale than your original, there is a neceſſity for marking the ſubdiviſions more delicately, in proportion to the diminution; (the character of forms, as well as of chiaroſcuro, is better conveyed, even by leaving theſe out, than marking them *too* ſtrongly,) this ſubordination eminently contributes to the unity above-mentioned, and to produce what in painting is termed *breadth*.

When the ſtudent is ſo far advanced as to be able to draw with accuracy and facility from caſts, he is qualified to make his firſt eſſays from nature, and it will be adviſeable to take this ſtep as early as convenient, leſt he ſhould fall into a dry and frigid manner, by copying too long from inanimate objects. It is unneceſſary, for this purpoſe, to add to the practical inſtructions we have already laid down; he may proceed exactly in the ſame way as with caſts, but as he cannot expect, in living models, to find the ſtillneſs to which he has hitherto been accuſtomed, a knowledge of the bones, and outer muſcles and their functions, of the proportions, and of perſpective, will now become ſtill more indiſpenſable; without theſe guides he will be continually falling into difficulty and error. We recommend him, however, to return frequently to the antique, to form his taſte in ſymmetry, the principles of which he can acquire from no other ſource, but will afterwards be able to recognize in nature. He muſt refer always to his anatomical ſtudies, to explain thoſe appearances in the human figure which he may not have obſerved in his former models, and comparing them with nature, and with the antique, he may learn from the latter what to modify and what to reject, for deception muſt be no longer his aim, but a ſelected imitation. The antique will lead him to diſtinguiſh what is general from what is merely individual, (the baſis of true taſte,) and will initiate him alſo in the harmony and contraſt of lines and quantities, and furniſh him with a clue for diſcovering the grand, the beautiful, or the characteriſtic in forms. But this belongs to the theory of painting, to which we muſt now refer the ſtudent for further inſtruction.

The next important diviſion of our ſubject is *Landſcape*.

In landſcape drawing, the reduction of the natural objects being ſo great, as to preclude the ſame exactneſs of repreſentation that we have inculcated in reſpect to the human figure, it is obvious that thoſe who wiſh to acquire that great eſſential of the art, accuracy of eye, will do well to make this branch follow the other, in their order of ſtudy: a complete change of ſyſtem, indeed, is neceſſary: as it is impoſſible to trace preciſely all the parts of a tree, a certain mode of imitation muſt be adopted, expreſſive of its general appearance; that is to ſay, its maſſes of light and ſhade, and its principal forms, muſt be carefully attended to, and details introduced here and there to characterize the minutiæ of leaves, branches, &c., and give it an air of truth. After copying ſome good examples of ſketches and finiſhed drawings, to gain a ſtyle of execution, and learning, at leaſt the fundamental rules of perſpective, we ſhould recommend the ſtudent to proceed as quickly as poſſible to nature. It will here be expedient to begin with ſimple ſubjects, as ſeparate ſtudies of different ſpecies of trees, plants, rocks, ſtones, buildings, with cattle and figures to introduce into your compoſitions, it being very ſeldom that any one ſcene will furniſh all the parts of a good landſcape. In taking a view, the portion of country included ſhould not be more than can be conveniently comprehended by the eye without turning the head, nor exceeding perhaps an angle of 60 deg. By extending your paper before you, till it juſt takes in the ſpace you wiſh, you will be able to note upon it the ſituation and proportions of the principal objects; fix the extremes firſt, and the height of the horizon, (which expreſſes the level of the eye,) and then ſketch, *very* faintly, the general form of the larger diviſions; after this draw in the outlines carefully and decidedly at once, the minuteneſs of the parts requiring that they ſhould be marked with as few lines as poſſible, and without alteration; exactneſs being unattainable, the draughtſman muſt aim at conveying the character of every thing with as much truth and ſpirit as poſſible, obſerving to give more detail and more ſtrength of touch as he advances to the foreground. As the fineſt ſcenes are apt to be inſipid without ſome decided chiaroſcuro, while the commoneſt derive pictureſque intereſt from the ſame principle, he ſhould habituate himſelf to ſketch all the ſtriking effects he may ſee in nature. Sunſhine is almoſt eſſential to the animation of landſcape; the morning and evening are to be preferred, in general, from affording more light and ſhade; where this is wanting, a ſubſtitute muſt be found in objects, dark or bright in themſelves, to create an agreeable balance. The choice and application of theſe circumſtances is to be learned from painting. The outlines are ſometimes put in with a pen, but this ſhould be done on the ſpot; it is adviſeable never to alter the lines put in from nature, as it is ſcarcely poſſible to go over them again, from recollection, without injuring their ſpirit. The ſhadows may afterwards be made out by hatching, or waſhed in with biſtre, ſepia, or Indian ink. A greyiſh paper is ſometimes uſed, the lights being made out with white chalk, the ſhadows with black; this is a very good and expeditious method. To *waſhed* drawings a ſlight tinge of colour is ſometimes given, in which caſe they are called *tinted* drawings; this is the firſt ſtep towards painting, but we ſhould not adviſe the uſe of colours till the ſtudent has ſome proficiency of execution in chiaroſcuro. See *Plates* VIII. IX. X.

Having ſaid ſo much on the two principal branches of drawing, the human figure and landſcape, it will be unneceſſary to enter into the particular conſideration of any other, the rules laid down for theſe being applicable to all. The ſtudy of animals may be purſued like that of the human figure; their anatomy muſt be acquired, and their characters ſtudied from nature. Drapery, ſtill life, flowers, &c., need no further precepts than thoſe already given. Architectural drawing and machinery proceed entirely by the mechanical aid of rule and compaſs.

We ſhall conclude this article with obſerving, that the great *deſideratum* in every kind and ſtyle of drawing, is a characteriſtic repreſentation of its ſubject, however ſlightly indicated, for the want of which no beauty of workmanſhip, no high finiſhing, as it is falſely called, can ever atone; this muſt depend on correctneſs of eye, facility of hand, and a competent knowledge of the ſubject: if to theſe we add juſt feeling and good taſte, we ſhall comprehend all the requiſites of a complete draughtſman.

Drawing, or *Deſign*, is alſo technically uſed for that part of painting which is employed in expreſſing the forms of objects, and, in its perfection, implies ſymmetry, congruity of character, anatomical correctneſs, and truth of proportion, equilibrium and perſpective, in the figures of a picture.

The revivers of painting in the 13th century followed the meagre taſte in drawing of the Greek artiſts, their immediate predeceſſors, and appear to have ſelected for their models the moſt emaciated objects in nature. Donatello and Luca Signorelli broke through this in a great degree; and its overthrow was completed by Michael Angelo. It required, however, two centuries to get entirely the better of this ſtrange poverty of ſtyle. Michael Angelo himſelf, when he deſigned his celebrated Cartoon of Piſa, if we may judge from the Holkham copy, (which has every appearance of being an accurate tranſcript,) had not then adopted that fulneſs of form which characterizes his ſubſequent works, and which he probably derived from ſome fine fragments of antiquity diſcovered in his time, particularly the *torſo*. The ſight of the Siſtine chapel produced in Raffaelle an immediate change from the Gothic taſte of his maſter Pietro Perugino, in which he commenced, and he ſeems to have been ſo pleaſed with this new ſtyle, as ſometimes to carry it to exceſs; he uſually ſurpaſſed his rival in grace, though he never equalled him in energy or grandeur. Drawing degenerated rapidly with the ſucceſſors of theſe two great men. After Guilio and Polidoro, the Roman ſchool fell into inſipidity, and the Florentine endeavouring to imitate Michael Angelo, became tumid and extravagant. Correggio and Parmeggiano, ſeduced by beauty of line, too often ſacrificed correctneſs to elegance. The Carraci at Bologna compoſed a ſort of middle ſtyle, in which they attempted to obviate all theſe defects; but it was heavy, and poſſeſſed little ſentiment or character, though it has become the common-place hiſtorical *manner* of almoſt all their ſucceſſors, and we may add, of moſt academies in other parts of Europe. Lodovico Carraci, and Domenichino, are the beſt of this ſchool, in regard to purity of taſte. Pouſſin adopted another ſtyle, founded on a cloſe imitation of the antique ſtatues, but acquired too much of the hardneſs of the material in which they are wrought, without attaining, in general, their grace or ſymmetry. The preſent French ſchool have puſhed this ſtill further, and fill their pictures with frigid copies of all the *ideal* forms of the ancients. The *antique*, however, muſt always be conſidered the great ſource of true taſte in drawing. It is here the artiſt may learn to ſeparate the eſſential and generic from the accidental and individual, the great principle of the ſuperiority of the ancients over the moderns, how much of this which is properly called *ſtyle*, may be adopted in painting, is a queſtion of ſome nicety: Rubens has expreſſed his admiration of the ancient ſtatues, and given his opinion how far they may be ſtudied with advantage by a painter, in a treatiſe quoted by Du Piles, but ſeems to have wholly neglected them in his practice. In this country, as it was formerly in the Venetian ſchool, drawing is conſidered as the leaſt important part of painting; fine tones and impoſing effects compenſate for all omiſſions of this kind. The pre-eminent talents of the late ſir J. Reynolds have probably not a little contributed to give this direction to the taſte of the Engliſh ſchool; his ſucceſsful example, though utterly at variance with his precepts, added to the natural faſcination of colour and chiaroſcuro, has made the ſenſual triumph over the intellectual part of the art, and it is the more to be regretted, as he has merely left his followers to labour in a mine which he himſelf had almoſt exhauſted. But in ſpite of faſhion or indolence, it may be ſafely affirmed, that drawing is the ſoul of beauty, character, and expreſſion, and that its neglect will inevitably be followed by the extinction of all the higher ſtyles of painting.

Drawing, among *Hunters*, is, when they beat the buſhes after a fox. The term is alſo applied to hounds who ſearch for hares or deer in covers and furze, buſhes, &c.

Drawing *amiſs* is, when the hounds, or beagles, hit the ſcent of their chace the contrary way, ſo as to purſue it up the wind, when they ſhould have done it down the wind. The huntſman, on firſt finding a fox, ſhould draw quietly, and *up the wind;* this is ſaid to be material. The fox, by drawing up the wind, does not hear the approach of the hounds, who by this means are alſo within hearing: beſides, if the fox ſhould turn down the wind, as moſt probably he will, it lets the hounds all in. See Scent. See alſo *Fox*-hunting.

Drawing *on the ſlot* is, when the hounds touch the ſcent, and draw on, till they rouſe, or put up the chace.

Drawing, *fine*. See Fine *Drawing*.

Drawing *out Ships Bolts*. See Bolts.

Figs. 1, 2, 3, 4, of *Plate* XXIII. *Mechanics*, repreſent a machine for this purpoſe, invented by Mr. W. Hill, who was rewarded with 40 guineas by the Society of Arts, London.

The power to draw out the bolt is obtained by two ſtrong male ſcrews, A, A, *figs.* 1 and 2, working in female ſcrews near the extremities of the cheeks B, B, againſt plates of iron, *e, e*.

C, the bolt to be drawn, which, being held between the chaps D, D, of the machine, (*fig.* 1.) is, by turning the ſcrews A, A, by a lever, forced upwards out of the wood, or plank of the ſhip. F, F, *fig.* 2, are two iron dogs, with hooks at their lower extremities, which being driven into the plank, ſerves to ſupport the machine till the chaps have got faſt hold of the bolt. At the upper parts of theſe dogs are rings, paſſing through holes in a collar, moveable near the heads of the ſcrews.

Fig. 4, is a plan of the upper ſide of the cheeks, when joined together; *a, a*, the holes in which the ſcrews A, A, work; B, B, the cheeks by which the bolts are drawn.

Fig. 3, the under ſide of the cheeks; *a, a*, the holes in which the ſcrews work; D, D, the chaps by which the bolts are drawn.

Under the article Bolts we have given an account of Mr. Bolton's machine for drawing out and drawing in bolts, which was rewarded by the Society of Arts with their gold medal.

DRAXHOLM, in *Geography*, a ſmall town of Denmark, in Zealand, which gives its name to the circle of Draxholm, and has an ancient caſtle, remarkable for having ſerved as a priſon to ſeveral ſtate priſoners, and, among others, to the wicked John Hepborne, earl of Bothwell, huſband of Mary queen of Scotland, who was confined here in the year 1576.

DRAY, a name given by ſportſmen to ſquirrel neſts, built on the tops of trees. See Squirrel.

Dray is alſo a cart uſed by brewers to carry beer on; likewiſe a ſledge without wheels.

Dray-*Plough*. See Plough.

DRAYTON, Michael, in *Biography*, an Engliſh poet, was born at Hartſhill, a village in Warwickſhire, in 1563. He ſtudied at Oxford, but with what particular view is not known. During the reign of queen Elizabeth he became known by various poetical publications, which obtained for him patrons, to whoſe liberality he acknowledged himſelf much indebted. On the acceſſion of James I. he attempted an ode in honour of the occaſion; but he ſucceeded ſo ill as to cut off all the hopes of preferment which he had indulged. He died in 1631, and was honoured with a tomb among the poets in Weſtminſter Abbey. In one of his own title-pages he is ſtyled poet laureat; but his name is not in the liſt of thoſe who have poſſeſſed the court office to which the title of laureat has in modern times been appropriated. From his various dedications, it ſhould ſeem that he enjoyed the favour of ſeveral noble families, particularly of that friend to literature, Sackville earl of Dorſet, who was at that period lord chamberlain. "Drayton," ſays his biographer, "is one of the moſt fertile Engliſh poets, and the moſt original and truly national in his ſubjects." Moſt of his pieces are derived from Engliſh hiſtory; but his principal performance is entitled "Polyolbion," which is a kind of ſyſtem of the geography and antiquities of England and Wales. To the modern reader this would appear tedious, but the learned Selden thought it worthy of annotations. His works were publiſhed twice during the laſt century, once in folio in 1748, and afterwards in four volumes, 8vo. The deſign of his poetry is evidently better than its execution. The variety is, however, conſiderable, the ſubjects often animating, the language and verſification are not ſo antiquated as might be expected; but the marks of true genius are rarely diſplayed. With occaſional inſtances of elevation and beauty, the general run of his verſe is proſaic and inſipid. Biog. Brit.

Drayton, in *Geography*, a town of England, in the county of Salop, with a weekly market on Wedneſday; 18 miles N.W. of Stafford, and 159$\frac{5}{8}$ N.W. of London.

DREAMS. According to Wolfius every dream takes its riſe from ſome ſenſation, and is continued by the ſucceſſion of phantaſms in the mind. His reaſons are, that when we dream we imagine ſomething, or the mind produces phantaſms; but no phantaſm can ariſe in the mind without a previous ſenſation: hence neither can a dream ariſe without ſome previous ſenſation. He obſerves farther, that though it be certain *à priori*, from the nature of the imagination, that dreams muſt begin by ſome ſenſation, yet that it is not eaſy to confirm this by experience; it being often difficult to diſtinguiſh thoſe ſlight ſenſations, which give riſe to dreams, from phantaſms, or objects of imagination. Yet this is not impoſſible in ſome caſes, as when the weak ſenſation ſufficient to give riſe to a dream gradually becomes ſtronger, ſo as to put an end to it, as it often happens in uneaſy and painful ſenſations. Wolf. Pſychol. Empir. § 123.

The ſeries of phantaſms, or objects of imagination, which conſtitute a dream, ſeem to be ſufficiently accounted for from the law of imagination, or of aſſociation; though it may be extremely difficult to aſſign the cauſe of every minute difference, not only in different ſubjects, but in the ſame, at different times, and in different circumſtances. We have an eſſay on this ſubject by M. Formey, in the Mem. de l'Acad. de Berlin. tom. ii. p. 316. He expreſsly adopts Wolfius's propoſition above mentioned, that every dream begins with a ſenſation, and is continued by a ſeries of acts of imagination, or phantaſms; and that the cauſe of this ſeries is to be found in the law of the imagination. "Si naturale ſomnium eſt, initium capere debet per legem ſenſationis, & continuari per legem imaginationis." Hence he concludes thoſe dreams to be ſupernatural, which either do not begin by ſenſation, or are not continued by the law of the imagination.

This opinion is as ancient as Ariſtotle, who expreſsly aſſerted, that a dream is only the φαντασμα, or *appearance* of things, ariſing from the previous motions excited in the brain, and remaining after the objects are removed. Hobbes has adopted this hypotheſis: he aſcribes different dreams to different diſtempers of the body, and whimſically enough obſerves, that lying cold breedeth dreams of fear, and raiſeth the thought and image of ſome fearful object. Thus he accounts for that which was in reality the waking viſion of Brutus, which addreſſed him the night before the battle of Philippi. "I am, Brutus, thine evil genius; but thou ſhalt ſee me again near Philippi." And Mr. Locke, though he does not expreſsly declare how dreams are excited during ſleep, ſeems to aſcribe the perfection of rational thinking to the body; and traces their origin to previous ſenſations, when he ſays, "The dreams of ſleeping men are all made up of the waking man's ideas, though for the moſt part oddly put together." He urges the incoherence, frivolouſneſs, and abſurdity, of many of our dreams, as well as the ſuppoſed fact that ſome ſleep without dreaming, as objections to the notion that men think always: to which it has been replied, that dreams may be entirely, imperfectly, or not at all remembered, according to the various degrees in which the nerves are impreſſed by the motion given to the animal ſpirits in ſleep. Ariſt. de Inſomn. cap. 3. Hobb. Lev. cap. 2. & cap. 45. Locke, Eſſ. book ii. ch. i. § 10, &c. Watt's Eſſ. § 2. p. 120, &c. Dr. Hartley explains all the phenomena of the imagination by his theory of vibrations and aſſociations. Dreams, he ſays, are nothing but the imaginations or reveries of ſleeping men, and they are deducible from three cauſes, *viz.* the impreſſions and ideas lately received, and particularly thoſe of the preceding day, the ſtate of the body, and particularly of the ſtomach and brain, and aſſociation.

That dreams are, in part, deducible from the firſt of theſe cauſes, appears, he ſays, from the frequent recurrence of theſe in greater or leſſer cluſters, and eſpecially of the viſible ones, in our dreams; more eſpecially when they are recent: whereas, in general, ideas that have not affected the mind for ſome days recur, in dreams, only from the ſecond or third cauſe above aſſigned. That the ſtate of the body affects our dreams is evident from the dreams of ſick perſons, and of thoſe who labour under indigeſtions, ſpaſms, and flatulencies. We may alſo perceive ourſelves to be carried on from one thing to another in our dreams partly by aſſociation. For the purpoſe of ſolving the moſt uſual phenomena of dreams upon theſe principles, this ingenious author obſerves, that the ſcenes which preſent themſelves are taken to be real:—that in our dreams there is a great degree of wildneſs and inconſiſtency:—that we do not take notice of, or are affected at, theſe inconſiſtencies, but paſs on, without heeding them, from one to another:—that in dreams it is common for perſons to appear to themſelves to be transferred from one place to another, by a kind of ſailing or flying motion, which ariſes from the change in the apparent magnitude and poſition of the images excited in the brain, the change being ſuch as a change of diſtance and poſition in ourſelves would have occaſioned:—that dreams conſiſt chiefly of viſible imagery, which agrees remarkably with the perpetual impreſſions made upon the optic nerves and correſponding parts of the brain during vigilance, and with the diſtinctneſs and vividneſs of the images impreſſed; and this viſible imagery in dreams is compoſed, in a conſiderable degree, of fragments of viſible appearances lately impreſſed:—that many of the things which are preſented in dreams appear to be remembered by us, or, at leaſt, as familiar to us; and that this may be ſolved by the readineſs with which they ſtart up, and ſucceed one another, in the fancy:—that dreams ought to be ſoon forgotten, as they are in fact, becauſe the ſtate of the brain ſuffers great changes in paſſing from ſleep to vigilance:—and that the dreams which are preſented in the firſt part of the night are, for the moſt part, much more confuſed, irregular, and difficult to be remembered, than thoſe which occur towards the morning; and theſe laſt are often rational to a conſiderable degree, and regulated according to the uſual courſe of our aſſociations: for the brain then begins to approach to the ſtate of vigilance, or that in which the uſual aſſociations were formed and cemented. For the illuſtration and proof of theſe obſervations we muſt refer to the author himſelf. Obſ. on Man, § 5. p. 226, &c. 4to. ed. 1791.

Democritus and Lucretius account for dreams, by ſuppoſing that ſpectres and ſimulacra of corporeal things, conſtantly emitted from them, and floating up and down in the air, come and aſſault the ſoul in ſleep. Lucret. De Rer. Nat. lib. iv.

Thoſe who have maintained the eſſential difference between ſoul and body have ſolved the common phenomena of dreams by the union of theſe two ſubſtances, and the neceſſary connection ariſing thence between ideas in the mind, and certain motions in the body, or in thoſe parts more immediately united to the ſoul; whilſt others, who have denied the exiſtence of matter, account for them in the ſame manner as for our other ideas, which may not be improperly called waking dreams.

A learned author has aſſerted, that our dreams are prompted by ſeparate immaterial beings; an opinion which was advanced long ago by the heathens, and maintained very generally, and applied to a ſpecies of divination. He contends, that the phantaſm, or what is properly called the viſion, is not the work of the ſoul itſelf, and that it cannot be the effect of mechanical cauſes; and therefore aſcribes it to ſeparate ſpirits, having acceſs to our minds, and furniſhing us with ideas while we ſleep. See Mr. Baxter's Eſſay on the Phen. of Dreaming, in his Inquiry into the Nature of the human Soul, vol. ii. 3d edit. 1745.

Biſhop Newton, "On Dreams," (Works, vol. iii. p. 180, &c. 8vo. ed.) adopts the hypotheſis of Mr. Baxter; alleging that the irregularity of our dreams may proceed from the indiſpoſition of the organ rather than from the imperfection of the agent, from ſome obſtruction in the brain or ſenſory, than from any incapacity in the ſpirit at that time acting upon the ſenſory; and endeavouring to obviate that tendency to encourage ſuperſtition, with which it has been, not unjuſtly, charged. Speaking of dreams, that have been of a prognoſticating kind, he ſays, "Have not ſuch dreams confeſſedly ſomething of *divine* in them, and do they not plainly declare a ſpiritual original? and ſhall we aſcribe ſome to ſpiritual and ſome to material cauſes? or ſhall we not rather be more conſiſtent with ourſelves, and ſuppoſe that good ſpirits may inſpire ſome, as evil ſpirits may excite others?" He adds, "It is a ſentiment as old as Homer (Il. i. 63.), that dreams are from Jupiter; and the beſt and wiſeſt authors of antiquity ſpeak the ſame language. Nay, what is more, the Scriptures themſelves, the oracles of truth, ſpeak always of dreams and viſions as proceeding from God immediately or mediately, by his inſpiration, or by the agency of angels and ſpirits through his permiſſion; and the worſe ſort of dreams is expreſsly attributed to the ſame cauſe, as well as the better. Job, vii. 13, 14."

Profeſſor Dugald Stewart has, with his uſual acuteneſs and perſpicuity, diſcuſſed the ſubject of dreaming in his "Elements of the Philoſophy of the Human Mind," (ch. v. p. 1. § 5.) He begins with ſtating three different queſtions that may be propoſed with reſpect to the phenomena of dreaming; they are as follow: What is the ſtate of the *mind* in ſleep, or, what faculties then continue to operate, and what faculties are then ſuſpended? How far do our dreams appear to be influenced by our bodily ſenſations; and in what reſpects do they vary, according to the different conditions of the body in health, and in ſickneſs; and what is the change which ſleep produces on thoſe parts of the *body*, with which our mental operations are more immediately connected, and how does this change operate in diverſifying, ſo remarkably, the phenomena which our minds then exhibit, from thoſe of which we are conſcious in our waking hours? The ſecond of theſe queſtions, which belongs to the medical inquirer, will be diſcuſſed in a ſeparate article; and the third relates to a ſubject, which ſeems to be placed beyond the reach of the human faculties. With regard to the firſt inquiry, which alone belongs to the philoſophy of the human mind, or the ſtate of the *mind* in ſleep, it ſeems reaſonable to expect, ſays the ingenious profeſſor, that ſome light may be obtained from an examination of the circumſtances which accelerate or retard its approach; for when we are diſpoſed to reſt, it is natural to imagine, that the ſtate of the mind approaches to its ſtate in ſleep, more nearly than when we feel ourſelves alive and active, and capable of applying all our various faculties to their proper purpoſes. The approach of ſleep is accelerated by every circumſtance which diminiſhes or ſuſpends the exerciſe of the mental powers, and is retarded by every thing which has a contrary tendency. When we wiſh for ſleep, we diſengage our attention, as much as poſſible, from every intereſting ſubject of thought. Moreover, if we examine the particular claſs of ſounds, which compoſe us to ſleep, ſuch as the hum of bees, the murmur of a fountain, and the reading of an unintereſting diſcourſe, we ſhall find that it conſiſts of thoſe that are adapted to withdraw the attention of the mind from its own thoughts. It has been alſo obſerved, that children and perſons of little reflection, who are occupied about ſenſible objects, and whoſe mental activity is, in a great meaſure, ſuſpended, as ſoon as their perceptive powers are unemployed, find it difficult to continue awake, when they are deprived of their uſual engagements. This has been remarked to be the caſe with regard to ſavages, whoſe time, like that of inferior animals, is almoſt wholly divided between ſleep and their bodily exertions. From theſe facts our author concludes, that in ſleep thoſe operations of the mind are ſuſpended, which depend on our volition. Accordingly, the difference between the ſtate of the mind, when we are inviting ſleep, and when we are actually aſleep, is this; that, in the former caſe, although its active exertions be ſuſpended, we can renew them, if we pleaſe: and in the other caſe, the will loſes its influence over all our powers both of mind and body, in conſequence of ſome phyſical alteration in the ſyſtem, which we ſhall never, probably, be able to explain. Admitting the ſuſpenſion of our voluntary operations in ſleep as a fact, its cauſe may be either the ſuſpenſion of the power of volition, or the will's loſs of influence over thoſe faculties of the mind and thoſe members of the body, which, during our waking hours, are ſubjected to its authority. The firſt of theſe cauſes not being agreeable to fact, the latter muſt be admitted, as a neceſſary conſequence. That the power of volition is not ſuſpended during ſleep appears from the efforts which we are conſcious of making while we are in that ſituation. Many inſtances might be adduced to this purpoſe. The ſame concluſion may be otherwiſe confirmed. When we are anxious to procure ſleep, the means to which nature directs us on ſuch occaſions are not to ſuſpend the power of volition, but to ſuſpend the exertion of thoſe powers, whoſe exerciſe depends on volition. Beſides, the effect which is produced on our mental operations is analogous to that which takes place with regard to our bodily powers. In ſleep the body appears to be, in a very inconſiderable degree, if at all, ſubject to our command. However, the vital and involuntary motions ſuffer no interruption. In like manner, the operations of the mind, depending on our volition, ſeem to be ſuſpended, whilſt ſome other operations are, at leaſt occaſionally, carried on. This analogy naturally ſuggeſts the idea, that *all* our mental operations, which are independent of our will, may continue during ſleep; and that the phenomena of dreaming may, perhaps, be produced by theſe, diverſified in their apparent effects, in conſequence of the ſuſpenſion of our voluntary powers. Moreover, the train of thought in the mind does not depend *immediately* on our will, but is regulated by certain general laws of aſſociation. Nevertheleſs, the *indirect* influence, which the mind poſſeſſes over its train of thoughts, is ſo great, that during the whole time of our being awake, excepting in thoſe caſes in which we fall into what is called a reverie, and ſuffer our thoughts to follow their natural courſe, the order of their ſucceſſion is regulated more or leſs by the will. In ſleep, ſays our author, the ſucceſſion of our thoughts, ſo far as it depends on the laws of aſſociation, may be carried on by the operation of the ſame unknown cauſes by which it is produced while we are awake; but the order of our thoughts, in theſe two ſtates of the mind, muſt be very different; inaſmuch, as in the one, it depends ſolely on the laws of aſſociation, and in the other, on thoſe laws combined with our voluntary exertion. He then proceeds to ſhew, that the ſucceſſion of our thoughts in ſleep is regulated by the ſame general laws of aſſociation, which influence the mind while we are awake; and that the circumſtances which diſcriminate dreaming from our waking thoughts, are ſuch as muſt neceſſarily ariſe from the ſuſpenſion of the influence of the will. In proof of the firſt propoſition it is alleged, that our dreams are frequently ſuggeſted to us by bodily ſenſations, and with theſe, particular ideas are frequently very ſtrongly aſſociated. Our dreams are alſo influenced by the peculiar temper of the mind, and generally vary, in their complexion, according as our habitual diſpoſition, at the time, inclines us to cheerfulneſs or melancholy: and our dreams are influenced by our prevailing habits of aſſociation, while awake. In proof of the ſecond propoſition our author obſerves, that if the influence of the will be ſuſpended during ſleep, all our voluntary operations, ſuch as recollection, reaſoning, &c. muſt alſo be ſuſpended, which appears to be the caſe from the extravagance and inconſiſtency of our dreams: the mind will alſo remain as paſſive, while its thoughts change from one ſubject to another, as it does during our waking hours, while different perceptible objects are preſented to our ſenſes: and, in the caſe here ſuppoſed, of the ſuſpenſion of the influence of the will during ſleep, the conceptions which we then form of ſenſible objects will be attended with a belief of their real exiſtence, as much as the perception of the ſame objects is while we are awake. To this purpoſe it is obſerved, that as the ſubjects, which we then think upon, occupy the mind excluſively, and as the attention is not diverted by the objects of our external ſenſes, our conceptions muſt be proportionably lively and ſteady. As there is no ſtate of the body in which our perceptive powers are ſo totally unemployed as in ſleep, it is natural to think, that the objects which we conceive and imagine, muſt then make an impreſſion on the mind, beyond compariſon greater than any thing of which we can have experience while awake. Our author's principles afford a ſatisfactory explanation of what ſome writers have repreſented as the moſt myſterious of all circumſtances connected with dreaming, *viz.* the inaccurate eſtimate of time which, whilſt we are thus employed, we are apt to form; ſo that ſometimes a ſingle inſtant has the appearance of hours, or perhaps, of days. A ſudden noiſe, for inſtance, ſuggeſts a dream connected with that perception; and the moment afterwards this noiſe has the effect of awaking us; and yet, during that momentary interval, a long ſeries of circumſtances has paſſed before the imagination. In accounting for theſe facts, ſome have ſuppoſed, that, in our dreams, the rapidity of thought is greater than while we are awake; but this ſuppoſition our author thinks to be needleſs. In ſleep, he ſays, the conceptions of the mind are miſtaken for realities; and, therefore, our eſtimates of time will be formed, not according to our experience of the rapidity of thought, but according to our experience of the time requiſite for realizing what we conceive.

In caſes where our ſleep ſeems to be complete, the mind loſes its influence over all thoſe powers, the exerciſe of which depends upon its will; but there are many caſes, in which ſleep ſeems to be partial, or where the mind loſes its influence over ſome powers, and retains it over others. In the caſe of the *ſomnambuli* it retains its power over the limbs, but poſſeſſes no influence over its own thoughts, and ſcarcely any over the body, except thoſe particular members of it which are employed in walking. In madneſs, the power of the will over the body remains undiminiſhed, while its influence in regulating the train of thought is in a great meaſure ſuſpended, either in conſequence of a particular idea, which engroſſes the attention to the excluſion of every thing elſe, and which we find it impoſſible to baniſh by our efforts; or in conſequence of our thoughts ſucceeding each other with ſuch rapidity, that we are unable to ſtop the train. In both theſe kinds of madneſs, the conceptions or imaginations of the mind become independent of our will, and therefore they are apt to be miſtaken for actual perceptions, and to affect us in the ſame manner.

Profeſſor Stewart has ſubjoined, in his notes and illuſtrations (Ed. 2. p. 570, &c.) ſome additional remarks on the phenomena of dreaming, which ſeem to obviate the difficulties attending his hypotheſis. In caſes, he ſays, where our dreams are occaſioned by bodily ſenſations, or by bodily indiſpoſition, it may be expected that the diſturbed ſtate of our reſt will prevent that total ceſſation of the power of attention, which takes place when ſleep is profound and complete; and, in ſuch inſtances, the attention which is given to our paſſing thoughts, may enable us afterwards to retrace them by an act of recollection. On the other hand, the more general fact unqueſtionably is, that at the moment of our awaking, the interval ſpent in ſleep preſents a total blank to the memory; and yet it happens, not unfrequently, that, at the diſtance of hours, ſome accidental circumſtance occurring to our thoughts, or ſuggeſted to us from without, revives a long train of particulars aſſociated in the mind with each other; to which train (not being able otherwiſe to account for the concatenation of its parts) we give the name of a *dream*.

Among the aſtoniſhing appearances exhibited by the mind in ſleep, a very large proportion is preciſely analogous to thoſe of which we are every moment conſcious while we are awake. If the exciting cauſes, for example, of our dreams ſeems myſterious and inſcrutable, is not the fact the ſame with the origin of every idea or thought which ſpontaneouſly ſolicits our notice? The only difference is, that in the latter inſtance, in conſequence of long and conſtant familiarity, they are ſurveyed by us with little wonder, and by moſt with hardly any attention. In the former inſtance, they rouſe the curioſity of the moſt illiterate, from their comparative infrequency, and from the contraſt which, in ſome reſpects, they preſent to the reſults of our habitual experience.

Dreams, in *Pathology*. Dreaming is much influenced by the phyſical condition of the body; and therefore dreams of various character, and of different degrees of intenſity, are among the effects and ſigns of various diſeaſes. They may be traced by the medical obſerver in all the gradations, from a common dream, produced by any cauſe of imperfect ſleep, up to actual Delirium, as well as under the varieties of Night mare, Somnambulism, &c. See thoſe articles reſpectively.

Some writers, as Wolſius, (Pſycholog. Empir. § 123.) and after him Formey, (in the Hiſt. de l'Academie de Berlin, tom. ii.) have conſidered all dreams as originating in ſome corporeal ſenſation, and continued by the imagination, by ſucceſſive phantaſms, which ariſe according to the law of this faculty. Hartley not only more fully developed the nature of this law of *aſſociation*, by which our dreams are carried on, but he admitted the recurrence of recent ideas, eſpecially of thoſe of the preceding day, as frequently giving origin to dreams, as well as various corporeal ſenſations, particularly in the head and ſtomach. We have ſhewn, under the word DELIRIUM, how much our dreams are modified or produced by external impreſſions, as well as by internal ſenſations, and have quoted ſome caſes in illuſtration, from Mr. Smellie's (then erroneouſly called *Stewart's*) Philoſophy of Natural Hiſtory. It remains for us here to point out the more obvious phyſical conditions, under various ſtates of diſeaſe, in which dreams are particularly increaſed both in frequency and force.

Diſeaſes give occaſion to unuſual dreaming in two ways: firſt, by inducing various internal ſenſations, connected eſpecially with morbid conditions of the circulation and of the nervous ſyſtem; and, ſecondly, by rendering the ſleep imperfect, and, therefore, leaving the mind in that ſtate of activity, in which not only the internal feelings, but alſo the external impreſſions on the ſenſes, become the origin of trains of aſſociated ideas, which conſtitute our dreams, and likewiſe admitting the recurrence of thoſe thoughts, which had particularly occupied the mind before the commencement of ſleep.

1. All febrile diſeaſes, and eſpecially idiopathic fevers, in which both the nervous ſyſtem and the circulation are greatly deranged, and the general feelings are always uncomfortable, often extremely diſtreſſing, are accompanied from the beginning with frequent and diſagreeable dreams. It is chiefly under the various forms of fever that the dreams extend to that degree which conſtitutes delirium, when the internal feelings become highly irritated, and eſpecially when the circulation through the brain, in its then morbid condition, is particularly excited. Any derangement of the circulation in the head, indeed, occaſions much dreaming. The approaches of ſymptomatic fever, however ſlight; even the temporary acceleration of the blood from an evening of exerciſe in the ball-room, or from exceſs in drinking, ſhort of intoxication, or from any other cauſe of excitement, will produce a ſucceſſion of dreams through the night; moſt commonly of an unpleaſant nature, but ſometimes agreeable, according to the general ſtate of the ſenſations: the febrile dreams are, from this cauſe, almoſt invariably unpleaſant.

Dreams are alſo generally among the ſymptoms of thoſe diſeaſes, which derange the circulation through the brain in a manner, different from that of unuſual excitement; and eſpecially where there is ſome diſtreſſing corporeal ſenſation. Thus in *peripneumony*, *aſthma*, *hydrothorax*, &c. in which the pulmonary circulation is obſtructed, the blood is prevented from undergoing its proper changes, and the circulation in the head is alſo neceſſarily impeded, the veſſels of the brain being diſtended with blood imperfectly altered by reſpiration, dreams of a painful and alarming nature, from which the patient awakes in fear and by ſtarting, are conſtant occurrences. The horrors with which theſe dreams are accompanied, and the ſudden interruption of repoſe in which they terminate, are doubtleſs to be attributed to the diſtreſsful ſenſations in the cheſt, which ariſe from imperfect breathing, and from the obſtruction to the free motion of the heart. The feelings of impending ſuffocation, the ſenſations of conſtriction, of weight, and of ſtuffing in the lungs, the laborious and palpitating action of the heart, and the anxiety about the præcordia, which render the waking hours of the patient painful to himſelf, and his ſituation diſtreſſing to ſpectators, continue during his ſhort and imperfect intervals of repoſe, and excite thoſe perpetual images of terror, which conſtitute his dreams: and when the corporeal feelings and the phantaſms of the imagination become at once too painful to be conſiſtent with ſleep, the ſleep is ſuddenly interrupted, and the patient ſeeks, by change of poſition, to relieve for a while the ſenſations, in which his dreams originated.

Again, the ſtomach is a common, perhaps the moſt common ſeat of thoſe corporeal ſenſations, which give origin to our dreams, as Hartley has intimated. In thoſe perſons, whoſe powers of digeſtion are weak, a ſeries of dreams, generally of an unpleaſant nature, uſually occur during the night, if they have taken a heavy ſupper immediately preceding ſleep. The ſtomach being loaded and oppreſſed, is the ſeat of uneaſy feelings, and its diſtenſion ſomewhat impedes the motions of the heart and lungs, by which thoſe feelings are much augmented. It is chiefly under ſuch circumſtances, that the dreams amount to that diſtreſſing degree, which is denominated *incubus*, or NIGHT-MARE. Dr. Darwin obſerves, that great fatigue, with a full ſupper and much wine, always produced the night-mare in one of his patients. The ſtomach, in ſuch a caſe, partakes of the fatigue of the body at large, and therefore is the leſs able to digeſt, and rid itſelf of the maſs of food which oppreſſes it. The ſtate of the ſtomach from drunkenneſs, the poſition of the body in bed, and other kinds of uneaſineſs during ſleep, give riſe to night-mare, and to the leſſer degrees of unpleaſant dreaming.

2. It can ſcarcely be doubted, that all thoſe morbid, or accidental conditions of the body, which, by the painful ſenſations which they induce, occaſion much dreaming, contribute to that effect, likewiſe, in no ſmall degree, by rendering the ſleep imperfect. It muſt be within the compaſs of every perſon's experience, that his dreams principally occur at the commencement, or towards the termination of ſleep, eſpecially during the dozing of the morning hours, and when his ſleep is any how diſturbed. Prof. Stewart has obſerved, that many people "never recollect to have dreamed, excepting when the ſoundneſs of their ſleep was diſturbed by ſome derangement in their general health, or by ſome accident which excited a bodily ſenſation." (Elem. of the Philoſophy of the Human Mind, p. 570, 3d edit.) Whether dreams do not occur in ſound ſleep; or whether they occur, but are not recollected, except when the ſleep is imperfect, is a queſtion which does not affect our reaſoning here.

All the diſorders, then, above alluded to, may be conſidered as exciting dreams in a twofold manner: firſt, they render ſleep unſound, and, therefore, favour the occurrence of dreams; and, ſecondly, by the diſagreeable ſenſations connected with them, they contribute to excite particular trains of aſſociated ideas, and, therefore, to modify the character of the dreams.

Beſides, in imperfect ſleep, the attention is, in a certain degree, alive to external impreſſions on the ſenſes, which become an additional ſource of excitement of our dreams. Under ſuch a ſtate of unſound ſleep, our dreams are often ſuggeſted to us by external bodily ſenſations, with which, as we know from what we experience while awake, particular ideas are frequently very ſtrongly aſſociated. "I have been told by a friend," ſays profeſſor Stewart, "that having occaſion, in conſequence of an indiſpoſition, to apply a bottle of hot water to his feet when he went to bed, he dreamed that he was making a journey to the top of mount Ætna, and that he found the heat of the ground almoſt inſupportable. Another perſon, having a bliſter applied to his head, dreamed that he was ſcalped by a party of Indians." Loc. cit. chap. v. § 5. In the ſame way various dreams are conſtantly excited during imperfect ſleep, by external ſenſations. See ſome ſimilar examples under the article Delirium.

This imperfect ſleep, likewiſe, admits of thoſe dreams which originate from the recurrence of the accuſtomed trains of thought, eſpecially thoſe of the preceding day, as obſerved by Hartley; the faculties of the mind, in ſuch a ſtate of ſleep, being partially active, particularly the faculty of attention. Stewart, loc. cit.

Hence, it is obvious, that almoſt every ſtate of diſeaſe, which is attended with painful and uneaſy ſenſations, will give riſe to much dreaming, which will be variouſly influenced and modified, according to the nature of thoſe ſenſations, and of the accidental external impreſſions, and of the individual habits of aſſociation.

The older medical writers attempted to deduce information, relative to the nature of diſeaſes, and the indications of cure, from the dreams of their patients. They ſuppoſed that all dreams, which were different from the thoughts of the preceding day, or the prevalent ideas ariſing from the buſineſs of life, were neceſſarily the reſult and the ſigns of a more or leſs diſtempered ſtate of the body; and, therefore, that the true nature of that ſtate might be often better learned from thoſe dreams, than from any other ſource. But ſuch a notion could only ariſe from an ignorance of the nature of the faculty of *aſſociation* by which our dreams are carried on, and of the ſlight and various relations by which ideas are aſſociated with bodily ſenſations, during ſleep. This ſlight and varying connection between the corporeal origin and the ſubſequent conceptions of our dreams, renders it impoſſible to deduce any general concluſions from them, or to trace back, from the phenomena which they exhibit, the corporeal condition by which they were ſuggeſted.

It will be ſufficient to enumerate ſome of the fanciful and gratuitous opinions which have been delivered, both in regard to diagnoſis and prognoſis, in order to ſhew their futility. Lommius has collected from the writings of Hippocrates the following obſervations on the ſubject. To dream of fire indicates a redundance of yellow bile: to dream of fogs, or ſmoke, indicates a predominancy of black bile: to dream of ſeeing a fall of rain, or ſnow, or a great quantity of ice, ſhews that there is a redundancy of phlegm in the body: he who fancies himſelf among ſtinks may be aſſured that he harbours ſome putrid matter in his body: to have red things preſented before you in ſleep, denotes a redundance of blood: if the patient dreams of ſeeing the ſun, moon, and ſtars hurry on with prodigious ſwiftneſs, it indicates an approaching delirium: to dream of a turbid ſea indicates diſorders of the belly: the appearance of monſters and frightful enemies, indicates delirium in diſeaſes: and to dream of being thrown down from ſome very high place, threatens an approaching vertigo, or ſome other diſorder of the head, as an epilepſy, apoplexy, or the like. Lommii, Obſervat. Medicin.

Theſe obſervations are altogether erroneous, and are obviouſly the ſuggeſtions of the imagination, and not the inferences of experience.

DREBBER-*Jacobs*, in *Geography*, a town of Germany, in the circle of Weſtphalia, and county of Diepholz.

Drebber-*Marien*, a town of Germany, in the circle of Weſtphalia, and county of Diepholz; 5 miles N. of Diepholz.

DREBKAU, or Drebkoy, a ſmall town of the kingdom of Saxony, in Lower Luſatia, one of the ſix towns of Lower Luſatia, in which the deſcendants of the Vandals have preſerved ſome traces of their language. It has 148 houſes, and about 1000 inhabitants, ſupported chiefly by agriculture, and the manufacture of linen cloth.

DRECANUM, in *Ancient Geography*, a place ſituated on the weſtern part of the iſle of Cos. Strabo.

DREDGE, or Dreg, a term uſed by the farmers for oats and barley mingled together.

DREDGERS, a term uſed in the admiralty courts for the fiſhers for oyſters. See ſtat. 2 Geo. II. cap. 19.

DREDGING-Machine, in *Mechanics*, an engine uſed to take up mud, or gravel, from the bottom of rivers, canals, docks, harbours, &c. while they remain full of water.

The common method of dredging is performed by men in a barge: the gravel, or ballaſt, is taken up in a leather bag, the mouth of which is extended by an iron hoop, attached to a light pole, of a ſufficient length to reach the bottom: in the ſmall way, two men are employed to work each pole. The barge being moored, one of the men takes his ſtation at the ſtern, with the pole and bag in his hand, the other ſtands in the head, having hold of a rope, tied faſt to the hoop of the leather bag. The man at the ſtern now puts the pole and bag down, over the barge's ſide, to the bottom, in an inclined poſition. The hoop being fartheſt from the man in the head of the barge, and having a rope, one end of which is faſt to the gunwale of the barge, he paſſes it twice, or thrice, round the pole, and then holds it tight: the man in the head now pulls the rope, faſtened to the hoop, and draws the hoop and bag along the ground, the other allowing the pole to ſlip through the rope as it approaches the vertical poſition, at the ſame time cauſing ſuch a friction, that the hoop digs into the ground, the leather bag receiving whatever paſſes through the hoop: both men now aſſiſt in getting a bag into the barge, and delivering its contents.

When the bag is large, ſeveral men are employed; and, to increaſe the effect, a windlaſs, with wheel-work, is uſed to draw the hoop along the ground. It is in this manner the convicts at Woolwich upon the Thames perform the ballaſt heaving, or dredging, which they are condemned to labour at as a puniſhment.

In large rivers, which require much dredging to keep the channel at the proper depth, the above method of manual labour becomes ſo expenſive, that a large machine, worked by horſes or a ſteam engine, is uſually employed; two ſuch machines worked by a ſteam engine have been ſome time in uſe in the river Thames, one of them is repreſented in *Plate* III. *Hydraulics*, which contains an elevation and plan of the engine.

It is erected in the hulk of a diſmaſted ſhip. A A, *fig.* 1, is a frame of timber bolted to the ſtarboard gunwale, to ſupport a large horizontal beam, B B, *fig.* 2; another ſimilar frame is fixed up in the middle of the ſhip at D, *fig.* 2, and the end of the beam is ſuſtained by an upright poſt bolted to the oppoſite gunwale; the ſtarboard end of the beam projects over the veſſel's ſide, and has an iron bracket S faſtened to it, to ſupport one of the bearings for the long frame E E, compoſed of four timbers bolted together: the other end of the frame is ſuſpended by pulleys *a*, *a*; from a beam F fixed acroſs the ſtern, the upper ends of the outſide beams of the frame E E have each a ſtout iron bolted to them, which are perforated with two large holes to receive two ſhort caſt iron tubes, one faſtened to the iron bracket S at the end of the beam B, and the other to a croſs beam of the frame A; theſe tubes act as the pivots of the frame E, upon which it can be raiſed or lowered by the pulleys *a*, *a*: they alſo contain bearings for an iron axis, on which a wheel or trundle O is fixed, containing four rounds. Another ſimilar trundle P is placed at the bottom of the frame E E, and two endleſs chains *k*, *k*, paſs round both, as is ſeen in the plan. Between every

every other link of the two chains, a bucket of plate iron *b b b* is faſtened, and as the chain runs round, the buckets bring up the ſoil; a number of caſt iron rollers *d, d,* are placed between the beams of the frame to ſupport the chain and buckets as they roll up. Four rollers *e, e,* are alſo placed on each of the outſide beams, to keep the chains in their places on the frame, that they may not get off to one ſide. The motion is conveyed to the chains by means of a caſt iron wheel at G in the plan, wedged on the end of the axis of the upper trundle O. The wheel is caſt hollow, like a very ſhort cylinder, and has ſeveral ſcrews tapped through its rim, pointing to the centre, and preſſing upon the circumference of another wheel incloſed within the hollow of the firſt, that it may ſlip round in the other where any power greater than the friction of the ſcrew is applied; the internal wheel is wedged on the ſame ſhaft with a large cog-wheel *f* turned by the ſmall cog-wheel *g* on the axis of the ſteam-engine. The ſteam-engine is one of that kind called high preſſure, working by the expanſive force of the ſteam only, without condenſation; *h* is the boiler containing the fire place and cylinder within it; *i* is one of the connecting rods, and *l* the fly-wheel on the other end of the ſame ſhaft as the wheel *g*. For a more particular deſcription of the engine, ſee STEAM ENGINE.

The pulleys *a*, which ſuſpend the chain frame, are reeved with an iron chain, the tackle fall of which paſſes down through the ſhip's deck, and is coiled on a roller *m* in the plan, and repreſented by a circle in the elevation: on the end of the roller is a cog-wheel *p*, turned by the engine wheel *g*: the bearing of this wheel is fixed upon a lever, one end of which comes near that part of the ſteam-engine, where the cock which regulates the velocity of the engine, is placed; ſo that one man can command both lever and cock, and by depreſſing that end of the lever, cauſe the wheel *p* to geer with *g*, and conſequently be turned thereby, and wind up the chain of the pulleys; *g* is a ſtrong curved iron bar bolted to the veſſel's ſide and gunwale, paſſing through an eye bolted to the frame E, to keep the frame to the veſſel's ſide, that the tide or other accident may not carry it away.

A large hopper or trough is ſuſpended beneath the wheel *o*, by ropes from the beam B, into which the buckets *b, b, b,* empty the ballaſt they bring from the bottom; the hopper conveys it into a barge brought beneath it: this hopper is not ſhewn in the plate, as it would tend to confuſe parts already not very diſtinct. The motion of the whole machine is regulated by one man. The veſſel being moored faſt, the engine is ſtarted, and turns the chain of buckets, the engine tender now puts his foot upon a lever, diſengages the wheel *p* from *g*, and by another takes off a gripe which embraced the roller *m*. This allows the end E of the frame to deſcend, until the buckets on the lower half of the chain drag on the ground, as ſhewn in *fig.* 1, when he ſtops the further deſcent by the gripe, the buckets are filled in ſucceſſion at the lower end of the frame, and brought up to the top, where they deliver their contents into the hopper before-mentioned: as they take away the ballaſt from the bottom, the engine tender lets the frame E down lower by means of the gripe lever, and keeps it at ſuch a height that the buckets come up nearly full; if at any time the buckets get ſuch deep hold as to endanger the breaking of the chain or ſtopping the engine, the coupling-box at G before-deſcribed, ſuffers the ſteam-engine to turn without moving the chain of buckets, and the engine tender preſſing his foot upon the lever which brings the wheel *p* to geer with *g*, cauſes the roller *n* to be turned by the engine, and raiſe up the frame E, until the buckets take into the ground the proper depth, that the friction of the coupling-box at G will turn the chain without ſlipping in any conſiderable degree.

The ſteam engine is of ſix horſes power, and is ſo expeditious, that it loads a ſmall barge with ballaſt in an hour and a half.

DREGAL, in *Geography*, a town and caſtle of Hungary; 12 miles N. E. of Gran.

DREGS *of Oil*, a name given by the people who trade in oil, to that coarſe and thick part of it, which ſubſides to the bottom of the veſſels in which great quantities of it are kept. This is not fit for the common uſes of the clear oil at the top, but there are ſeveral purpoſes to which it ſerves very well. Great quantities of theſe lees or dregs of common oil are uſed by the ſoap-boilers, principally in making the common ſoft ſoap. The leather dreſſers alſo uſe it in conſiderable quantities to ſoften the hides they are employed to prepare for the ſeveral artificers who uſe them. Some of theſe dregs are alſo uſed in the making of flambeaux, which, inſtead of being made of yellow wax, as pretended, are uſually compoſed of pitch, roſin, and this oil, mixed in ſuch a proportion as to make a maſs of a proper hardneſs and conſiſtence. People who uſe preſſes, and other works in which there are many ſcrews, ſometimes buy this to greaſe their ſcrews, inſtead of ſoap or ſuet. Theſe are the uſes mentioned by Savary; but beſides theſe we have in England another manufacture which conſumes a greater quantity than all theſe put together. This is the making of ſpermaceti; ſome perſons among us have found the art of making this out of the fæces of oil, and will give an oilman at any time as much clear oil in exchange of theſe dregs, as they are in quantity. All the other uſes of theſe dregs leave the trader at a great loſs; and as Savary obſerves, the more fæces the oil contains, the greater is the loſs to the buyer; but with us, this is rendered equal, and there is no loſs in it.

All ſorts of oil produce more or leſs fæces and dregs, but of all others, the whale-oil is obſerved to produce the largeſt quantity, and the nut oil the leaſt.

DREHBACH, in *Geography*, a ſmall town of the kingdom of Saxony, in the circle of the Erzgebirge, four miles from Ehrenfriederſdorf. It is divided into Upper and Lower Drehbach, and has ſeveral bleaching grounds where moſt of the thread is bleached, which is uſed in the manufacture of the common and middling ſort of Saxon thread lace.

DREHEMI, a town of Arabia, in the country of Yemen; 20 miles S. E. of Hodeida.

DREHHALS, in *Ornithology*, the name given by Friſch to the YUNX *torquilla*, which ſee.

DREIT-DREIT, or DROIT-DROIT, in our *Old Writers*, ſignifies a double right, that is, *jus poſſeſſionis & jus dominii.* Bracton, lib. iv. cap. 27. and lib. iv. tract. 4. cap. 4. and lib. v. tract. 3. cap. 5. Coke on Litt. fol. 266.

DREITSCH, in *Geography*, a town of Germany, in the circle of Upper Saxony, and circle of Neuſtadt; two miles N. E. of Neuſtadt.

DRELINCOURT, CHARLES, in *Biography*, an eminent proteſtant divine, was born, and received the elementary parts of his education at Sedan, whence he was ſent to ſtudy philoſophy, at Saumur, under the celebrated profeſſor Duncan. He was admitted to the miniſtry in the year 1618, being then twenty-three years of age, but meeting with ſome diſappointments at Langres, the place in which he firſt ſettled, he removed to Paris, and, in 1620, became paſtor of the church at Charenton. In 1625, he married the daughter of a rich merchant at Paris, by whom he had ſixteen children. He greatly excelled as a preacher, and was regarded by the people among whom he miniſtered, in the relation of a kind and benevolent friend and affectionate parent. The intereſts of religion were not only ſerved by his diſcourſes as a preacher, and by the advice and conſolation which he afforded as a paſtor, but his various writings ſhew how diſtinguiſhed he was as a pious author, and zealous advocate of the proteſtant faith. By his contemporaries the controverſial pieces of Drelincourt were regarded as of the utmoſt importance in fortifying the young and unwary againſt the arts and deluſions of Romiſh prieſts and emiſſaries: his moderation and prudence were as conſpicuous as his zeal was active and energetic. He never provoked the reſentment of his adverſaries by injurious aſperſions, unfair arguments, or illiberal language. He died in the year 1669, highly beloved by thoſe who enjoyed his friendſhip, and reſpected even by thoſe who differed from him moſt widely in religious opinions. Bayle.

Drelincourt, Charles, ſon of a miniſter of that name, of Charenton, acquired great fame for his learning, and for his ſkill in every branch of medical ſcience. He was born at Paris in the year 1633, and after ſtudying ſome years at Saumur, he went to Montpellier, where he completed his medical courſe, by being honoured with the degree of doctor in that faculty. We find him ſoon after attending the marſhal Turenne, in his campaigns, and by him appointed phyſician to the army. The ſkill and ability he had ſhewn in this ſituation, occaſioned his being nominated to ſucceed Vander Linden as profeſſor of medicine at Leyden, whither he obtained permiſſion to go, though he had been made, ſeveral years before, one of the phyſicians to Lewis the XIVth. This was in 1688. Two years after he was advanced to the chair of anatomy in the ſame univerſity. He was alſo made phyſician to William, prince of Orange, and to his princeſs Mary. As rector of the univerſity of Leyden, he ſpoke the congratulatory oration to the prince and princeſs, on their acceſſion to the throne of England. He continued to hold his profeſſorſhips, the offices of which he filled ſo as to give univerſal ſatisfaction, to the time of his death, which happened on the laſt day of May 1697. He was a voluminous and learned writer, but there is little original in his works, which were nevertheleſs much read in his time, and paſſed through ſeveral editions. They were collected, and publiſhed together in 1671, and again in 1680, in four vols. 12mo. But the moſt complete edition of them is that publiſhed at the Hague, in 1727, in 4to. In one of his orations, he has been careful to exculpate profeſſors of medicine from the charge of impiety, ſo frequently thrown upon them. "Oratio Doctoralis Monſpeſſula, quâ Medicos Dei operum conſideratione atque contemplatione permotos, cæteris hominibus Religioni aſtrictiores eſſe demonſtratur: atque adeo impietatis crimen in ipſos jactatum diluitur." He alſo, in his "Apologia Medica," refutes the idea of phyſicians having been baniſhed from, and not allowed to ſettle in, Rome for the ſpace of ſix hundred years. He was a lover of Greek literature, and like his countryman, Guy Patin, an enemy to the introduction of chemical preparations into medicine, which were much uſed in his time. He was alſo a ſtrong opponent to his colleague Sylvius. His ſon Charles ſucceeded him in his practice, but has left no publication, except his inaugural diſſertation, "De Lienoſis." Haller Bib. Med. et Ch. Gen. Biog.

DRENA, in *Geography*, a town of Germany, in the county of Tyrol; 7 miles N. E. of Riva.

DRENCH, among *Farriers*, a phyſical draught, or potion, given to a horſe, by way of purge.

DRENCHES, or Drenges, *Drengi*, or *Threngi*, in our *Old Cuſtoms*, a term, about which the lawyers and antiquaries are a little divided. See Threngus.

Drenges, ſays an ancient manuſcript, were "tenentes in capite:" according to Spelman, they were "e genere vaſallorum non ignobilium, cum ſinguli qui in domes-day nominantur ſingula poſſiderent manéria:" ſuch as, at the coming in of the conqueror, being put out of their eſtates, were afterward upon complaint, reſtored thereto; becauſe, they being before owners thereof, were neither in auxilio, nor conſilio, againſt him.

DRENGAGE, Drengagium, vel *ſervitium drengagii*, in our *Old Writers*, the tenure by which the drenches held their lands; concerning which, ſee Term Trin. 21 Ed. III. Ebor. and Northum. Rot. 191. "Notandum eſt, eos omnes eorumve anteceſſores, qui e drengorum claſſe erant, vel per drengagium tenuere, ſua incoluiſſe patrimonia ante adventum Normanorum." Spelm. Gloſſ. Du-Cange, Gloſſ. Lat. in voc. Drenches.

DRENGFURT, in *Geography*, a ſmall town of Pruſſia, in that part of Eaſtern Pruſſia which is called Samland It was built in the year 1403.

DRENTE, a quarter or diſtrict of Overyſſel.

DRENTELBURG, or Trentelburg, a town of Germany, in the circle of the Upper Rhine, and principality of Heſſe; 18 miles N. N.W. of Caſſel, and 32 E. S. E. of Paderborn. N. lat. 51° 23′. E. long. 8° 59′.

DREPANA, in *Ancient Geography*, a town of Aſia Minor, in Lycia.—Alſo, a town in Sicily.—Alſo, a town of Africa, in Libya.—Alſo, two iſlands in the Ægean ſea, placed by Steph. Byz. in the vicinity of the iſland of *Lebinthus*. The Drepana of the Phæacians, ſo called by this geographer, is Corcyra or Corfu.—Alſo, a mountain of Ethiopia. Steph. Byz.

DREPANIA, in *Botany*, from Δρεπανη, a *ſickle*, Juſſ. Gen. 169, is a genus made by Juſſieu of the *Crepis barbata* of Linnæus, *Tolpis* of Gærtner, t. 160, who adopts the name from Adanſon, and who is followed by Willdenow, Sp. Pl. v. 3. 1608. See Tolpis.

DREPANON, Δρεπανον, among the Greeks, an engine of iron crooked like a ſickle, and fixed to the top of a long pole. It was uſed in cutting aſunder the cords of the ſail-yards, in order to diſable the ſhip by letting fall the ſails, and was otherwiſe called *dorydrepranon*. Potter's Archæol. tom. ii. 141.

DREPANIS, in *Ornithology*, the ſand-martin or ſhore-bird, the Hirundo *Riparia*, which ſee.

DREPANUM, in *Ancient Geography*, a town of Aſia Minor, in Bithynia; ſituated on the gulf of Nicomedia, and called by Conſtantine the Great *Hellenopolis*.—Alſo, a promontory of the Peloponneſus, in Achaia Propria; placed by Pauſanias in the gulf of Corinth. It was alſo called *Rhium*, according to Ptolemy.—Alſo, a promontory of Cyrenaica, a country of Africa, mentioned by Ptolemy.—Alſo, a promontory of Egypt in the Arabic gulf, diſtinguiſhed by Ptolemy from *Lepte*, though Pliny ſays, that they were the ſame.—Alſo, a promontory in the ſouth eaſt part of the iſle of Cyprus, to the ſouth of the ancient town of Paphos. M. d'Anville places it N.W. of Paphos.—Alſo, a town of Sicily *(Trapani)* towards the weſt. Here, Æneas, according to Virgil, loſt his father Anchyſes; and near it was the temple of Venus on mount Eryx. The Carthaginians had poſſeſſion of Drepanum, and made many vigorous efforts to preſerve it. This place was famous for a naval battle, in which Adherbal defeated Claudius, the conſul, A. U. C. 505.

505. B. C. 249.—Alſo, a promontory of the iſle of Crete, now *La Punta di Drapono* in the iſle of Candia.—Alſo, a promontory of the iſle of Icaria, ſo called by Strabo.—Alſo, a promontory in the weſtern part of Sicily oppoſite to the Ægades, under mount Eryx, of which it formed a part, according to Ptolemy; now called *Trapani*.—Alſo, another promontory of Sicily, on the eaſtern ſide of the iſland, and almoſt oppoſite to the town of Rhegium, according to Pliny. Ptolemy calls it Argennon, and it is now *Capo di S. Aleſſio*.—Alſo, a ſmall branch of Achaia, ſituated E. of Panormus, which, according to Strabo, had a temple of Neptune.

DRESBACH, in *Geography*. See Drehbach.

DRESDEN, Dresen, *Dreſdin*, *Dreſnem*, *Drazdzu*, *Drazdonech*, in Latin *Dreſdena* and *Dreſda*, in French *Dreſde*, one of the handſomeſt towns of Europe, is the capital of the kingdom of Saxony in Germany. It is ſituated on the Elbe, where the Weiſſeritz falls into that river, which divides it into the old and new town, 18 miles S. E. of Meiſſen, and 58 miles S. E. of Leipzick.

Dreſden conſiſts of three parts, *viz*. Dreſden, or Old Dreſden, with its three ſuburbs; the new town (Neuſtadt) which is, properly ſpeaking, the old town, ſince it obtained its town privileges in 1216, two hundred years ſooner than Old Dreſden, but which was called the new town by order of Auguſtus II., king of Poland, and elector of Saxony; and the Frederickſtadt or Oſtra, which communicates with the ſuburbs of Old Dreſden by means of a ſtone bridge over the Weiſſeritz.

In 1429, 1491, and 1614, Dreſden ſuffered greatly by fire; it alſo endured many hardſhips in the thirty years' war. From 1631 to 1635, the plague raged with the greateſt fury at Dreſden, deſtroying 14 out of 15 perſons, and cauſing, in the year 1632, the death of 6892 individuals. In 1697, Dreſden had 1916 inhabited, and 219 uninhabited houſes, with 40,000 inhabitants. In 1755, one year before the ſeven years' war, during which Dreſden ſuffered ſeverely; its population amounted to 63,209 individuals. In 1760, Dreſden was bombarded by the Pruſſians, when the old town had 226 houſes deſtroyed, and 37 damaged, the new town 25 damaged, and the ſuburbs 190 deſtroyed. The Auſtrians, who were ſhut up in the town, which was but badly fortified, had added ſome intrenchments before the ſuburb of the Frederickſtadt from the river Weiſſeritz to the Elbe. In the year 1788, Dreſden counted 2450 dwelling houſes, and 53,000 inhabitants, without the garriſon. There were 349 couple married, 1516 born, of whom 240 were illegitimate children, and 2009 dead. The number of the poor relieved by public charities in hoſpitals, orphan-houſes, infirmaries, poor-houſes, &c. exceeded 3000. There were 5000 Roman catholics, and about 900 Jews.

The ſtreets of Dreſden, which are 61 in number, are ſpacious, ſtraight, well paved, and well lighted. There are ſeveral handſome ſquares and ſome beautiful walks. Dreſden has 40 public ſchools and 18 churches, the moſt remarkable of which are the church of St. Sophia, in which the firſt Lutheran ſermon was preached at Dreſden, on the 23d of April, 1539; the church of St. Ann; that of St. Mary's, or our Lady (Fraŭenkirche) built in 1734, by Auguſtus II. upon the plan of St. Peter's at Rome: and the new Catholic church, built by Auguſtus III., from the year 1737 to 1756.

The royal palace at Dreſden is a very fine building, which owes moſt of its grandeur to Auguſtus II. The green vault, (das grüne Gewölbe) which contains eight rooms, is particularly ſplendid. The floors are moſtly of exquiſite marble, and the walls covered with large mirrors. In theſe rooms is one of the richeſt cabinets of curioſities.

In the ſecond floor of the Dreſden palace, is the celebrated picture gallery, which has ſeven pictures of Correggio, among others his "Night" and his "Magdalen;" ſeveral of Vanderveld and Mengs; many paſtels, chiefly of the celebrated Roſa Alba; and, in 1806, it was enriched by a large hiſtorical painting of Fr. Mathæi, with 12 figures, repreſenting Ægiſthus puniſhed by Oreſtes and Pilades in the palace of Agamemnon. The royal armoury occupies 36 rooms. The gardens, called der Zwinger, contain a magnificent building, in which there is a cabinet of natural curioſities; a gallery of prints, which ſhews the progreſs of engraving from the infancy of the art; a collection of anatomical preparations, and a ſhow room of mathematical inſtruments.

Of the public buildings, the moſt remarkable are the large and the ſmall opera-houſe, the aſſembly rooms; the arſenal; the military academy; the barracks; the mint; the ſtate-houſe (landhaŭs); the royal china warehouſe; the beautiful ſtone bridge over the Elbe, with ſixteen arches; the Dutch palace, which contains a muſeum of curious articles made of china of different manufactures, a cabinet of medals, and the royal library. The latter has above 150,000 volumes and 2000 manuſcripts.

The principal manufactures of Dreſden are thoſe of woollen cloth, ſaddles, ſaddle-clothes, ſilks, ſilk-ſtockings, gauze, ribbands, lace, leather gloves, play-cards, muſical inſtruments, and large mirrors, which are poliſhed at Dreſden, but caſt at Frederickſthal near Senſtenberg.

The diſtrict of Dreſden contains three towns and 167 villages; 31 of which belong to the town of Dreſden, the whole population of which amounts to about 90,000 individuals.

The beſt account of Dreſden is to be found in the hiſtories of Anthony Week, Daſdorf, and Haſche. The deſcription (umſtændliche Beſchreibŭng von Dreſden) of Dreſden by the latter has had a new improved edition ſince the year 1788. (Guibert's Journal d'un voyage en Allemagne. F. G. Leonhardi's Erdbeſchreibŭng der Sæchſiſchen Lande 1790.)

Dresden, a poſt town of America, in the ſtate of Maine, and county of Lincoln, ſeated on the eaſt bank of Kennebeck river, nine miles from Wiſcaſſet point, 12 S. by E. of Hallowell, and 180 N. by E. of Boſton. Swan iſland lies in this townſhip.

DRESIA, in *Ancient Geography*, a town of Aſia, in Phrygia. Steph. Byz.

DRESNICK, in *Geography*, a town of Croatia; 18 miles N. W. of Bihacs.

DRESS, as it relates to *military* affairs, means a word of command given when the ſoldiers are not exactly in line, to bring them into their proper places, ſo that the whole front may appear exactly even. Perſons habituated to "dreſſing in line," however irregularly they may "fall in," or move to a new poſition, will, on the word "dreſs" being given, inſtantly conform to its intention, and aſſume the moſt regular front. This, however, can only relate to ſmall bodies, ſuch as a company, drawn up in two or three ranks; all perfectly even, and parallel. When large bodies are to aſſume a new front, it is uſual to ſend from each company a ſoldier, who, from his being poſted on the flank, is called a "pivot-man." Theſe, being acquainted with the number of paces their reſpective companies meaſure in front, habitually place themſelves at the proper diſtances from each other along the new front, and taking care to "cover," that is, to dreſs, exactly in a correct line, remain motionleſs until their reſpective companies arrive at their new ſtations; and thus, not only determine the preciſe localities of the flanks, or pivots, of the ſeveral companies, but make certain, that, when the whole wheel up into line, there ſhall be no irregularity, break, or undulation in its front. When the ſeveral companies have wheeled up, their commanders being guided by the point, either on the right or on the left, flank, which gave the direction to the new front, order their ſeveral diviſions to dreſs by the right, or by the left accordingly. In order to "dreſs" correctly, either the chin, or the breaſt-plate, of the ſecond man, on the right, or left, as may be ordered, is to be ſeen; and no more: when a ſoldier cannot ſee either of theſe objects, he is not up to the line; and when he can ſee more, he is beyond the line.

Dreſs alſo appertains to the regimentals of a corps; and, in many inſtances, is claſſed, as "full dreſs," "half dreſs," and "undreſs." The former relates to the complete uniform, ſuch as is worn at reviews; the ſecond to that which is in ordinary uſe for common duties; and the laſt to that which is appropriated to labour; ſuch as working parties, watering horſes, cleaning out ſtables, and for wear on board ſhip. The three claſſes are moſt in uſe among the cavalry and artillery corps; battalions of the line rarely have more than an ordinary and a full dreſs; ſome, indeed, have little or no diſtinction, beyond trowſers, feather-caſes, and beſt, or old, cloathing.

We are free to confeſs, that the great increaſe of articles in requiſition, merely to ornament the ſoldier's perſon, by no means appears judicious. We have heard it ſaid, that ſoldiers cannot be kept too poor; but, we believe, that when all fair expences are diſcharged, there will be found a very ſmall balance for the ſoldier's comfort: much leſs to enable his following corporal Trim's inimitable interpretation of the fifth commandment; or towards the ſupport of his wife and family. The opinions of many veteran officers, high in rank and repute, warrant us in the expreſſion of our wiſh, that every ſoldier in the Britiſh ſervice were provided by government with all neceſſary articles of the firſt quality; but, that no trappings, or gew-gaws, ſhould be exacted from his purſe. He ſhould have no petty accounts to ſettle with his ſuperiors: they looſen the ties of reſpect, and of ſubordination; and give birth to much diſcontent. It would, perhaps, not be unreaſonable, that ſuch commanders as may wiſh to ſee their regiments highly dreſſed, ſhould defray all the extra expences.

DRESSERUS, Matthew, in *Biography*, was born at Erfurt, the capital of Thuringia, in Auguſt 1536, and obtained a conſiderable reputation among the learned. He ſtudied for a ſhort time under Luther and Melancthon, at Wittemberg, but the air of that city not being congenial to his health, he returned to Erfurt, where he completed his ſtudies. In 1559, he took his degree of maſter of arts, and immediately aſſumed the office of lecturer in belles lettres and rhetoric at his own houſe, after this he was choſen profeſſor in the college of Erfurt, and beſides philoſophy, he undertook to inſtruct the young men in claſſical literature. In the duties of this office he continued to labour ſixteen years, during which he obtained a high reputation. In 1574, he removed to Jena, as the ſucceſſor of Lipſius, who had been the profeſſor of hiſtory and eloquence in that univerſity. Here Dreſſerus remained but a ſhort time, when he became head of the college of Meiſſen, and afterwards, *viz.* in 1581, he was appointed to the profeſſorſhip of polite learning in the univerſity of Leipſick, and a particular penſion was allowed him to continue the hiſtory of Saxony. Here he ſpent the remainder of his life, a uſeful member of the body to which he belonged: he died in the year 1607. He was a man of deep learning and great induſtry, and contributed to the extenſion of learning in Germany, not only by his own exertions as a teacher of the Greek language, but by obtaining the conſent of his colleagues, while he was one of the profeſſors at Erfurt, that the Hebrew language ſhould be taught in that univerſity. He was author of various works in polite literature, moral philoſophy, &c. Bayle. Moreri.

DRESSING *of hemp and flax.* See Hemp and Flax.

Dressing *of hops.* See Hops.

Dressing *of meats*, the preparing of them for food by means of culinary fire.

The deſign of dreſſing is to looſen the texture of the fleſh, and diſpoſe it for diſſolution and digeſtion in the ſtomach. Fleſh not being a proper food without dreſſing, is alleged as an argument, that man was not intended by nature for a carnivorous or fleſh-eating animal.

The uſual operations are, roaſting, boiling, and ſtewing. In roaſting, it is obſerved, meat will bear a much greater and longer heat than either in boiling or ſtewing, and in boiling greater and longer than in ſtewing. The reaſon is, that roaſting being performed in the open air, as the parts begin externally to warm, they extend and dilate, and ſo gradually let out part of the rarefied included air, by which means the internal ſuccuſſions, on which the diſſolution depends, are much weakened and abated; boiling being performed in water, the preſſure is greater, and, conſequently, the ſuccuſſions to lift up the weight are proportionably ſtrong; by which means the coction is haſtened, and even in this way there are great differences; for the greater the weight of water, the ſooner is the buſineſs done.

In ſtewing, though the heat be much leſs than what is employed in the other ways, the operation is much more quick, becauſe performed in a cloſe veſſel, and full; by which means the ſuccuſſions are more often repeated, and more ſtrongly reverberated. Hence the force of Papin's digeſtor; and hence an illuſtration of the operation of digeſtion.

Boiling, Dr. Cheyne obſerves, draws more of the rank, ſtrong juices from meat, and leaves it leſs nutritive, more diluted, lighter, and eaſier of digeſtion: roaſting, on the other hand, leaves it fuller of the ſtrong, nutritive juices, hard to digeſt, and needing more dilution. Strong, grown, and adult animal food, therefore, ſhould be boiled, and the younger and tenderer roaſted. See the ſeveral articles.

Dressing *of Ore.* The methods of preparing each ſpecies of metallic ore for fuſion may be found under the heads of the various metals; and for the general principles of this important manipulation, ſee Ores, *dreſſing of.*

Dressing, in *Surgery*, is a term which includes every ſpecies of application employed for the cure of external diſeaſes. A ſurgeon, therefore, is ſaid to *dreſs* a wound, &c. when he applies remedies to it; ſuch as fomentations, ointments, lint, bandages, or any other kind of curative means. Dreſſings muſt vary according to the nature of the caſe; and the ſame caſe may require different dreſſings in its ſucceſſive ſtages. The ſkill of a ſurgeon will be eaſily diſtinguiſhed from the routine of an ignorant pretender by the judicious ſelection he makes of peculiar dreſſings in various circumſtances of diſeaſe, climate, or conſtitution. The modern practice of ſurgeons has greatly ſimplified the art of dreſſing, ſince it has been found that nature does much more towards a cure than our anceſtors imagined. Very little is requiſite by way of dreſſing to freſh inciſed wounds in muſcular parts, except bringing the lips of the wound into contact, and preſerving them in that ſituation by ligature or adheſive plaſters, aided occaſionally with a bandage. Complicated wounds muſt, however, be ſuppoſed to require additional means. See Wounds, Fractures, Luxations, Abscesses, Cicatrix, Contusions, Ulcers, &c.

It is a very general error among unprofeſſional perſons to pour balſams, oils, or ſpirits into a freſh wound, and then to fill it up with lint or ſome other extraneous ſubſtance. This officiouſneſs is commonly hurtful, and cauſes the patient to be three or four times as long in recovering as he would if left entirely to nature. Thoſe irritating applications to recent wounds always produce more or leſs pain and inflammation, with ſubſequent inconveniences, if not long continued ſuppuration and ſwelling of the part, &c. &c. A little blood flowing from a wound will be uſeful in preventing the pain, inflammation, and tumefaction which might otherwiſe have enſued; and therefore none of the above artificial means of arreſting the hemorrhage (if it be but ſlight) ſhould be had recourſe to in trivial accidents of this kind. See Lint, Bandages, Plasters, Ligatures, and the other articles connected with this ſubject.

Dressing *a ſhip*, is the act of ornamenting a ſhip with a variety of colours, as enſigns, flags, pendants, &c. diſplayed from different parts of her maſts and rigging on a day of feſtivity.

Dressing-*Machine*. See *Flour*-Mill.

DRESVIANIA, in *Geography*, a town of Ruſſian Siberia, in the government of Tobolſk, on the Vagai; 60 miles S. of Tobolſk.

DREVET, Pierre, in *Biography*, a French engraver, died at Paris in 1739, aged 42.

DREUX, in Latin *Durocaſſes*, or *Durcaſſes*, in *Geography*, a ſmall but ancient town of France, chief place of a diſtrict of the ſame name, in the department of Eure and Loire, ſituated at the foot of a mountain on the river Blaiſe, 18 miles N. W. of Chartres, 51 miles W. of Paris, and 66 S. E. of Rouen. It was in the neighbourhood of Dreux that was fought, in 1562, under Charles IX., the memorable battle, in which the Proteſtants were defeated and the prince of Condé taken priſoner.

Dreux has 5437 inhabitants. Its canton contains 23 communes and a population of 14,802 individuals, upon a territorial extent of 330 kiliometres. It has a conſiderable manufacture of cloth for the clothing of the troops. As chief place of a diſtrict, Dreux has a ſub-prefect, a ranger, a court of juſtice, and a regiſter office.

The diſtrict comprizes an extent of 1572½ kiliometres, 138 communes, and 68,824 inhabitants. It abounds in corn and cattle, makes ſome bad wine and cyder, and has a few tanneries and manufactures of linen and woollen cloth.

DREYE, or Dreihe, a town of Germany, in the circle of Weſtphalia, and county of Hoya; five miles S.S.E. of Bremen.

DREYEN, a ſmall iſland of Denmark, in the Little Belt; three miles S.W. of Middlefahrt.

DREYGELHAUSEN, a town of Germany, in the circle of Lower Rhine, and electorate of Mentz; five miles N.W. of Bingen.

DREYS, or Dreysz, a town of Germany, in the circle of Weſtphalia; four miles W. S. W. of Willich.

DREYSALLIGKEIT, a town of Germany, in the duchy of Stiria; five miles N. of Pettau.

DREYSSIGACKER, a ſmall town of Germany, in the duchy of Saxe Cobourg, ſituated on a hill two miles off Meinungen. It has a ſummer-palace and a park. One-third of its inhabitants are Jews. The whole population is not much above 300.

DRIBENTZ, a river of Pruſſia, which runs into the Viſtula; ſix miles S. E. of Thorn.

DRIESEN, anciently Dresn and *Dreſno*, a ſmall town of Pruſſia, in the New Mark of Brandenburg, pleaſantly ſituated on the river Netze, which at this place divides itſelf into two branches, one called the Leſſer, or Old Netze, the other the Larger Netze, 36 miles E. of Landſberg. It is ſaid to have been built in 1270, by Boleſlaus, king of Poland. In 1317, margrave Woldemar, of Brandenburg, conferred it as a fief on Henry and Burchard-von-der-Oſten. In 1603 a ſtrong fort was erected againſt the incurſions of the Poles. It is ſurrounded by a moat and a branch of the river. In 1636, the Swedes made an unſucceſsful attempt upon it, but took it in 1639 and reſtored it to Pruſſia in 1650. In 1662 the town of Drieſen was completely deſtroyed by fire; it has ſince been rebuilt. The Ruſſians occupied the fort in 1758, and improved its fortifications.

The diſtrict of Drieſen comprizes 14 ſmall towns. The principal induſtry of the inhabitants is tillage and grazing; they alſo ſhare in the woollen cloth manufacture, which flouriſhes in the New Mark.

DRIFFBOR, a town of Norway; 46 miles E. of Romſdal.

DRIFFIELD, Great, a market town and pariſh, in the diviſion of Beacon-Bainton, and wapentake of Harthill, in the Eaſt Riding of the county of York, England, contains 320 houſes and 1411 inhabitants. Several woollen and cotton manufactories have recently been eſtabliſhed here; and a conſiderable trade is carried on in corn. Driffield has a market on Thurſdays, and four annual fairs. The pariſh is conſolidated with Little Driffield, which is about one mile and a half diſtant.

Driffield *Canal*, is the parliamentary name of a navigable canal, of about 11 miles in length, in the Eaſt Riding of Yorkſhire; it commences in the river Hull, at Aikbeck Mouth, and extends to the town of Driffield. See Canal.

DRIFT, in *Mining*. See Mining.

Drift *of the Foreſt*, an exact view or examination of what cattle are in the foreſt; that it may be known whether it be ſurcharged or not, and whoſe the beaſts are; and whether they are commonable beaſts or not. Theſe drifts are made at certain times in the year by the officers of the foreſt; when all the cattle of the foreſt are *driven* into ſome incloſed place, for the purpoſes above-mentioned. See Forest, and Common.

Drift, in *Maſt-making*, denotes the difference between the ſize of a bolt and the hole into which it is to be driven; and the ſame term is applied to a hoop, which is to be driven on a maſt.

Drift, in *Navigation*, denotes the angle which the line of a ſhip's motion makes with the neareſt meridian, when ſhe drives with her ſide to the wind and waves, and is not governed by the power of the helm; and alſo the diſtance which the ſhips drive on that line; ſo called only in a ſtorm.

Drift-*ſail*, in a *Ship*, a ſail uſed under water; veered out right a-head, by ſheets, as other ſails are: its uſe being to keep the ſhip's head right upon the ſea in a ſtorm, and to hinder a ſhip's driving too faſt in a current; with which view it is generally uſed by fiſhermen, eſpecially in the North ſea.

DRILL, or Drill-*box*, a name given to an inſtrument uſed in the new method of horſe-hoeing huſbandry for ſowing the land. See Broad-cast and Husbandry.

The drill is the engine that plants the corn and other ſeeds in rows; it makes the channels, and ſows the ſeeds in them, and covers them with earth when ſown, and all this at the ſame time, and with great expedition. The principal parts of the drill are the ſeed-box, the hopper, the plough, and its harrow. The ſeed-box is the chief of theſe; it meaſures, or rather numbers out, the ſeeds which it receives from the hopper, and is for this purpoſe as an artificial hand, but it delivers out the ſeed much more equally than can be done by a natural hand. The plough and hopper are drawn by a horſe, and by theſe the ground is opened, and the ſeed is depoſited in it; the harrow follows, and lightly rakes in the earth over them. When the ground is fine, and the ſeeds ſmall, a hurdle, with ſome prickly buſhes faſtened to its under part, will ſerve better than the harrow. The whole apparatus for this method of ſowing is deſcribed, and illuſtrated with figures, by Tull, in his Horſe-hoeing Huſbandry. See *Drill*-Plough.

Drill *rake*, in *Huſbandry*. See *Drill*-Rake.

Drill, in *Mechanics*, a tool made of hardened ſteel, uſed to bore holes in metal; they are of various forms, the moſt uſeful of which are ſhewn in *Plate* XXIV. *Mechanics*.

Fig. 1. is the common lathe or crank-drill, having an angular point, and two cutting edges, *a a*, which are only adapted to be turned one way; it is therefore adapted for drilling any work in the lathe, or by the crank, which is formed of iron, having a ſocket at the lower end to receive the drill; the upper end is pointed, and is preſſed upon by a lever loaded with a weight. The workman turns the drill round by means of the elbow of the crank, and the weight and lever keep it to its work.

Fig. 2. is the ordinary drill, having the cutting edge, as ſhewn in the ſide view B, made ſo as to cut either way; it is uſed with the crank, but chiefly with the bow.

Fig. 3. is like the former, except that it has a round edge; it is uſed for drilling ſteel and hardened iron, where, from the hardneſs of the work, a point might fail.

Fig. 4. is a drill, where the cutting edge (*a b* in *fig.* D.) croſſes the point. The cutting ſide of the edge at *a* is toward *fig.* A; and at the other ſide of the centre; *viz.* at *b*, it is toward D; the edge is therefore ſomewhat like a ſcrew, and leads itſelf into the work; for which reaſon it is good for drilling lead, copper, and other metals, which are tough without being very hard.

Fig. 5. is called a pin drill, and is uſed for drilling very large holes. A ſmall drill, like *figs.* 1 or 2, is firſt uſed, and the hole, thus made, juſt fits the pin *a a*, and keeps the drill ſteady while it is turned round. It has two cutting edges, *b* and *d*; in *b* the face is towards the eye of the ſpectator, and *d* repreſents the back of the edge; the edge is a little hollowed out above at *b* in the edge view, to make a thinner and ſharper edge.

Fig. 6. is a counterſunk drill, which is uſed to make holes to receive the heads of ſcrews; a hole is firſt drilled by the common drill, which is the ſize of the body of the ſcrew, and the pin *a a* juſt fits it, the cutting part *d b* is the ſize of the head of the ſcrew, *e e* is a ſhoulder, which prevents the drill cutting any further than intended.

Drills for ſmall work are turned by means of a ſmall pulley fitted on them; the ſtring of an elaſtic bow is paſſed round it. The piece of metal to be drilled, is fixed in a vice, and the point of the drill applied to it; the other end is placed in a hole in a piece of metal held againſt the breaſt of the operator; by drawing the bow backwards and forwards, a rapid motion is given to the drill, though it is not always in the ſame direction; therefore, the drill ſhould be ſhaped like *fig.* 1.

To avoid the trouble of making a great number of pulleys, workmen frequently uſe drill ſtocks, which will fit any ſize drill with the ſame pulley.

Fig. 7. is one of theſe where the drill A is formed of a round piece of ſteel wire, and puſhed into a round hole, a little taper in the end of the ſtock B; *a*, *a*, are notches to puſh out the end of the drill in caſe it breaks in the ſtock. Sometimes the hole in the ſtock is ſquare, for unleſs the work is very light, the round ones are apt to ſlip.

Fig. 8. is a neat contrivance to obviate this difficulty, communicated to us by Mr. T. Gill. The hole in the end of the ſtock is cylindrical, and the wire of the drill has one ſide filed flat, a ſmall pin is put through one ſide of the hole, as ſhewn by the ſmall round circle, and the flat ſide of the wire applies itſelf to it; by this means, the drill cannot turn round, and always fits tight in its ſocket.

Fig. 9. is a ſteel bow for giving motion to a drill as before explained. A is the ſteel part formed into a hook at the end, to hold the catgut B. At the other end, the ſteel is enlarged to receive a thumb-nut D, on which the catgut is wound, *d* is a ſmall ratchet wheel faſtened to the nut D, and fitted with a click to prevent its turning back. The uſe of the ratchet is to draw up the catgut, ſo that it may fit any ſize pulley on the drill.

In large manufactories where much large drilling is to be performed, it is done by machinery uſually turned by a ſteam engine.

Figs. 10. and 11. are elevations, at right angles to each other, of a machine of this kind. A, *fig.* 10, is a ſhaft, bringing the power to the machine, B a bevelled wheel fixed thereon, giving a rotative motion to another, D, on a vertical axis, E, turning in bearings *d*, *d*; this axis is perforated with a ſquare hole throughout to receive a ſquare iron bar *e*, at the lower end whereof the drill *f* is fixed. The work to be drilled is placed on a ſtool F upon the floor, that it may be readily moved about; in the drawing it is ſuppoſed to be a cylinder lid; the drill is preſſed down upon the work by a lever G, the fulcrum of which is *g*, at the other end of the lever is jointed an iron rod *h*, having a rack *k* cut in the lower end; this rack is moved by a pinion on the axis of a toothed wheel *l* turned by another pinion, on whoſe ſpindle is the winch *m*; the upper end of the iron bar *e* is pointed, and works in a hole in the lever; a collar *n* is put over the lever and keyed upon the bar *e*, ſo that the lever will lift up the drill as well as force it down upon the work.

The operation of the machine is very ſimple; the drill being conſtantly in motion, the workman turns the winch *m*, and raiſes the drill above the work, he then adjuſts the work by moving the ſtool F and laying the piece upon wedges to the proper place, and by turning the winch *m* back, he brings the drill down upon the work with any degree of force he pleaſes. The drill muſt be ſupplied with cold water, otherwiſe the friction would heat and ſoften it. The drill is fitted into its ſocket by a ſquare, the ſocket is open above the drill, as ſhewn in *fig.* 11, that it may be driven out to change it for another.

Drills are hardened by heating them in the fire to a red heat, and plunging them in cold water. They are then rubbed bright in ſome part by a ſtone, file, &c. and again heated in the fire, till the bright part aſſumes a light ſtraw colour, when they are cooled in water. Small drills are heated in the candle by a blow pipe, and cooled in the tallow.

It is a very well known fact, that a drill made of iron has frequently not only a polarity, but ſo ſtrong an attractive virtue of the magnetic kind, that it will ſuſpend a common needle from its point. It is uſually ſuppoſed that a drill acquires this polarity by boring iron. But it is not only by boring of iron that this power is obtained, but in the very making. As ſoon as one of them is finiſhed and hardened, its point becomes a north pole before it has ever been worked either in iron or any other materials, ſo that of the great numbers of theſe inſtruments found in a ſhop, endowed with this power, it is to be ſuppoſed that more of them owe it to their original make than to any after-uſe. All pieces of wrought iron, which in ſhape reſemble drills, that is, which are of a long and ſlender form, will not only have this polarity, but they will change it on being placed for ſome time in an inverted poſture, and that which was the oppoſite to the north pole, by ſtanding downwards will be the north pole. This has been an old obſervation, but on a fair experiment it does not prove to be true in all things without exception, though it be ſo in moſt particulars. The larger pieces of iron ſeem to be moſt eaſily influenced in their polarity, by changing their poſition; but the ſmall ones will ſometimes be found to have fixed poles, which no change of poſture will alter. Phil. Tranſ. N° 246. See MAGNET.

DRILL, ſaid to be derived from Fr. *drille*, which ſignifies a raw ſoldier, in a *Military Senſe*, applies to the tuition of recruits, under the auſpices of proper commiſſioned officers, aided by ſerjeants, and others, properly qualified to inſtruct in all the minutiæ of whatever appertains to the management of the firelock; and to the various evolutions performed by the company and by the regiment at large. Some regiments have an extra company, for the purpoſe of raiſing, and of inſtructing new levies; in them that branch of the ſervice is generally much accelerated, on account of their being duly provided with preceptors eſpecially ſuited to this highly important duty: from theſe extra companies the recruits are forwarded, in due time, to their regiments. In other corps, the drill is excluſively attended to by the adjutant, and the drill ſerjeants, and corporals expreſsly appointed for the purpoſe: in a few regiments there is no regular drill: the new men being trained by the officers of the companies to which they are, from the firſt, attached.

From all we have been able to collect on the ſubject of drills, it appears, that the Britiſh ſervice is entitled to greater encomium than any other, for this branch of incipient diſcipline; though we regret, that it ſhould be held expedient to admit the uſe of the rattan in any ſtage of the recruit's progreſs. We have the authority of many highly reſpected military characters for our aſſertion, that it is invariably better to act on the *pride*, than on the *back* of any candidate for an honourable profeſſion. Indeed, it ſeems rather inconſiſtent, that a man ſhould be taught to carry himſelf with dignity, grace, and firmneſs, by placing a watch over his action, ſo as to inflict a diſgraceful puniſhment for the moſt trivial error; or, perhaps, for an accidental deviation from the marked path.

On the other hand, we have heard it urged, that the armies of the great Frederick of Pruſſia, which, in his days, were conſidered truly formidable from the great perfection of their diſcipline, owed their ſuperiority entirely to the ſeverity with which every part of the drill ſyſtem was conducted. To this we may be allowed to anſwer, that among a people habituated, and in fact born, to degradation and vaſſalage, ſuch a method of inſtruction might be tolerated: the boor might be *warmed* into ardour by the force of ſtripes; but we cannot conceive that mode to be any wiſe applicable to the tuition of free men, poſſeſſed of ſome education, or at leaſt to a certain degree enlightened, and in a ſtate of civilization. We muſt confeſs it has often occurred to us, when witneſſing the rude application of the ſerjeant's cane, that the object in view was rather retarded, than accelerated: we have ſeen the types of honeſt indignation mount upon the juvenile cheek, and gliſten in the eye: we have ſeen offended pride combating with ſubordination, and oppreſſing a ſpirit which, with proper encouragement, and under due guidance, might lead to the moſt heroic actions.

Further, we have heard it ſtated, that, in ſome regiments, where the rattan is exploded; or, at leaſt, its uſe proſcribed, the recruits are more cheerful, more active, more aſſiduous, and direct their whole attention to an emulous conteſt for ſpeedy perfection. And this aſſuredly is natural; the lurking dread of caſtigation for involuntary lapſes, or for venial miſtakes, being baniſhed, their minds can freely receive inſtruction, and there will prevail a certain willingneſs to pleaſe the inſtructor; which cannot be expected under the ſyſtem of terror. We ſincerely hope, the day is not remote, when kindneſs, and conciliation, will be made to ſuperſede harſhneſs and ſeverity.

DRILLÆ, in *Ancient Geography*, a people of Aſia, in Cappadocia, who inhabited the coaſt of the Euxine ſea, between the territories of Trebiſond and Colchis.

DRILLENBURG, WILLIAM VAN, in *Biography*, a painter of landſcapes, born at Utrecht in 1626. He was a diſciple of Abraham Bloemart, an imitator of John Both, and the maſter of Houbraken. His pictures reſemble thoſe of Both in the choice of ſubjects and ſituations; in the trees, ſkies, and diſtances; but they have neither the beauty of colouring, the look of nature, nor the freedom, lightneſs, and delicacy of touch, of that excellent maſter. He delighted in his art, and was ſo intent on the practice of it, that he ſometimes confined himſelf to his houſe for a whole year together, without once going out of doors. Pilkington.

DRILLING and HORSE-HOEING, in *Agriculture*. Drilling is an operation that requires but very little attention. On this ſubject, we ſhall only ſtate the depth at which the ſeed ſhould be ſown; the quantity *per* acre, and the width of the intervals. Many crops of wheat have been greatly injured by depoſiting the ſeed too deep, eſpecially in wet ſoils: a little attention to the principles of vegetation will demonſtrate this. Nature is uniform in her operations; and whether the ſeed be put in the earth at four, three, two, or one inch below the ſurface, the roots which are to carry the corn to perfection will be formed at one preciſe depth; and, very near the ſurface, wheat has two ſets of roots, which may be termed the ſeminal and coronal; the firſt come from the grain, and the others are formed in the ſpring from the crown of the plant: they are united by a tube of communication, by which the plant is ſupported, until the coronal roots are formed. By depoſiting the ſeeds too deep, it frequently periſhes by a ſuperabundance of moiſture; and, certainly, from its increaſed length, this thread-like tube is more liable to be cut aſunder by the red, or wire-worm. This theory is confirmed by practical obſervation; for, in the ſpring of the year, we have frequently taken up plants of broad-caſt wheat, and always found thoſe which appeared moſt luxuriant had been covered by not more than an inch of mould, and thoſe which had fallen into the furrows, and were three or four inches below the ſurface, had a very ſickly appearance, with a ſmall blade, of a bad colour, and making no efforts for tillering. From this obſervation, we may conclude, that an inch is the beſt depth for depoſiting the ſeed of wheat. The remark will apply to barley and rye, and all plants which form their coronal roots near the ſurface. We ſhould recommend wheat, barley, oats, vetches, and rye, on ſoils not very wet, to be drilled on five, or ten feet ridges, in equal diſtant rows of one foot: beans, peaſe, and turnips, on three feet ridges, two rows on a ridge, nine inches from row to row, with intervals of 27 inches; lands in high tilth, and on five feet ridges, will require only three pecks of ſeed. Wheat and rye, five pecks of oats, barley, or vetches, and one buſhel of beans and peaſe *per* acre, according to the goodneſs of the ſeed, and the richneſs of the ſoil. For ſcarifying and horſe-hoeing, ſome attention and judgment will be requiſite. No corn ſhould be ſcarified until the ſpring; and pulverize the ſurface, by paſſing the fixed harrows acroſs the wheat, previous to ſcarifying, to break the incruſtations on the ſurface, leſt the ſcarifiers ſhould throw large flakes of earth over the rows of corn. After this operation, paſs the ſcarifiers through, about an inch below the ſurface, returning in the ſame track, as deep as the land was ploughed; then roll with a heavy roller, which will give the whole land a concuſſion, and pulverize it ſix inches below the ſurface, allowing the tender roots room to expand, in a fine bed of vegetable food. In ſhort, care muſt be taken not to throw any earth up to the plants in this early ſtage; for, as nature always forms the coronal root at the moſt advantageous depth below the ſurface of the ſoil, by throwing earth to the plants you impede her operations, and ſhe will, by a ſort of vegetable inſtinct, be obliged to form freſh coronal roots, and the progreſs of vegetation will be much retarded, for want of this precaution; and nature has laboured ſo ſteadily to rectify the errors of man, that ſometimes three ſets of coronal roots have been found, thoſe beneath dying away, as the joint at the proper diſtance below the ſurface ſends out new ones. When theſe ſeparations are performed with judgment, the advantages are beyond calculation. The ſcarifiers and rollers moving all the ſoil without earthing up, give the roots room to expand, and aſſiſt the operations of nature: the tillering will be greatly increaſed by it, and all the offſets ripen at the ſame time; and by earthing up the plants, when the ears are riſen ſix or ſeven inches above the ſurface, a plump and fine ſample will be ſecured, and no offſets can be formed. Rolling will be injurious when the ears are riſen above the ſurface. Theſe precautions are only neceſſary with wheat, and the white corn crops; with coronal root, peaſe, beans, vetches, and all tap-rooted plants, no injury can be ſuſtained for want of ſuch attention. Two general obſervations are applicable to all grains and ſoils. Never attempt to perform any of theſe operations until the land is dry; and be ſure to keep a fine tilth on the ſurface of the ground, four or five inches deep in the ſpring, whilſt the plants are in a young and growing ſtate. Were this new mode univerſally adopted, the ſaving of ſeed-corn would be of the utmoſt national conſequence: certainly not leſs than eight million buſhels of wheat, three million buſhels of barley, one of rye, four of oats, and one million of peaſe and beans. This ſtatement does not amount to the full quantity which might be ſaved. This autumn more than a ſixth part of the ſcanty crop of wheat was uſed for ſeed. Such would be the advantage of this improved method, that the farmer might pay his advance rent, and obtain a competency for his labour, without increaſing the neceſſary of life.

DRILLO, in *Geography*, a river of Sicily, in the valley of Noto, which runs into the Mediterranean; 6 miles S.E. from Terra Nuova.

DRILO, in *Ancient Geography*, a river of Illyria, called alſo *Drinus*, which firſt ran from the ſouth-eaſt towards the north-weſt of Epicaria, and then turned its courſe towards the ſouth, and diſcharged itſelf into the ſea, near Liſius. It united with the Mathis.

DRILOPHYLITÆ, a people of India, on this ſide of the Ganges. Ptolemy.

DRIMILLUS, a mountain of Aſia, ſituated in the vicinity of the Euphrates.

DRIMISSA, or DRYMUSA, an iſland of Aſia Minor, near the town of Clazomæne, according to Thucydides, Livy and Pliny.

DRIMYS, in *Botany*. See WINTERA.

DRIN, in *Geography*, a river which riſes in the S.W. part of Servia, and runs into the Save; 32 miles W. of Sabatz.

DRINGENBERG, a town of Germany, in the circle of Weſtphalia, and biſhopric of Paderborn; 6 miles E.S.E. of Paderborn.

DRINK, a part of our ordinary nouriſhment, in a liquid form, ſerving to dilute and moiſten the dry meat. See DIET and DRUNKENNESS.

DRINKING-GLASSES. See GLASSES.

DRINKLEAN, in our *Old Writers*, a ſcot-ale, or contribution of the tenants towards a potation, *i. e.* ale provided to entertain the lord, or his ſteward. In ſome records it is written *potura drinklean.*

DRINO BLANCA, or *White Drino*, in *Geography*, a river of European Turkey, which riſes near Rechia, on the borders of Dalmatia, and joins the Drino Nero; 15 miles N.W. of Ibali, forming with it one ſtream, called *Drino.*

DRINO *Nero*, or *Black Drino*, a river of European Turkey, which, ſpringing from a lake near Akrida, and joining the Drino Blanca, takes the name Drino only, and runs into the Adriatic, about 8 miles S.W. of Aleſſio; forming a bay at its mouth, called the *Gulf of Drino.*

DRINOPOLEOS, in *Ancient Geography*, an epiſcopal town of Mœſia.

DRINOVATZ, in *Geography*, a town of European Turkey, in Bulgaria; 28 miles S. of St. Viddim.

DRINUS, in *Ancient Geography*, a river of Europe, which marked the boundaries of Mœſia to the eaſt, and Illyria to the weſt. It ſprung in mount Scardus, took a bent courſe towards the weſt, as far as Sirmium, and then ran towards the eaſt, to diſcharge itſelf in the Danube.

DRIOS, a mountain of the Peloponneſus, in Arcadia.

DRIP, in *Architecture*. See LARMIER.

DRIPS are uſed alſo in building, for a kind of ſteps, on flat roofs, to walk upon.

This way of building is much uſed in Italy; where the roof is not made quite flat, but a little raiſed in the middle; with drips, or ſteps, lying a little inclining to the horizon. See ROOF.

DRIPPA, in *Ancient Geography*, a town of Thrace, to the eaſt of the Hebrus, and of Cypſela, and N.E. of Ænos.

DRIPPING-SPRING, in *Geography*, a place in which is a poſt-office, in the ſtate of Kentucky, America, and the county of Warren; 855 miles W. by S. from Waſhington.

DRIS, a town of Perſia, in the province of Farſiſtan; 70 miles W.S.W. of Schiras.

DRISON, in *Ancient Geography*, a town of Greece, in Epirus.—Alſo, a town of Thrace. Suidas.

DRISSA, in *Geography*, a town of Ruſſia, and one of the eleven diſtricts of the government of Polotſk, ſeated on the river Driſſa, near its junction with the Duna; 20 miles W.N.W. of Polotſk, and 272 S. of Peterſburg.

DRISTRA, or SILISTRIA, a town of European Turkey, in Bulgaria, near the Danube; 216 miles N. of Conſtantinople, and 160 N. of Adrianople. N. lat. 44° 17′. E. long. 27° 9′.

DRITTEY, a town of Germany, in the duchy of Carniola; 10 miles E.S.E. of Stein.

DRIVASTO, a town of European Turkey, in Albania; 20 miles N.E. of Dulcigno.

DRIVE, in the *Sea Language*. A ſhip is ſaid to drive when ſhe is carried at random, being impelled by a ſtorm, or current; or, when an anchor, being let fall, will not hold her faſt, but ſhe ſails away with the tide and wind.

The beſt way to prevent this, is to veer out more cable;

for the more cable ſhe has, the ſurer and ſafer ſhe rides: or elſe to let fall more anchors.

Alſo, when a ſhip is a-hull, or a-try, they ſay, ſhe drives to leeward, or in with the ſhore, according to the way ſhe makes.

Drive-*bay*, in *Geography*, a bay of the river St. Lawrence, on the ſouth-coaſt of Canada. N. lat. 48° 52′. W. long. 68° 20′.

Drive-*bolts*, in *Ship Building*, See Bolts.

DRIVER, the name given by our ſportſmen to an inſtrument uſed in taking pheaſant-powts, in the method called driving. This inſtrument conſiſts only of a parcel of ozier-wands, ſuch as are uſed by the baſket-makers, which are made up into a bundle, or ſort of great whiſk, and faſtened in a handle; and, to prevent their ſpreading too much at the points, are tied round in one or two places in the length; with this inſtrument the ſportſman, having fixed his nets, drives the young birds into them. See Driving.

Driver, in a *Ship*, is an oblong ſail, occaſionally hoiſted to the mizen-peak, when the wind is very fair. The lower corners of it are extended by a boom, or pole, thruſt out acroſs the ſhip, and projecting over the lee-quarter.

Driver-*boom*. See Boom.

Driver-*yard*. See Yard.

Drivers, *Wool*. See Wool.

DRIVING, amongſt *Sportſmen*, a term applied to the taking of young pheaſants, and ſome other birds, in nets of an open ſtructure. The method of doing this is, when an eye of pheaſants is found, the ground all about is to be ſearched, for finding their principal haunts. The induſtrious ſearcher will ſoon be able to make out ſome one of their paths, which are beaten in the manner of ſheep-tracks, only more ſlightly. When one of theſe is found, the place is to be marked, by ſetting up a ſtick with another tied to its top, like the hand of a road-poſt, marking out the place where the path ſeems to run to. On examining the reſt of the ground thereabouts, having regard to the ſame direction, it is highly probable that ſeveral more of the ſame ſort of tracks will be found all running the ſame way. By one or other of theſe, probably, the ſportſman will be led to their haunt, which he will not miſs knowing, by the nakedneſs and barrenneſs of the ground, and its being covered with the dung and feathers of the young birds. When this is found, the nets are to be placed near this ſpot, looſe and circularly, in ſuch a manner, that the under part being faſtened down to the ground, the upper part may be a hollow, and give a paſſage to the young birds in, and entangle them when there. When the nets are fixed, the perſon muſt go to the haunts, and call them together by the artificial noiſe of the pheaſant-call, which is ſo like the real note of the pheaſant, that the powts, or young ones, will ſeldom fail being deceived by it. When they hear this, and begin to anſwer it with their chucking and piping, the call is to be ſtopped, and a perſon is to get behind them, taking the wind with himſelf, as they always run with the wind. He is to have in his hand the inſtrument called by the ſportſman a driver.

When the perſon who carries this inſtrument perceives that he is come pretty near ſome of the powts, he muſt ſoftly beat the buſhes with the driver, or only lightly draw it over them; the little noiſe this makes will terrify theſe timorous creatures, and they will gather together in the track, and run a little way forward, and then all ſtop and turn about; on this the perſon is to make the ſame noiſe again, upon which they will run farther; and when they ſtop again, the ſame noiſe will again ſend them forward. Whatever other powts are in the way will join the main body in the fright, and the whole will be driven in this manner, like a flock of ſheep, and by a little addreſs of the ſportſman be ſent into the nets; ſo that out of a whole eye, it often happens that not one is miſſed. If in the fright the birds happen to run out of their track, and take a wrong way, then the driver is to make a raking noiſe with his inſtrument dragged along the ground, on that ſide on which they are running; this will amaze and terrify them ſo, that they will immediately ſtart back, and come into the beaten track that leads directly to the haunt. There are but two cautions neceſſary to the ſucceeding perfectly in this method of taking them: theſe are ſecrecy and patience. Whatever ſtops they make, or however tediouſly they move, the ſportſman who would make ſure of them, muſt bear with it; for over-raſhneſs and hurrying will ſpoil all, and he muſt content himſelf with terrifying them by the noiſe alone, keeping himſelf carefully out of their ſight; for if they eſpy him, all the plan is diſconcerted, and they will no more move forwards, but will every one run a different way, and hide under the roots of trees, and thick buſhes, and all the art in the world will never bring them out again till night, when it will be too dark to watch them.

Driving *of wild Fowl*, is only practicable in the moulting time, which is in July and Auguſt; and it is to be done by means of a ſpaniel, well trained to the purpoſe. The nets are to be ſet in creeks and narrow places, or at their uſual night retreats, and the dog is to put them up, and driving them forward, they will be ſent immediately into the nets, not being able to fly away from the dog, from the want of their wing-feathers. The people who live in the fens find great account in this practice, taking very great numbers of wild-ducks by it. They are uſually indeed poor and out of fleſh at this time, but as they are always taken alive, and without any hurt, the people find it eaſy to fatten them with beaſts' livers, barley, paſte, ſcalded bran, and the like; and they will on this become, in a very little time, fat and well taſted, excelling in flavour both the tame ducks commonly kept in the yards, and the wild ducks in their natural ſtate. When the ſportſman takes the dog into places where they are not ſo frequent, he may hunt them ſingly, and the dog alone will take them.

Driving, in *Metallurgy*, is uſed by the refiners of ſilver to expreſs the riſing up of copper from its ſurface in red fiery bubbles. When the lead that was added for refining the ſilver is burnt away before the copper is gone from it, theſe bubbles appear very fiercely on the ſurface. They ſay, on this occaſion, that the metal drives, and then add more lead till the remainder of the copper is conſumed. Phil. Tranſ. No. 142.

Driving, among the workmen in canals, &c. denotes the ſame with digging, or conſtructing a heading or tunnel under ground.

Driving-*Notes*, in *Muſic*. See Binding-*Notes* and Syncopation.

In driving-notes the firſt part of the ſound begins generally on the unaccented parts of a bar, and ends on the accented parts. See Ligature.

DRIUM, in *Ancient Geography*, a temple ſituated in Apulia, at the foot of mount Garganus.

DROCI, in *Geography*, a town of Italy, in the kingdom of Naples, and province of Calabria Ultra; nine miles S.S.E. of Nicotera.

DROCK, in *Huſbandry*, a name given by our farmers to a part of the common plough. It is an upright piece of timber, running nearly parallel with the hinder part of the plough, but belonging to the right ſide of the tail, as that does to the left. The ground-wriſt of the plough is faſtened to this, as alſo is the earth-board. See WRIST, EARTH-BOARD, and PLOUGH.

DROFFAND, or DRYFFAND, in our *Old Writers*, was a quit-rent, or yearly payment made by ſome tenants to the king or their landlords, for driving their cattle through the manor to fairs or markets.

The word comes from the Saxon *dryfene*, driven.

DROGHEDA, in *Geography*, a town in Ireland, ſituated between the counties of Louth and Meath, which has the privilege of a diſtinct county and its own aſſizes. It is a large well-built town on both ſides of the river Boyne, about five miles from the Iriſh ſea. The ground riſes from the river on both ſides, and the houſes, overtopping one another on the aſcent, ſhew the town to great advantage. The Boyne is navigable for ſhips of 150 tons burden to the town, where there is a handſome convenient quay for their reception, and the diſcharge of their cargoes. It has an excellent market, moſt plentifully ſupplied with proviſions of all kinds, the country around being one of the richeſt and beſt cultivated in Ireland. The great flour-mills of Slane are only ſeven miles diſtant, and they have the advantage of water-carriage by a canal. A great deal of coarſe linen and linen yarn find a ready market here, and there is a great export trade in proviſions and grain. This port alſo ſupplies the neighbouring country for many miles round, with Engliſh coals, and other heavy goods, and muſt of courſe derive conſiderable advantage from the meaſures taken of late years to improve the navigation of the river Boyne. Drogheda, or as it was formerly called, *Tredagh*, is often mentioned in hiſtory. It was fortified, and was one of the ſtrongeſt poſts belonging to the Engliſh. Parliaments were repeatedly held there, and amongſt others, that which enacted the memorable Poynings' law, in 1494. In the inſurrection of 1641, the Iriſh endeavoured to get poſſeſſion of this town, but it was defended with great vigour by ſir Henry Tichbourne, until the arrival of a force which enabled him to raiſe the ſiege. It was afterwards held by the royaliſts, and taken by ſtorm by Oliver Cromwell, who put all the garriſon to the ſword. About two miles from it up the river Boyne, king William III. defeated James and his French auxiliaries, in 1690, in commemoration of which, an obeliſk has been erected on the ſpot. The walls of Drogheda are in great part ſtill ſtanding, but the town is ſo entirely commanded by the riſing ground on both ſides, as to be incapable of defence, according to the preſent ſyſtem. The population of Drogheda is at preſent about fifteen thouſand. It is governed by a mayor, ſheriffs, and common council; is repreſented in parliament, and acts of parliament have been paſſed for various meaſures of police and local improvement. There is a good ſchool at Drogheda, with a very large endowment. It is nearly 24 Iriſh miles north from Dublin, in N. lat. 53° 42′. W. long. 6° 21′. Beaufort, Dodd, &c.

DROGMAN. See DRAGOMAN.

DROGONE, in *Geography*, a river of Italy, in the kingdom of Naples, which runs into the bay of Squillace.

DROIEZYN, one of the four diſtricts of the new Ruſſian government of Bialyſtock, which was ceded to Ruſſia by the king of Pruſſia, at the peace of Tilſit in July 1807. It had been only twelve years under the dominion of Pruſſia, and was a part of that diviſion of Poland which was occupied by Pruſſia in 1795. In the Poliſh language the name of this town was *Drogiczyn*.

DROIT, JUS, in our *Law-Books*, ſignifies *right*, or *law*; whereof ſome diſtinguiſh ſix kinds, *viz.* 1. *Jus recuperandi*, right of recovering. 2. *Jus intrandi*, right of entering. 3. *Jus habendi*, right of having. 4. *Jus retinendi*, right of retaining. 5. *Jus percipiendi*, right of receiving. 6. *Jus poſſidendi*, right of poſſeſſing. See LAW, and RIGHT; as alſo RECTUM, ENTRY, POSSESSION, &c.

DROIT, *right*, gives name to the higheſt writ of all real writs, becauſe the greateſt regard is paid to it, and it has the moſt aſſured and final judgment, and therefore, it is called, the *writ of right*; and in the old books droit. Co. Litt. 158. Of this kind are the *droit de advowſon*, &c.

DROIT *of Admiralty*, a valuable prerogative of the crown of Great Britain, conſiſting in a claim to property captured from an enemy on the ſeas or in harbour, under particular circumſtances. Such veſſels and property as are ſeized before any declaration of war, or before the iſſuing of letters of marque and repriſals, are ſaid to belong to the king *jure coronæ*, but the captures made afterward belong to him as lord high admiral, the rights of which office accrued to the crown when the office itſelf was put into commiſſion: it has, however, of late years, been the uniform cuſtom, to give up the proportion of prizes which belongs to the king in this capacity, to the captors. Another ſpecies of this property is that which is captured in port, or by ſuch as are not licenſed captors: this was properly the droits of admiralty, and likewiſe came to the king in virtue of the office of lord high admiral.

Before it became the practice to give up the king's ſhare of prizes to the captors, it was in ſeveral inſtances applied to the public ſervice. Thus queen Anne, in a ſpeech to parliament, in 1702, tells them, "I have given directions that my part of all the prizes which have been taken, or ſhall be taken during this war, be applied entirely to the public ſervice." The proportion of the produce of prizes thus applied, was, however, but inconſiderable: in 1702, it amounted to 73,412*l.* 18*s.* 10$\frac{1}{2}$*d.*; in 1703, to 65,767*l.* 16*s.* 10*d.*; and in the whole to only 161,591*l* 0*s.* 8$\frac{1}{2}$*d.* At ſubſequent periods more conſiderable ſums have been received from this ſource: thus in 1764, 659,500*l.* was applied to the public ſervice from the ſale of prizes.

Of late years formal notices of war have been much diſuſed, and governments have thought it juſtifiable to do an intended enemy as much miſchief as poſſible before any public notice of attack; this has greatly increaſed the number of captures previous to a declaration of war, which being conſidered as the property of the crown, has very much augmented the ultimate ſum which theſe condemnations place at its diſpoſal. Thus, the Spaniſh property ſeized before the iſſuing of letters of marque and repriſals in 1796, and which was of very conſiderable value, was condemned as the droits of admiralty; and on the breaking out of the war, in May 1803, though hoſtilities were not commenced againſt Holland till 16th June following, Dutch property was in the mean time detained, and afterwards condemned as prize to the crown. Spaniſh, Pruſſian, and Daniſh property was afterwards condemned under ſimilar circumſtances, the captors thereof being conſidered as having no claim to any ſhare in it. But though the captors have no legal claim, it has been uſual in the diſtribution of the produce of this property to grant a moiety, and in ſome inſtances two-thirds, as a reward to the captors; out of the remainder grants are made to perſons who have been ſufferers by the war, and to ſuch other perſons as his majeſty thinks proper to direct. The great amount of the property thus condemned has enabled his majeſty to direct two millions to be applied to the public ſervice.

DROIT *cloſe*. See RECTO.

DROIT *de advowſon*. See RECTO *de Advocatione Eccleſiæ*.

DROIT DROIT, *Jus Duplicatum*, or double right, is the right of poſſeſſion, joined with that of property; and when actual poſſeſſion is joined to this double right, then a title is completely legal.

Droit *de dower*. See Recto *De dote*.

Droit *patent*. See Recto.

Droit *de rationabili parte*. See Rationabili, &c.

Droit *ſur diſclaimer*. See Recto *ſur Diſclaimer*.

Droit, *monſtrans de*. See Monstrans.

DROITWICH, in *Geography*, a market and borough town in the hundred of Halfſhire, county of Worceſter, is ſeated on the navigable river Salwarp, and has been noted from time immemorial for its fine ſalt-ſprings, or brine-pits. It is ſuppoſed to have been well known to the Romans, and was certainly occupied by the Saxons. At the time of compiling the Domeſday book, the ſalt-works here were very conſiderable; as it appears from that record, that every week during the ſeaſon of "Wealing," the manufacturers paid a tax of ſixteen bullions.

At an early period the town was populous, and divided into different pariſhes. In 1290, St. Andrew's church, with many houſes, were burnt. King John granted ſeveral privileges to the town: theſe were confirmed and augmented by Henry III., and by different ſubſequent monarchs. As a *borough* it ſent members to all the parliaments of king Edward I.; and again in the 2d and 4th of Edward II. This privilege, however, then ceaſed till 1554, when it was reſtored by Philip and Mary. The right of election is now veſted in a recorder, two bailiffs, and eleven burgeſſes, who are denominated the 'Corporation of the Salt-ſprings of Droitwich.' The bailiffs are the returning officers, and juſtices of the quorum, and the recorder is a juſtice of the peace.

Here are ſeveral public buildings. The exchequer-houſe, built in 1580, has ſome windows of fine painted glaſs. In 1763 a chapel was built here, in the room of one pulled down on the bridge. In that part of the town called Dodderhill, was formerly an hoſpital for a maſter and poor brethren, under the priory at Worceſter. Here was alſo a monaſtery of Auguſtine friars. The town compriſes three pariſhes, beſides one in the ſuburb called *Dodderall*, which is a vicarage. That of St. Nicholas is a rectory; that of St. Peter is a vicarage; St. Andrew's, united to that of St. Mary Witton, is a rectory.

A canal, about ſix miles in length, communicates between this town and the Severn, by which the ſalt is conveyed to various parts of the kingdom. Here are a market on Friday; and four annual fairs.

The Droitwich ſalt is noted for its purity and whiteneſs; and the ſprings for their abundant ſupply. The water is eſtimated to contain about one-fourth of ſalt, while thoſe of Nantwich, in Cheſhire, contain only one-ſixth. As we ſhall have occaſion, under the term Salt, to enter pretty fully into the chemical properties, natural hiſtory, proceſſes of making, &c. we muſt refer our readers to that head. Droitwich contains 419 houſes, and 1845 inhabitants. It is 5½ miles from Worceſter, and 118 weſt of London.

Droitwich *Canal*, is the parliamentary name of a navigable canal of near ſix miles in length, in Worceſterſhire, commencing in the Severn river at Hawford, and extending to the town of Droitwich, whoſe copious ſalt-ſprings occaſion the water in this canal (like that in the Wirral branch of the Elleſmere canal) to be ſo ſalt as to deſtroy all the ſpecies of freſh-water fiſh. (See Canal.) About the year 1793 a branch of the Worceſter and Birmingham canal was propoſed to join this canal at Droitwich.

DROLSHAGEN, a ſmall town of Germany, in Weſtphalia, remarkable for an ancient abbey of Bernardine nuns.

DROMAHAIRE, a poſt town, or rather village, in the county of Leitrim, Ireland; 98 Iriſh miles N.W. from Dublin.

DROME, a town of Africa, on the Grain coaſt, famous on account of its market for pepper.

Drôme, *the Department of the*, is the third department of the fifth, or ſouth-eaſt region of France. Its capital is Valence. It conſiſts of the provinces formerly called the Valentinois and the Diois, which were parts of Dauphiné, and owes its names to the river Drôme, which traverſes it from eaſt to weſt.

To the north and north-weſt the department of the Drôme is bounded by that of the Iſere; to the ſouth-eaſt by that of the Upper Alps; to the ſouth by that of Vaucluſe; and to the weſt by the river Rhône, which ſeparates it from the department of the Ardèche. Its principal rivers are the Rhône, the Iſère, the Drôme, Galaure, Herbaſſe, Roubion, Aigues, Ouvèze. All theſe rivers abound in excellent fiſh, particularly trouts. There are alſo ſeveral ſmall lakes well ſtocked with fiſh; the principal of theſe lakes is called le Lac de Luc.

The department of the Drôme had anciently a canal from the Rhône, near the rocks of Robinet, in the pariſh of Douzere, to the limits of the commune called la Palud. It has been neglected for the laſt 30 years, but it would be eaſy to reſtore it, and to render it navigable at a ſmall expence. By its means the dangerous parts of the Rhône near Bourg St. Andèol, Blanc Rouge, and Pont St. Eſprit, would be avoided.

The ſoil of the department of the Drôme, being almoſt every where mountainous, is not very favourable to agriculture. It is rather dry, and this dryneſs proceeds partly from the ground being ſandy, and not retaining any moiſture, and partly from the injudicious cultivation of the declivity of the mountains, which nature deſtines to be covered with woods, and the ſoil of which is rapidly waſhed away. The mountains, beſides, are no longer able to keep any moiſture, having been ſtripped of their trees. The ſummits of the mountains afford ſome paſture. The beſt paſtures are at Greſſe, Valdrôme, and Vercors. There are alſo medicinal plants in the mountains.

In general the department of the Drôme does not grow corn enough for its conſumption. The banks of the Rhône, and the hills in the diſtricts of Die and Nyons, yield more wine than the department conſumes. It has alſo plenty of nut oil, and ſome olive oil. The mulberry tree ſucceeds uncommonly well. Vaſt numbers of ſilk-worms are reared; the annual amount of their produce is upwards of three millions of French livres.

The foreſts of oak and pine are occupied by bears, chiefly at Orbon and Valaurié. The mountains abound with goats, of the kind called Chamois. There is plenty of game, white hares, white partridges, pheaſants, and alſo ſome eagles and vultures.

On a mountain named Orel, near Die, is a ſpring of mineral water, which is reported to be an excellent ſpecific againſt intermittent fevers.

The principal trade of the department of the Drôme is with the productions of its ſoil, cattle, butter, and cheeſe, and the produce of ſeveral manufactures, chiefly of woollen and linen cloth, hoſiery, hats, ſtuffs, thread, paper, and gloves.

Beſides Valence, the capital, the principal towns are Romans, Chabeuil, Die, Creſt, Nyons, and Montélimart. The territorial extent of the department of the Drôme is 6927 kiliometres and a half, or 1,324,227 arpens, 147,381 of which are foreſts. It contains four diſtricts, *viz.* Valence, Die, Nyons, and Montélimart; 28 cantons, 360 communes, and

231,188

231,188 inhabitants, or 757 individuals *per* ſquare league. The average contribution of each individual annually, is about 6*s.* 8*d.* ſterling. (Herbin. Statiſtique de la France.)

Drôme, *La*, a river of France, which gives its name to one of the twelve ſouth-eaſt departments of France. It has its ſource in the valley of the Drôme, near Serres, in the department of the Upper Alps, from whence it enters the department to which it gives its name, paſſes by Die, Saillans, Creſt, between Livron and Lauriol, and not far from thence falls into the Rhône, 15 kiliometres, or about 9 miles below Valence. Its ſtream is ſupplied by the Mayroce, Sure, Rhoane, Gervane, Véoure, and Beſc. Its total courſe is about 90 miles, the laſt 30 of which only are navigable. The embankment of the Drôme, which at preſent does conſiderable miſchief by its overflowings, would confer eſſential benefits on the fertile vallies through which it runs. (Herbin. Statiſtique de la France.)

DROMEDARY, in *Zoology*, the Camelus *dromedarius*. See Camelus.

Dromedary, *Cape*, in *Geography*, a cape on the eaſt coaſt of New Holland. N. lat. 36° 50′. W. long. 210°. On this coaſt there is alſo a high mountain, lying near the ſhore, which, on account of its figure, Cook called *Mount Dromedary*: under this mountain the ſhore forms a point, to which he gave the name of *Point Dromedary*, and over it there is a peaked hillock. At this time, *viz.* April 21, 1770, being in S. lat. 36° 18′, and W. long. 209° 55′, the variation was found to be 10° 42′ E.

DROMESNIL, a ſmall town of France, in the department of the Somme, with a handſome caſtle; 12 miles W. of Amiens.

DROMEUS, from δρεμω, *I run*, in *Natural Hiſtory*, a word uſed by the ancients, as the name of two very different animals, the ſtag and the dromedary. The meaning of the word is *ſwift in running*; and the ſtag had this name as being ſwifter than any other animal, and the dromedary as being ſwifter than any of the camel kind beſide.

DROMISCOS, or Dromiscus, in *Ancient Geography*, a place of Aſia Minor, in the neighbourhood of the town of Miletus. Pliny ſpeaks of it as an iſland, which had been joined to the continent.

DROMO, in *Geography*, a ſmall iſland in the Grecian Archipelago. N. lat. 39° 28′. E. long. 24°.

DROMONARII, in *Antiquity*, rowers belonging to the ſhips called dromones.

DROMONES, a kind of yachts or expeditious ſhips uſed in carrying proviſions, or other neceſſaries. Pitiſc. Lex. Ant. in voc.

Dromones, *Dromos*, or *Dromunda*, in *Middle Age Writers*, ſignified any large ſhips; but afterwards it was uſed chiefly for men of war; and in this ſenſe it is uſed in Walſingham, anno 1292, and in Knighton, lib. iii. cap. 14, &c.

DROMORE, or Drumore, in *Geography*, a townſhip of America, in the ſtate of Pennſylvania, and county of Lancaſter; containing 1077 inhabitants.

Dromore, a market and poſt town in the county of Down, Ireland. It ſtands upon the river Lagan, and has a ſhare of the linen manufacture which enriches the county. It is a biſhop's ſee, and a place of great antiquity, but in no other reſpect remarkable. The reſidence of the biſhop is at a reſpectable country-houſe near the town, ſurrounded by a handſome demeſne. The biſhopric is very compact, and the ſmalleſt in extent of any in Ireland, which is not annexed to another ſee. It contains 26 pariſhes. Dromore is on the great north road leading to Belfaſt, and is 66 Iriſh miles north from Dublin.

DROMOS Achillis. See Achillis *Dromos*.

DROMWA Petri, in *Geography*, a town of Africa, on the Ivory coaſt.

DRONE-Base, in *Muſic*, a continuation of the ſound of the key-note, as on the bag-pipe. Sometimes the drone of this inſtrument is doubled by the 5th of the key-note. See Bag-pipe. The ſame drone-baſe, or baſes, belong to the *Piva*, and *Como muſa*, Italian bag-pipes.

Drone, in *Natural Hiſtory*, a ſort of bee of a larger ſize than the common working bee, which being unprovided with the neceſſary apparatus, never goes out to work, in collecting either wax or honey, but lives on the honey collected by the reſt. Theſe are the males of the ſwarm; the common working bees are of no ſex at all, or rather females in diſguiſe, and the female is uſually only one in a hive, for there is reaſon to conclude, from numerous late experiments, that the queen-bee lays only two kinds of eggs, thoſe that are to produce drones, and thoſe from which the working bees are to proceed. The proportion of drones to other bees in ſwarms is various; ſome having more than others. See Queen-*Bee*.

This larger ſpecies of drones may be eaſily diſtinguiſhed from the working bees, by being nearly double their ſize. Their head is round, their eyes full, their tongue ſhort, and belly broader and more obtuſe than that of the other claſſes; they are likewiſe of a darker colour, and more thickly clothed; and they make a much greater noiſe in flight, ſo that they may be eaſily known though unſeen. They have alſo no ſting, as the other bees have.

The diſſection of the drone-bee gives as great a proof of its being the male, as that of the queen does of her being female. In this creature there is no appearance of ovaries or eggs, nor any thing of the ſtructure of the common working bees, but the whole abdomen is filled with tranſparent veſſels, winding about in various ſinuoſities, and containing a white or milky fluid. This is plainly analogous to that fluid in the males of other animals, which is deſtined to render the eggs of the female prolific; and this whole apparatus of veſſels, which much reſembles the turnings and windings of the ſeminal-veſſels in other animals, is plainly intended only for the preparation and retention of this matter, till the deſtined time of its being emitted on the eggs. At the extremity of the laſt ring of the body is placed the aperture of the anus in the female, and in the working-bees; and it is at this aperture, that the ſting is alſo thruſt forth; but the caſe is quite otherwiſe in the drone or male bee; for the extremity of that ring is not open, but abſolutely cloſed; and the aperture of the anus is in the under part of that ring about its middle. On preſſing the body of this bee, there is alſo forced out at this part the penis; this is a ſmall and ſlender fleſhy body, contained between two horns of a ſomewhat harder ſubſtance, which join at their baſe, but gradually part aſunder as they are continued in length. When the preſſure is continued, there are finally thruſt out at the ſame aperture a part of the internal apparatus of the ſeminal veſſels, and, in fine, there is uſually ſome of the milky liquor extravaſated: but this ſeems rather to be let out by the burſting of a veſſel, than by any natural paſſage. Theſe parts found in all the drones, and none of them in any other bees, except theſe, ſeem to prove very evidently the difference of ſex; but there is one thing extremely remarkable in regard to them, which is, that though they appear ſo evidently on being forced out of the body by preſſure, yet it is very difficult to find them in it on diſſection. The cauſe ſeems to be their ſwelling when expoſed to the air; and Swammerdam ſuppoſes, that to this purpoſe they are furniſhed with a great number of tracheæ, which readily admit the air as ſoon as ever they are expoſed to it.

Maraldi, as well as Swammerdam, diſcovered in the ſtructure of the drones ſome reſemblance to the male organs of generation, and from thence concluded that they were the males; but neither of theſe accurate and induſtrious obſervers could detect them in the act of copulation. Swammerdam, therefore, entertained a notion, that the female or queen-bee was fecundated without copulation; that it was ſufficient for her to be near the males, and that her eggs were impregnated by a kind of vivifying aura, exhaled from the body of the males, and abſorbed by the female. Maraldi adopted a ſimilar opinion. Hiſt. Acad. Sci. 1712, p. 332. This opinion has been at a later period ſtrenuouſly maintained by Mr. Debraw of Cambridge. Phil. Tranſ. vol. lviii. p. 1. art. 3. However, M. Reaumur thought that he had diſcovered the actual copulation of the drones with the female bee, and he has very minutely deſcribed the proceſs of it. Hiſt. Inſect. tom. x. p. 128. 149. 157. The fact has been ſince demonſtrated by Huber. See *Generation* of Bees.

Maraldi and Reaumur had long ago diſcovered, that there were drones of the ſame ſize with the common bees; but the curious experiments of Debraw, beſides aſcertaining the fact, throw a new light on their importance and uſe, and remove conſiderable difficulties, which embarraſſed the proceſs of generation among theſe uſeful inſects. It is well known that the large drones never appear in the hive before the middle of April, and that they are all dead before the end of Auguſt, when the principal breeding ſeaſon terminates; and they are deſtroyed, together with all their worms or nymphs, by the working bees; probably by order of the queen to ſave honey; and yet it is equally certain that the bees begin to breed early in the ſpring, ſometimes in February, if the weather is mild; and that many broods are completed before the drones appear. But if drones of a ſmaller ſize are ſuffered to remain, which in a time of ſcarcity conſume leſs honey than the others, theſe will anſwer the purpoſe of ſupplying the early broods, and the larger drones are produced againſt a time of greater plenty.

An ingenious friend of the editor, who amuſed himſelf with obſerving the economy of bees, and who long ago diſcovered the ſmall drones, aſſured him, that theſe ſmaller drones are all dead before the end of May, when the larger ſpecies appear, and ſuperſede their uſe.

It was not without reaſon that a modern author ſuggeſted, that a ſmall number of drones are reſerved to ſupply the neceſſities of the enſuing year; and that theſe drones are very little, if at all larger, than the common bees. Nat. Diſp. p. 90.

DRONERO, in *Geography*, a ſmall town of France, in the department of the Sture, which formerly was a part of Piedmont in Italy. It is ſituated at the foot of the Alps, on the river Macra, over which there is a very high bridge.

Dronero is the chief place of a canton in the diſtrict of Coni, and has a population of 6342 individuals. Its canton contains four communes and 10,136 inhabitants.

DRONFIELD, a town and pariſh in the hundred of Scarſdale, in the county of Derby, England, is pleaſantly ſeated in a valley, which abounds with ſprings. The town conſiſts of 231 houſes, and contains 1182 inhabitants. Here is a well endowed free ſchool, which was founded by Henry Fanſhawe, eſq. in the reign of queen Elizabeth. The church is a large handſome building; and near it was formerly a chantry, now converted into a public houſe. The market is diſcontinued. Abundance of coal is obtained in the vicinity of the town, which is ſix miles from Cheſterfield, and 157 N.W. from London. About two miles from Dronfield are the remains of Beauchief Abbey. This was ſeated in a pleaſant, fertile valley, and was appropriated by Robert Fitz-Ranulph, lord of Alfreton, circa 1172, for regular canons of the Premonſtratenſian order. See Pegge's Hiſtory, &c. of Beauchief Abbey, and Pilkington's Hiſtory of Derbyſhire, 2 vols. 8vo. 1789.

DRONGO, in *Ornithology*, the name given by Buffon to the Lanius *forficatus*, which ſee.

DRONNE, in *Geography*, a river of France, which riſes about ſix miles from Thiviers, in the department of the Dordogne, and joins the Ille, near Coutras, in the department of the Gironde.

DRONNINGBORG, a ſmall town of Denmark, in the peninſula of Jutland, in the dioceſe or general government of Aarhuus. Its diſtrict contains the herred of Rougſad, with five pariſhes; that of Stoffring with eight pariſhes, and Stoffringgaard a convent for ladies of noble birth; the herred of Galthen with eight pariſhes; that of Gierlev with ten, and that of North Hald with twelve pariſhes.

DRONONCA, in *Ancient Geography*, a river of Gallia Acquitanica, now *Dordogne*, which ſee.

DRONTE, in *Ornithology*. See Didus *Neptus*.

DRONTHEIM, in Latin *Nidroſia*, in *Geography*, a conſiderable town of Norway in Drontheimhus, or general government of Drontheim, of which it is the capital, is ſituated at the mouth of the river Nid, 285 miles N.E. of Bergen, 408 miles N. by W. of Copenhagen, and 324 N.W. of Stockholm. It was anciently called Nideroos, or the outlet of the river Nid, from which it ſtill derives its Latin name. Its preſent name aroſe from that of the province of Trondheim, of which it is the principal town, and the inhabitants of which are called Tronder.

Drontheim is ſaid to have been built by king Oluf Tryggeſon; it was originally the reſidence of the Norwegian kings, and afterwards of the archbiſhops, but the archiepiſcopal ſee was ſuppreſſed at the Reformation. At preſent it has only a biſhop. The cathedral, which was a ſuperb edifice built with marble, was burnt down in 1530, excepting the choir which ſtill forms a part of the preſent cathedral, for which it is however too large. There are two churches, a public ſchool, a ſeminary for miſſionaries, an orphan-houſe, a poor-houſe, an infirmary, and a houſe of correction. The town is governed by a ſtadtvogt and other magiſtrates. It has two ſuburbs, Bakkelandet and Ladegaard, which have each their ſeparate church. The number of inhabitants amounts to 9000.

The general governor of the province reſides at Drontheim. The town is defended by the fort of Chriſtianſtein, erected in 1680, and by the caſtle of Munkholmen, which ſtands on a rock in the harbour, and protects both the city and the harbour towards the ſea. In the month of July, 1685, the king of Denmark, Chriſtian V., paſſed a few days at Drontheim, and ſupped at midnight without candlelights, the twilights being ſufficiently luminous.

In the muſeum at Copenhagen there are ſeveral medals and coins found in the neighbourhood of Drontheim; among others, a medal ſtruck by order of king Sverre. In 1786, 48 ſilver pieces of a large ſize, ſome round, ſome ſquare, and ſome triangular, with very ancient inſcriptions, were dug out of a field. In 1789, a ſort of a copper trunk was found, containing ſeveral coins of the reign of Frederick III.; and in 1805, 32 ſilver coins were diſcovered at a very inconſiderable depth, of the reign of king Eric of Pomerania. Later ſtill, ſome inhabitants of the pariſh of Maldalen, near Drontheim, diſcovered in a ſand-bank 70 or 80 ancient ſilver coins, and four or five urns of a rare metal, containing nothing but blue aſhes. Some of the coins are of the reign of king Ethelred of England. One of them has a crucifix and a temple: it appears to have been coined towards the eleventh century.

The principal trade of Drontheim is with all ſorts of ſalt fiſh, herrings, timber, tallow, copper of the celebrated copper-works at Röraas, and ſome other leſs important articles. Its exports and imports occupy from 400 to 500 ſhips annually. The number of veſſels which arrived at Drontheim in 1785 was 250.

The prefecture of Drontheim comprizes the diſtricts of Romſdal, Nordmor, Foſen, Oeckedalen and Guldalen, Strinden, Stordalen and Verdalen and Inderoen. The town of Drontheim itſelf is in the diſtrict of Strinden. In 1760, a literary ſociety was eſtabliſhed at Drontheim. Its tranſactions, which are regularly publiſhed ſince 1784, are leſs known abroad than they deſerve to be from their merit.

DRONTHEIMHUS, Drontheimhuus, in Daniſh *Trondheimhuus*, is the moſt extenſive province of Norway, being above 150 Norway miles in length. It ſtretches along the coaſt, and is bounded on the weſt by the North ſea, on the north by the gulf of Wardhus, on the eaſt by Sweden, and on the ſouth by the gulf of Bergen. A long chain of high mountains, called Kolen, ſeparates it from Sweden. It forms a dioceſe, with one biſhop and 13 archdeacons. Its population is ſo very thin, that it reckons only nine or ten individuals on the Engliſh ſquare mile.

The province of Drontheim is under a general governor, who reſides at Drontheim. It is divided into three prefectures, *viz.* Drontheim, Nordland, and Finmark, which are ſubdivided into diſtricts.

DROOGSLOOT, N., in *Biography*, painter of landſcape and fairs; born in 1650. He practiſed chiefly at Dort, in Flanders, where he was greatly encouraged and much employed. He drew his ſcenery always from nature, and painted towns, cities, and villages, with great truth and accuracy of reſemblance. His colouring is pleaſing. He took his ſubjects from the loweſt life, from fairs and markets; with a multitude of figures and military groups. The attitudes and actions of his figures are very natural; but they are without elegance, and generally of diſagreeable forms. Deſcamps and Pilkington.

DROP, in *Sea-Language*, is a name ſometimes given to the depth of the principal ſails: thus, a main-top-ſail drops ſeventeen yards. To *drop* anchor is uſed ſynonymouſly with *to anchor;* and *dropping* a-ſtern denotes the retrograde motion of a ſhip.

Drop-*Stile*, a kind of moveable fence, at the partings of the fields, on the towing path of a canal.

Drop-*Planks* are planks let down into a groove prepared under a bridge, or other walled place, for ſtopping the water of a canal.

DROPALACH, in *Geography*, a town of Germany, in the duchy of Carinthia; 12 miles S. of Saxenburg.

DROPAX, Δρωϖαξ, in *Pharmacy*, an external medicine in form of a plaſter, uſed to take off the hairs from any part. See Hair, and Depilatory.

The dropax is of two kinds, ſimple and compound. The ſimple is made of an ounce of dry pitch, and two drachms of oil.

The compound is made with pitch, wax, colophony, common ſalt, bitumen, ſulphur vivum, pepper, euphorbium, cantharides, and caſtor. There are alſo other ways of making it, to be found in the diſpenſatories.

It was anciently much in uſe alſo to warm the parts, to draw the blood and ſpirits to them, and to cure atrophies. To this purpoſe it was applied hot on the part affected, after firſt ſhaving it; and was pulled off again before it became quite cold; then heated afreſh, and applied again; and the operation thus repeated, till the part was rendered very red.

DROPPER. See Fishing.

DROPPING, or Dripping, a term uſed among *Falconers*, when a hawk mutes directly downwards, in ſeveral drops, not throwing out her dung ſtraight forwards.

DROPS, in *Architecture*, are ſmall bodies of a circular horizontal ſection, either of a cylindric, conic, or of a form ſpreading towards, and concave at, the bottom. They are placed in the mutules of the Doric order, where they are always ſix in number, upon the fronts of the mutules, in three rows. In the Roman Doric, the ſurface of the metops is the ſame with that of the architrave; and the vertical ſurface of the triglyph projects equally with the drops, which are hung to the tenea. In the Grecian Doric, the faces of the triglyphs are generally diſpoſed in the ſame vertical ſurface with the face of the epiſtylium, and conſequently the regula and the drops pending therefrom project. In the Choragic monument of Thraſyllus, the tenea of the epiſtylium has a continued row of drops. This is not a regular Doric. The temple of Apollo at Cora in Italy has a row of drops pending from the ſoffet of the corona, continued from end to end without interruption, which are, as well as thoſe of the preceding example, of a cylindric form, though thoſe under the triglyphs are conical, with inclined ſoffets. The drops pending from the ſoffets of the mutules under the corona have their ſoffets in a plane, parallel to the ſoffets of the mutules, and conſequently inclining; while thoſe of the epiſtylium have their ſoffets in a horizontal plane. Drops vary much in their proportion. The height of thoſe in the cornice of the Doric portico at Athens is little more than a quarter of their diameter; while thoſe of the epiſtylium have their heights more than half their diameters. In the theatre of Marcellus at Rome, and in the peripteral temple at Paeſtum, the cornice is without either mutules or drops. In the eneaſtyle, or nine-columned temple at Paeſtum, the cornice is deſtroyed, and the architrave ſeems to have been originally without either mutules or drops.

Drops, in *Medicine*, a liquid remedy, whoſe doſe is eſtimated by a certain number of drops.

Drops, in *Meteorology*. See Rain.

The ſpherical figure, into which the drops of fluids conform themſelves, is a phenomenon that has a little perplexed the philoſophers. The ſolution commonly given was, that the equable, uniform preſſure of the ambient, or incumbent atmoſphere, cloſed them into this form. But this account will no longer paſs; now that we find that the phenomenon holds in vacuo as well as in air.

The Newtonian philoſophers, therefore, aſcribe it to their attraction, which being greater between the ſeveral particles of the fluids, than between them and thoſe of the medium, they are, as it were, concentrated, and brought as near each other, and into as little compaſs, as may be; which cannot be, without their being ſpherical.

Thus, ſir Iſaac Newton: "Guttæ enim corporis cujuſque fluidi, ut figuram globoſam inducere conentur, facit mutua partium ſuarum attractio; eodem modo quo terra mariaque in rotunditatem undique conglobantur, partium ſuarum attractione mutua, quæ eſt gravitas." Opt. p. 338.

Drops, *Engliſh*, or *volatile Engliſh drops*, *Guttæ Anglicanæ*. See Guttæ *Anglicanæ*.

DROPSY, in *Medicine*, a preternatural collection of ſerous or watery fluids in ſome of the cavities of the body.

The word is a corruption of the Greek ὑδρωψ, *hydrops*, derived from ὕδωρ, *water*.

From ancient times dropſy has been divided by medical writers into different genera, according to the part of the body in which it is ſeated; and the different denominations, which were given by the Greeks to the different varieties of the diſeaſe, are ſtill retained in medical language. They are compounded of the word ὕδρωψ with the name of the part affected. Thus, *hydrocephalus* ſignifies dropſy of *the head*; *hydrothorax*, dropſy of *the cheſt*; *hydrocardia*, dropſy of *the heart* or *pericardium*; *hydrophthalmia*, dropſy of *the eye*; *hydarthrus*, dropſy of *a joint*, &c. The ſubcutaneous dropſy, in the interſtices of the cellular membrane, was called *hydrops anaſarca*, ανασαρκα, or dropſy *between the fleſh*; and the dropſy of *the belly*, *hydrops aſcites*, ἀσκίτης, from ασκος, *a bottle*: the belly, when diſtended with water, being thought to reſemble a full bottle. The dropſical accumulations, however, under all theſe forms, partake of one common nature, and depend very much upon ſome general cauſes, which it may be expedient to endeavour to explain, before we conſider the ſeveral varieties alluded to.

It has been aſcertained by phyſiologiſts that, in the healthy condition, a ſerous or watery fluid is conſtantly poured out, or exhaled, from what are termed the exhalent extremities of the arteries, into every cavity and interſtice in the body, by which the parts are conſtantly moiſtened, and their adheſion, or painful attrition, is prevented. But upon the ſurfaces of the ſame cavities and interſtices the mouths of another ſet of veſſels, the abſorbents or lymphatics, open, and take up or abſorb this effuſed fluid, before it has remained long, or been accumulated in thoſe ſpaces, and carry it back into the circulating blood, through the thoracic duct, or general trunk of the abſorbents. See ABSORBENTS. From this view of the animal economy it will be obvious, that a perfect balance between theſe oppoſite functions of exhalation and abſorption muſt exiſt, in order to maintain the health of the ſyſtem; and that a dropſical accumulation muſt be the conſequence of the loſs of ſuch balance, and muſt be occaſioned in one or other of the two following ways: 1. If the quantity of fluid poured out into any ſpace be greater than the abſorbent veſſels can at the ſame time take up, it muſt neceſſarily accumulate in ſuch parts; or, 2. Although the quantity poured out be not greater than uſual, yet if the abſorption be any how interrupted or diminiſhed, an unuſual accumulation will from this cauſe alſo enſue. Dropſy may, in general, therefore, be imputed to an increaſed exhalation or a diminiſhed abſorption, in the cavities in which it occurs. It will be found, however, upon an inveſtigation of the various cauſes which are capable of producing theſe morbid conditions, that the exhalent veſſels are moſt commonly in fault, and that preternaturally increaſed effuſion is moſt frequently the chief ſource of dropſy.

Cauſes of Dropſy.—The ordinary exhalation may be increaſed in various ways: but one of the moſt direct cauſes of ſuch an increaſe is an interruption or obſtruction to the free return of the venous blood from the extreme veſſels of the body to the right ventricle of the heart. Such an obſtruction, by impeding the free paſſage of the blood from the arteries into the veins, while the action of the heart continues to propel it, neceſſarily occaſions the blood to paſs more forcibly into thoſe avenues, where leſs reſiſtance to its progreſs exiſts, *viz.* into the exhalent branches of the arteries, and thence into the cavities into which they open. This is not a mere hypotheſis: for Lower proved and illuſtrated the fact by moſt ſatisfactory experiments, which leave no room to doubt, that ſimple obſtruction to the free paſſage of the blood through the veins is adequate to produce dropſy. He made a ligature on the aſcending *vena cava* of a dog, which occaſioned its death in a few hours; and upon diſſecting the animal, a great collection of water was found in the abdomen, as if it had long laboured under an *aſcites*. In other experiments, in which the *jugular* veins of a dog were tied, a conſiderable general ſwelling of the parts above the ligature were obſerved by the ſame phyſiologiſt, who expected to find a great extravaſation of blood in thoſe parts, after the death of the animal; but, on diſſection, he found all the interſticial cavities of the muſcles and integuments diſtended with a colourleſs and tranſparent water, or in a true dropſical ſtate. Tractatus de Corde, cap. ii.

This origin of dropſy is farther illuſtrated by the numerous internal cauſes of obſtruction, with which both partial and general dropſy are obſerved to be connected. One of the moſt frequent and remarkable inſtances of the occurrence of dropſy from obſtruction to the circulation through a particular vein, is found in the caſe of *aſcites*, originating from diſeaſed liver. The blood, which circulates to the inteſtines, is collected, in its return to the heart, into one great vein, (the *vena portæ*,) which conveys it through the liver by numerous branches, before it reaches the organ of its motion: when the liver, therefore, is greatly diſeaſed, the paſſage of the blood through it is impeded or prevented, as much as by the ligature of Lower; and the exhalent arteries of the inteſtines and *peritoneum* pour out water into the cavity of the belly.

Hence dropſy, eſpecially in the form of *aſcites*, is frequently the conſequence of intemperance in the uſe of ſpirituous and fermented liquors, which commonly excites ſchirrous tumours, tubercles, and other obſtructions in the liver. From a ſimilar circumſtance, dropſy is ſometimes one of the *ſequelæ* of fevers, eſpecially of intermittent fevers, which, when they continue long, occaſion obſtructions in the liver, or enlargement and obſtruction of the ſpleen and other viſcera. Theſe, when they preſs upon any conſiderable vein, bring on dropſy, and particularly by compreſſing the *vena cava* give riſe to *anaſarca* of the lower extremities. Dropſy is a common conſequence or concomitant of diſeaſes of the lungs, in which the circulation of the blood through thoſe organs is conſiderably impeded, as happens in peripneumony, in aſthma, in the catarrh of old people, &c. Not only *hydrothorax*, or dropſy of the cheſt itſelf, but anaſarca generally, and ſometimes univerſal dropſy, are thus occaſioned. For if the great maſs of blood is prevented from paſſing freely through the lungs from the heart, the return of blood from the extremities of the arterial ſyſtem to the heart is likewiſe impeded; and a greater tide, therefore, is turned upon the exhalents in general. Impoſthumes in the lungs, and pulmonary conſumption, produce dropſical effuſions in a ſimilar manner. And ſtill ſmaller obſtructions to the circulation produce the ſame effects; ſuch as oſſification of the valves of the heart. (See Monro on the Dropſy, p. 1.) It may ſerve as a farther illuſtration of the operation of theſe general cauſes to remark, that where the force of the circulation is weak, if the poſture of the body is ſuch as gives occaſion to the gravity of the blood to oppoſe in ſome meaſure the motion of it in the veins, the return of the venous blood being thus reſiſted, a ſufficient preſſure on the exhalents is produced to give riſe to effuſion. Whence it partly ariſes, that an upright poſture, eſpecially if long continued, produces or increaſes ſerous ſwellings in the lower extremities; and ſuch ſwellings are always great in the evening, and ſmaller in the morning. Even in the ſmaller portions of the venous ſyſtem, the interruption of the motion of the blood in particular veins has had the ſame effect. Thus a polypus formed in the cavity of a vein, or tumours in its coats, or compreſſing it externally, and preventing the free paſſage of the blood through it, have had the effect of producing dropſy in parts towards the extremity of ſuch veins. A ſchirrous tumour in the arm-pit often cauſes the arm to become extremely anaſarcous; and aneuriſms in the arteries, abſceſſes, and ſteatomatous or other tumours in the adjoining parts, are the moſt common cauſes of dropſy from venous compreſſion. To this head may be referred the compreſſion of the deſcending *cava* by the bulk of the uterus in pregnant women, as well as by the bulk of water in *aſcites;* both of which frequently produce ſerous ſwellings in the lower extremities.

The ſuppreſſion of natural or cuſtomary evacuations, as of urine, perſpiration, piles, menſes, &c. has been often deemed the cauſe of dropſy; and it has been ſuppoſed to have the effect of increaſing the exhalation, by producing a preternatural plethora in the venous ſyſtem, and therefore obſtructing the freedom of the arterial circulation. This hypotheſis, however, appears to be fanciful, and altogether gratuitous; and a dropſy from ſuch a cauſe has been at leaſt a rare occurrence. Dr. Cullen juſtly obſerves, that when ſuch a dropſy ſeems to have originated in this way, it was more probably owing to the ſame cauſes as the ſuppreſſion itſelf, rather than to the plethora produced by it. (Firſt Lines, § 1655.) In the caſes in which a ſpontaneous ſuppreſſion of ſuch evacuations occurs, there is generally more or leſs of a morbid condition of the habit, connected with a *debility of the ſolids*, and indicated by languor, paleneſs, and paſtineſs of the countenance, (termed by the ancients *leucophlegmatia*, from a ſuppoſed prevalence of *white phlegm* in the humours,) loſs of appetite and ſtrength, and other failures of the functions. To this ſtate of diſeaſe, whether belonging to *chloroſis*, conſumption, &c. or whether the reſult of cold, intemperance, or other morbid cauſe, both the ſuppreſſion of the diſcharges alluded to, and the appearance of the dropſical effuſions, are to be attributed: for, as we ſhall attempt to ſhew, *debility of the ſolids*, both in the exhalent arteries in particular, and in the ſyſtem at large, is a frequent cauſe of dropſy.

That a debility and laxity of the exhalent veſſels is occaſionally the cauſe of increaſed exhalation, by permitting the thinner parts of the blood to paſs too readily through them, appears to be proved from the circumſtance, that palſied limbs, in which ſuch a laxity is to be preſumed, are frequently affected with dropſical, or, as they are called, *œdematous* ſwellings. But a great general debility is ſtill more remarkably and frequently attended with dropſy; and dropſy is a moſt common conſequence of the operation of all powerfully debilitating cauſes. Hence fevers, whether of the intermittent or continued ſort, which have laſted long; long continued and ſomewhat exceſſive evacuations of any kind; and, in ſhort, almoſt all diſeaſes, which have been of long duration, and have at the ſame time induced the other ſymptoms of debility, are followed by dropſy. Intemperance in the uſe of intoxicating liquors, beſides exciting diſeaſe in the liver, is a frequent cauſe of general debility of the ſyſtem: whence it partly happens, that drunkards of all kinds, and eſpecially dram-drinkers, are ſo often affected with dropſy.

The fact, that ſerous effuſions are obſerved to take place in every cavity and interſtice of the body, at the ſame time, —into the cavity of the cranium, of the thorax, and of the abdomen, and likewiſe into the cellular tiſſue throughout,—is adduced by Dr. Cullen in proof of the operation of a general cauſe; which is rendered ſtill more evident by the circumſtance, that theſe ſeveral dropſies have increaſed in one part as they diminiſhed in another, and this alternately in the different parts. In moſt inſtances, he adds, hardly any ſuch cauſe can be thought of, except a *general laxity* of the exhalents. This *hydropic diatheſis*, he obſerves, frequently operates by itſelf; and frequently, by concurring with the other cauſes, contributes to give them their full effect. Loc. cit. § 1657.

There is a third cauſe by which an increaſed exhalation may be brought on, and dropſy be produced. This is a preternatural abundance or proportion of ſerous or watery fluids in the blood veſſels, and more eſpecially when ſuch a condition concurs with the cauſes above-mentioned. The experiments of Dr. Hales eſtabliſh the truth of this fact, as fully as thoſe of Lower evince the effect of venous obſtruction. Dr. Hales ſuppoſed that water, being thinner than the red blood, would paſs more readily from the extremities of the arteries into the veins; and he injected warm water into the arteries of dogs: the event did not anſwer his expectation; for the water did not return by the veins, but eſcaped through the exhalent arteries, through which the red blood could not paſs into the interſtices of the cellular membrane, occaſioning a dropſical ſwelling. (Hales Hæmaſtat. Exp. xxi.) When he perſiſted to inject water through a tube fixed to the carotid artery, although the jugular veins were cut longitudinally, the water did not iſſue freely by theſe apertures; but all the parts of the body began to ſwell, and an univerſal dropſy took place; the lungs were diſtended, all the muſcles grew turgid, the interſtices between the fibres being filled with water: yet the water was not propelled through the arteries with a greater force than the power of the heart in its natural ſtate. (Ibid. Exper. xiv.) It appears evident, therefore, that a mere increaſe of the watery portion of the blood diſpoſes the body to dropſy.

This over-proportion of watery fluids may be occaſioned by various circumſtances. Exceſs in the uſe of thin and watery liquids is one of the moſt obvious of theſe; and it is certain that dropſy has been induced by drinking an unuſual quantity of water, tea, &c. Large quantities of water, it is true, are on many occaſions taken in; and being as readily thrown out again by ſtool, urine, or perſpiration, have not produced any diſeaſe. But it is alſo certain, that, upon ſome occaſions, they have run off by the internal exhalents, and produced a dropſy. This ſeems to have happened either from the excretories not being fitted to throw out the fluid ſo faſt as it had been taken in, or from their having been obſtructed by accidentally concurring cauſes. Accordingly, the ſudden drinking of a large quantity of *very cold* water has produced the dropſy, probably from the cold producing a conſtriction of the excretories. An interruption of the ordinary watery ſecretions is apparently alone the cauſe of dropſy, by occaſioning a preternatural proportion of the watery fluids in the blood-veſſels; accordingly, it is alleged, that perſons much expoſed to a cold and moiſt air are liable to the diſeaſe; to the production of which the general debility, thus occaſioned, may alſo contribute. An interruption, or conſiderable diminution of the urinary ſecretion, is alſo ſaid to have produced the diſeaſe; and it is certain, Dr. Cullen affirms, that in the caſe of an *iſchuria renalis*, or ſtoppage of the ſecretion, the ſeroſity retained in the blood-veſſels has been poured out into ſome internal cavities, and has occaſioned dropſy.

Dropſy, again, is a common conſequence of very large evacuations of blood, whether ſpontaneous or artificial, as well as of profuſe diſcharges of other kinds; as of bile, in *cholera;* of *pus*, from extenſive ulcerations or abſceſſes, &c.; which laſt, being ſecretions from the blood, contribute to impoveriſh the blood, or to increaſe the proportion of its watery part. But from the effect of great general debility in producing dropſy, as we have already ſtated, and from the conſideration that exceſſive debility reſults from all ſuch evacuations, eſpecially of the blood itſelf, the debility will perhaps afford a larger ſhare of the explanation, than the mere tenuity of the remaining blood, thus occaſioned.

The ſame remark alſo applies to the dropſy, which enſues after long ſubſiſting upon ſcanty, poor, or indigeſtible diet. Dr. Cullen is diſpoſed to explain the dropſical appearances, occurring from ſuch a cauſe, to the want of a due proportion of the gluten and red globules of the blood, while the watery parts are continually ſupplied; and thus, being in an over-proportion, are ready to run off in too great a quantity by the exhalents. Hence the dropſy, ſo often attending *chloroſis*, appears at firſt by a pale colour of the whole body, ſhewing a manifeſt deficiency of the red blood; which in that diſeaſe can only be attributed to an imperfect digeſtion and aſſimilation of the food. (Firſt Lines, 1660.) It cannot, indeed, be doubted that both the cauſes operate together.

The fluids exhaled into the cavities and interſtices of the body, although not in a preternatural quantity, may nevertheleſs be accumulated, and occaſion dropſy, as already obſerved, if any interruption or diminution of the action of the abſorbents ſhould take place. The occurrence of ſuch an interruption of abſorption is, however, not very frequent, and the cauſes of it are not eaſily aſcertained. It is not improbable that a loſs of tone in the abſorbent extremities of the lymphatics may occaſion a diminution, or even a ceſſation of the action of abſorption. For it cannot be doubted, that a certain degree of tone or active power is neceſſary in theſe abſorbent extremities; and it is probable that the ſame general debility, which produces laxity of the exhalent veſſels (in which the *hydropic diatheſis* appears to conſiſt) will at the ſame time occaſion a loſs of tone in the abſorbents; and therefore that a laxity of the former will generally be accompanied with ſome loſs of tone in the latter, both of which will contribute to the production of dropſy. It may be obſerved too, that medicines which ſeem to act by exciting the action of the abſorbents, have often cured dropſical diſeaſe.

It has been ſuppoſed that abſorption may be interrupted by an obſtruction of the lymphatic veſſels, or at leaſt of the conglobate glands through which they paſs. But this is very doubtful; ſince the lymphatics have branches frequently communicating with one another, which renders it improbable that the obſtruction of any one, or even ſeveral of theſe, can have any conſiderable effect in interrupting the abſorption of their extremities. The ſame reaſoning will apply to the interruption in conſequence of obſtruction in the conglobate glands; at leaſt it is only an obſtruction of the glands of the meſentery, through which ſo conſiderable a portion of the lymph paſſes, that can poſſibly have the effect of interrupting abſorption. And even theſe glands are often conſiderably tumefied, without either interrupting the tranſmiſſion of fluids to the blood-veſſels, or occaſioning any dropſy.

A rupture of the lymphatic veſſels may occaſion an effuſion of watery fluids, and thus produce a dropſical ſwelling. In this way a rupture of the thoracic duct has given occaſion to an effuſion of chyle and lymph into the cavity of the thorax; and a rupture of the lacteals has occaſioned a like effuſion into the cavity of the abdomen; and in either caſe a dropſy has been produced. It is ſufficiently probable that a rupture of lymphatics, in conſequence of ſtrains, bruiſes, or the violent compreſſion of neighbouring muſcles, has occaſioned an effuſion, which, being diffuſed in the cellular texture, has produced a conſiderable anaſarca.

Varieties of Dropſy.—As the ſymptoms attending dropſical effuſions vary materially, according to the part of the body in which the fluid is depoſited, it will be neceſſary, before we proceed to detail the methods of cure, to notice thoſe ſpecies of the diſeaſe which moſt frequently occur, and are the moſt common objects of practice.

Dropſy of the Integuments.—*Anaſarca*, or dropſy of the cellular membrane, has been already deſcribed at length. See ANASARCA.

DROPSY *of the cheſt*, *Hydrops pectoris*, or *Hydrothorax*, in which the water is effuſed into the cavity of the breaſt, between the membrane lining the ribs, and the external covering of the lungs, is a common form of dropſy. The ſymptoms, by which the exiſtence of water in the cheſt is to be aſcertained, are various in degree and in combination, ſo as to render it very difficult, in many caſes, to find any better guide than probable conjecture, in determining the preſence of the diſeaſe. The following are the leading ſymptoms, which characterize this affection, when it is fully formed: ſhortneſs of breath, which is much increaſed by lying in a recumbent or horizontal poſture, and is uſually attended with a frequent cough, at firſt dry, but afterwards accompanied with an expectoration of thin mucus;—paleneſs or purple hue of the face, particularly of the lips;—frequent, ſudden, and ſpontaneous ſtarting from ſleep, accompanied with a ſenſe of ſuffocation, anxiety, and palpitation of the heart, which immediately require an erect poſture;—a paucity of the ſecretion of urine, which is always of a high colour, and, when cooling, depoſits a copious reddiſh ſediment;—and laſtly, an œdematous ſwelling of the feet and legs, and a puffineſs about the lower eye-lids. When all theſe ſymptoms are preſent, they will leave no doubt as to the exiſtence of hydrothorax. The great difficulty of breathing ariſes from the compreſſion of the lungs by the ſurrounding water, and the conſequent inability to admit a ſufficiency of air into the cells, or a free tranſmiſſion of the blood through them. This difficulty is increaſed by the horizontal and diminiſhed by the erect poſture; becauſe, while the body is erect, the preſſure of the abdominal viſcera upon the diaphragm is removed by their own gravity, and the gravity of the incloſed water preſſing down the upper ſurface of the diaphragm, tends alſo to enlarge the ſpace in which the lungs move; but the contrary occurs in the horizontal poſition. The ſtarting from ſleep does not always accompany hydrothorax, but it does generally, and is not found in *empyema*, or other diſeaſes of the thorax.

The moſt deciſive ſymptom of hydrothorax is a fluctuation of water in the cheſt, perceived by the patient himſelf, or by the phyſician, upon certain motions of the body, according to Dr. Cullen. He does not, however, ſeem to have made much uſe of this teſt. Profeſſor Gregory, his ſucceſſor, ſtates, that he has never been able to diſcover fluctuation in the cheſt in hydrothorax, although in empyema he has eaſily perceived it. He properly ſuggeſts that great caution ſhould be uſed in making the experiment; inaſmuch as patients under hydrothorax occaſionally die ſuddenly from ſlight agitation or exertion, and at all events it greatly alarms the patient, when he thus aſcertains the actual exiſtence of water in the cheſt. Beſides theſe objections, it may be added, that when the ſtomach is moderately diſtended with liquid nutriment, the fluctuation from that cauſe, which is readily perceived, may be eaſily miſtaken for a fluctuation in the cheſt. The teſt propoſed by Auenbrugger of a percuſſion of the thorax, and an obſervation of the ſort of ſound thus occaſioned, appears to be altogether futile. (See Invent. nov. ex percuſſ. thorac. ut ſigno, &c. 1763. Vindob.)

When the diſeaſe is advanced, a numbneſs or palſy in one or both arms has been frequently obſerved to come on, and the pulſe commonly becomes irregular and often intermitting; but this laſt ſymptom occurs in ſo many other diſeaſes of the cheſt, that its importance can only be eſtimated in conjunction with the other appearances.

The hydrothorax ſometimes appears alone without any other ſpecies of dropſy being preſent at the ſame time; and in this caſe the diſeaſe is for the moſt part a partial affection, ſometimes of one ſide of the thorax only, ſometimes conſiſting of a collection of hydatids in one part of the cheſt. Occaſionally an univerſal dropſy has begun by effuſion into the cheſt: it more frequently, however, comes on from an anaſarca gradually increaſing; and the general dropſical diatheſis ſeems often to affect the thorax ſooner than either the head or the abdomen.

The *prognoſis* in hydrothorax is generally unfavourable, as it originates moſt frequently from local organic diſeaſe in the viſcera of the thorax. By ſome writers it has been deemed the moſt dangerous form of dropſy; but from a judicious compariſon of facts by Dr. Ferriar of Mancheſter, it appeared to be at leaſt as often removed, as the other forms of dropſical effuſion. We have occaſionally ſeen examples of recovery from hydrothorax under very unpromiſing circumſtances: ſo that the event of the diſeaſe cannot be predicted with too much caution.

Dropsy *of the lungs*, *hydrops pulmonum*, or *anaſarca pulmonum*, in which the watery effuſion is made into the cellular membrane, in the ſubſtance, or rather between the cells, of the lungs themſelves, and not into the cavity of the thorax, is attended with nearly the ſame ſymptoms as the hydrothorax; and it is often difficult, if not impoſſible, to diſtinguiſh them. But the *œdema*, or dropſy of the cellular membrane of the lungs, when its attack is ſudden, Dr. Percival obſerves, may often be diſtinguiſhed by the following ſigns, although it muſt be acknowledged that they often prove equivocal. "The difficulty of reſpiration is conſtant, and increaſed by the leaſt motion, though not much varied by different attitudes of the body; the patient complains of great anxiety about the *præcordia*, and when he attempts to take a deep inſpiration, he finds it impoſſible to dilate his cheſt, and his breath ſeems to be ſuddenly ſtopped, &c." (Eſſays Med. and Experimental, vol. ii. p. 177.) The principal diagnoſtic ſymptom, it will be obſerved, is the circumſtance, that the dyſpnæa is not increaſed by change of poſture; the water, not being in the cavity of the thorax, but confined in the body of the lungs, cannot change its place by change of attitude, but muſt equally compreſs the cells in all poſitions of the body. This diſtinction, however, of the two forms of dropſy, is of little practical utility, unleſs with a view to the operation of tapping.

Dropsy *of the pericardium*, or of the inveſting membrane of the heart, *hydrocardia*, *hydrops pericardii*. It will perhaps be ſufficient to ſtate here, in the words of Dr. Donald Monro, that "the dropſy of the pericardium can ſcarce be certainly known till after death, by diſſection; for all the ſymptoms of this diſeaſe, that have been ſpecified by the moſt accurate phyſicians, are ambiguous; for inſtance, an unequal pulſe, an uneaſineſs in lying, a frequent neceſſity of ſitting down, an oppreſſion within the ſternum after motion, difficulty of breathing, attended with a ſenſe of pain and reſtleſſneſs, either no cough at all, or a very moderate and dry one, all which ſymptoms become milder or go off altogether when the patient is at reſt. And could the dropſy of the pericardium," he adds, "be diſcovered, it ſcarce ever yields to internal remedies; and it would be a bold, not to ſay a raſh attempt, to make an aperture into the pericardium." (Eſſay on the Dropſy, p. 166.) Sauvages mentions the occurrence of frequent faintings, or *ſyncope*, and an obvious tremulous or undulatory motion between the third and fifth ribs, correſponding with the pulſations of the heart, as conſtituting, in addition to the ſymptoms of hydrothorax, the ſigns of dropſy in the pericardium. (Noſolog. Method. Claſs v. Genus xiii. ſp. 8.) But ſimilar ſymptoms are attributed to other diſeaſes of the heart, as to inflammation and dilatation of that organ. See Carditis, and Cardiogmus.

Dropsy *of the belly*, *Aſcites*, is the name given to every collection of waters that cauſes a general diſtenſion and ſwelling of the abdomen, or lower belly. Such collections are more frequent than thoſe which occur within the thorax, and, like them, are found in different ſituations. The moſt common form of abdominal dropſy is that which takes place in the general cavity of the belly, or, as it is more ſtrictly expreſſed, in the ſac of the *peritoneum*. Occaſionally, however, the water is contained in a preternatural ſac, formed upon and connected with one or other of the viſcera; the moſt frequent inſtances of which occur in the *ovaria* of females. Sometimes the collection conſiſts of ſpherical membranous bags of fluid, generally encloſing other ſimilar bags, which appear to be of an animalcular nature, and are termed *hydatids*. Very rarely the ſac of the *omentum* has been the ſeat of a dropſical collection; and in other rare inſtances water is found entirely without the *peritoneum*, or lining membrane of the abdomen, and between this and the abdominal muſcles. The collections of fluid connected with the viſcera, in preternatural ſacs or cyſts, have been denominated *encyſted dropſy*, or *hydrops ſaccatus*. The ſame term has been applied by ſome authors both to the collections of hydatids, and to the dropſy external to the peritoneum. See Hydatids.

The diſtinguiſhing characteriſtic of the ordinary form of aſcites, in the cavity of the belly, is an uniform, tenſe, and nearly inelaſtic ſwelling of the belly, in which the fluctuation of the water within may be perceived by the practitioner's feeling, and ſometimes by his hearing. The ſwelling is accompanied with a ſenſe of weight and diſtenſion, which vary a little according as the poſture of the body is changed, being felt the moſt on the ſide on which the patient lies. When the collection of water becomes conſiderable, it is always attended with a difficulty of breathing, even though there be no water in the thorax; becauſe, as the abdomen is diſtended in all directions, the diaphragm is neceſſarily preſſed upwards, and the cavity of the thorax ſtraightened. The fluctuation may be readily felt, by applying one hand open to one ſide of the abdomen of the patient, and gently ſtriking the other ſide. Where this is diſtinctly perceived, it affords a ſatisfactory diagnoſis, by which the diſeaſe may be pronounced to be neither *tympanites*, or windy dropſy, nor *phyſconia*, or ſolid tumour, nor pregnancy, when the patient is a female. It may be remarked, however, that when the diſtenſion of the belly is extremely great, it acquires a conſiderable degree of elaſticity, by which an incautious examiner might be led to ſuſpect *tympanites*. In aſcites, as in the other forms of dropſy, the urine is ſcanty, high-coloured, and generally thick after ſtanding. There is ſometimes a ſlight degree of fever preſent. Aſcites frequently occurs, when there is no other dropſical appearance; but it is often only a part of univerſal dropſy, and comes on from a gradually increaſing anaſarca. Sooner or later, however, it for the moſt part occaſions anaſarcous ſwellings of the lower extremities, although there is no general hydropic diatheſis preſent.

Encyſted Dropsy, or *hydrops ſaccatus*, is often extremely difficult to aſcertain from its ſymptoms, eſpecially when the progreſs of the diſeaſe has not been accurately noticed; for where the ſac has already attained a large ſize, the ſwelling and fluctuation are ſimilar to thoſe of aſcites. In the *encyſted* dropſy, the ſwelling is at firſt confined to one part of the abdomen, and is often attended with an obtuſe pain; the fluctuation is for ſome time obſcure, or altogether imperceptible; and there is often a ſenſe of dragging and uneaſineſs on turning in bed. If theſe ſymptoms have not been preceded, or for ſome time accompanied by any remarkable derangement of the general health: if the ſtrength be little impaired, the appetite continue pretty good, and the natural ſleep be little interrupted; if the menſes in the female continue to flow, and there be no leucophlegmatic paleneſs or ſallowneſs of the complexion, and leſs thirſt or ſcantineſs of urine, than occur in dropſy in general;—according as more of theſe circumſtances take place, there will be ſtronger ground for ſuppoſing the *aſcites* to be of the *encyſted* kind.

Encyſted dropſy occurs in connection with moſt of the viſcera of the abdomen, but the form moſt frequently ſeen, is the Hydrops *ovarii*, or encyſted dropſy attached to the *ovarium* in the female. In this caſe, the diſeaſe commences in one or other ſide of the hypogaſtric region, or lower part of the body, to which part the tumour is for ſome time circumſcribed, and is often moveable under the hand. There is ſometimes an uneaſineſs in the part, amounting rather to a ſenſe of weight, than of ſevere pain; and the health ſuffers little. By degrees the tumour becomes more fixed, more extended both forwards and upwards in the belly, and more painful and oppreſſive to the patient. When the cyſt is ſingle, and at length extended over the whole abdomen, it cannot be diſtinguiſhed by the feel from a common aſcites: till which period, however, it can hardly be ſaid to reſemble it. "I have had occaſion to ſee a great number of encyſted dropſies," Dr. Hunter obſerves, "many of them treated by phyſicians of the firſt rank, and yet have never ſeen one cured; nor have I ever known one caſe of that kind where the cyſt has been ſenſibly diminiſhed in bulk, by any other means than by the *trocar*. If I may form a judgment from what I have ſeen, both in the living and in the dead body, I ſhould believe that the dropſy of the *ovarium* is an incurable diſeaſe; and that a patient will have the beſt chance of living longeſt under it, who does the leaſt to get rid of it. The *trocar* is almoſt the only palliative." (See Med. Obſ. and Inquiries, vol. ii. p. 41.) This opinion is but too well founded. Nevertheleſs patients have in ſome inſtances lived to old age under the influence of this diſeaſe. The caſe of an unmarried woman is related in the Mem. de l'Acad. de Chirurg. tom. ii. who was attacked with this diſorder at the age of thirty, and lived to be eighty years old, when the ſwelling filled the abdomen. Mr. Martineau of Norwich communicated to the Royal Society, a caſe of *ovarial* dropſy, which began after a miſcarriage in the 27th year of the patient's age. She was firſt tapped in 1757, and afterwards had recourſe to the *trocar* three, four, or five times a year, till her death in 1783. She was tapped 80 times, and loſt 6631 pints of fluid. (See Lond. Med. Journal, vol. v. for 1784, p. 315.) Profeſſor Morand aſſerts, that he ſeveral times performed this operation upon a lady of quality, who ſuffered ſo little from it, that ſhe frequently went into the country the day after the operation, although generally eighteen pints of water were drawn out: nor did ſhe die at laſt of the dropſy, but of ſome other diſeaſe. (Van Swieten Com. ad Aph. 1223.)

Sometimes the cyſt in *ovarial*, or other encyſted dropſy, has burſt, and produced an aſcites of the abdomen, by pouring out the fluid into that cavity.

There is occaſionally a matter of great delicacy and difficulty of deciſion, which the phyſician is called upon to determine, namely, whether an abdominal enlargement be the conſequence of this diſeaſe, or of pregnancy. So much of character and feeling is concerned in ſuch a queſtion, that the utmoſt caution is neceſſarily requiſite, and the moſt comprehenſive inquiry into the circumſtances and ſymptoms ſhould be inſtituted, before any deciſion can be made. The ſymptoms of pregnancy in the early months are various and ambiguous, and thoſe of *encyſted* dropſy are perhaps ſtill more uncertain. A careful compariſon of both, and of the general circumſtances of the health, can alone enable us to form a correct judgment. See Pregnancy.

The Dropsy *of the Peritoneum*, as it has been termed by ſome writers, (See Med. Obſ. and Inq. vol. i. p. 7.) or dropſy between the peritoneum and abdominal muſcles, has been included under the term of encyſted dropſy by Dr. Cullen and others. (Monro loc. cit. p. 118.) It is the Ascites *internus* of Sauvages, Spec. 14, who quotes La Mothe Obſ. 100. Van Swieten has entered into a long diſcuſſion of a queſtion, reſpecting the ſeat of this effuſion, *viz.* whether the fluid is collected between the duplicature of the peritoneum, as the ancients ſuppoſed, or between the peritoneum and muſcles. It is probable the older phyſicians were miſled, in believing the peritoneum to be double, by the thickening of the cellular membrane, external to the peritoneum. (See Mead, Monit. et Præcep. p. 128.) Liſtre has deſcribed the diagnoſtic ſymptoms of this form of dropſy. It agrees with the encyſted dropſy, he obſerves, in the locality and ſlow progreſs of its ſymptoms, for a conſiderable period after the commencement; the ſwelling does not alter much in form by change of poſition, as in aſcites; it does not begin in the lower part of the body, nor is accompanied with obtuſe pain, as in ovarial dropſy; the fluctuation is confined within the limits of the ſwelling; the lower extremities do not ſwell, or very little; and the patient ſuffers ſcarcely any other inconvenience, than what ariſes from the ſize and weight of the tumour gradually increaſing. (Van. Swieten ad Aph. 1226.) A caſe of this ſpecies of dropſy is related in the Philoſophical Tranſactions, which occurred in a woman, whoſe belly was amazingly ſwelled, but who lived upwards of 30 years, in other reſpects healthy. And a ſtill more extraordinary inſtance of the ſame ſpecies of dropſy, in the perſon of Elizabeth Boucheret, of Spitalfields, is recorded in the firſt vol. of the Med. Obſ. and Inquiries. She continued 44 years without any perceptible change in the ſize of her ſwelling, (ſhe meaſured upwards of three yards round the waiſt,) and died at the age of 82. She would never conſent to be tapped.

Dropsy *of the Head*, or *chronic hydrocephalus*. The title of dropſy of the head has been given to two very diſtinct forms of diſeaſe, differing widely in their nature, origin, progreſs, and appearances from each other; one of which has been denominated the *acute*, and the other the *chronic* hydrocephalus. It is the latter only which, in its general characteriſtics, partakes of the true dropſical nature, and therefore falls under our cognizance in this place. The other diſeaſe, which has been variouſly named hydrocephalus *internus*, and *acutus*; *Apoplexia hydrocephalica*, and *Phrenicula*, will be deſcribed hereafter under its moſt common appellation, Hydrocephalus.

The chronic dropſy of the head is a diſeaſe, which commences in early infancy, or ſubſiſts from or even before birth, and conſiſts in a ſlow effuſion of water, ſometimes external to the brain, but within the bones of the ſkull, before thoſe bones have united by their ſutures, and thus preventing their union, and diſtending the head to an indefinite ſize, while the face remains unchanged, or at all events very diminutive in compariſon with the cranial tumour. The head, thus enlarged, is ſoft to the touch, and ſomewhat elaſtic, and the openneſs of the ſutures may be perceived by the touch. This is an irremediable diſeaſe, and fortunately rare. Inſtantaneous death is ſaid to have followed every attempt to relieve the diſorder, by opening the ſwelling. We are acquainted with one caſe of this ſpecies of dropſy, in a female, who lived to the age of 16 years. She was blind, and without the power of locomotion; the head had attained an enormous and unwieldy magnitude, ſo that a hollow ſupport, in the back of the chair in which ſhe ſat, was conſtructed to receive it.

The Dropsy *of the ſpinal marrow*, *ſpina bifida*, or *hydrorachitis*, is alſo a congenital and univerſally mortal diſeaſe, in which there is a deficiency in ſome part of the ſpine, and a watery tumour communicating with the ſpinal marrow. See Hydrorachitis.

Dropsy *of the ſcrotum*, in *Surgery*. See Hydrocele.

Dropsy *of the eye*. See Hydrophthalmia.

From the preceding view of the various forms and cauſes of dropſy, it muſt be obvious, that the general *prognoſis* muſt be, on the whole, unfavourable. The difficulty of removing the diſeaſe was thus long ago noticed by Aretæus. "Ab ipſo pauci liberantur, idque felicitate, ac deorum potius quam artis auxilio." And modern phyſicians, ſays Dr. Home, were they as honeſt, could ſay little more. Of thirty caſes, however, which this intelligent phyſician has detailed, twenty are reported as cured. (See Clinical Experiments and Hiſtories, p. 349, *et ſeq.*) And of 47 caſes, related by Dr. Ferriar, 22 are deſcribed as cured, five relieved, ſeven not relieved, ten dead, and three convaleſcent. (See Medical Hiſt. and Reflec. vol. i. p. 108.) It appears, from Dr. Ferriar's table, "that caſes of anaſarca alone, or of anaſarca and aſcites complicated, are the moſt curable ſpecies of dropſy;—next to theſe aſcites;—and that the moſt intractable kind is the complication of aſcites and anaſarca, or of either, with hydrothorax. The caſes of hydrothorax alone were very favourable; but they are not in ſufficient number to juſtify a concluſion." Of *four* ſuch caſes, *two* were cured, *one* relieved, and *one* convaleſcent. But in theſe diſeaſes relapſe is ſo frequent, that ſeveral of theſe cures would probably prove to be but inſtances of a temporary removal of the ſwellings.

In forming a judgment reſpecting the ultimate event of dropſies, the age and conſtitution of the patient, the nature of the cauſes, the ſymptoms and duration of the complaint, its ſimplicity or combination with other diſorders, and the effects which remedies, already applied, have produced, muſt be taken into conſideration. Univerſally, however, the leſs the ſtrength of the conſtitution is impaired, or the blood impoveriſhed, the more readily may the diſeaſe be expected to be ameliorated by remedies. On the contrary, if the diſeaſe occurs in advanced life, in a leucophlegmatic or broken habit, and has been brought on by intemperance, or is connected with organic diſeaſe of the heart, lungs, liver, ovarium, &c. medicine may alleviate it, but will ſeldom effect a cure. Among the *unfavourable ſigns*, are progreſſive waſting of the fleſh, purple, or livid ſpots, or eryſipelatous eruptions on the ſkin, ſpontaneous hæmorrhages from different parts, or diarrhœa, without relief, the ſwelling, when reduced by medicine, returning more quickly than before;—all implying the great proſtration of the living powers: and conſtant feveriſh heat, and intenſe thirſt, indicating the exiſtence and progreſs of organic diſorder. Among the *favourable ſigns* may be mentioned the abſence of thoſe juſt enumerated, the pulſe remaining of good ſtrength, ſteady, and not quick, the deficient excretions, eſpecially the urine and perſpiration, being ſenſibly increaſed by remedies of moderate power, and the appetite, reſpiration, and ſleep, not ſuffering ſeverely.

Cure of Dropsy.—In attempting the cure of dropſy, three indications preſent themſelves to the practitioner: the firſt object to be accompliſhed, is the removal of the fluid already effuſed; the ſecond, to obviate or remove the cauſes which gave riſe to it; and the third, to reſtore the ſtrength of the ſyſtem, and prevent the return of the diſeaſe.

1. The fluids already collected may be evacuated either *indirectly*, through the natural excretories of the body, by exciting them to increaſed action; in conſequence of which an abſorption may be excited in the dropſical parts, and the ſerum, thus abſorbed and carried into the blood-veſſels, may paſs out by one or other of the common excretions. The principal emunctories, through which the effuſed fluids may be made to paſs off, are the ſtomach, the inteſtines, the kidnies, and the ſkin, by means of their correſponding evacuants, emetics, cathartics, diuretics, and diaphoretics. Or they may be drawn off *directly*, by artificial openings, produced by punctures, bliſters, &c.

Spontaneous vomiting has ſometimes been obſerved to occaſion abſorption in dropſical parts, and to evacuate the fluids contained in them: and hence perhaps the uſe of *emetics* was firſt ſuggeſted in the cure of dropſy. The practice is very ancient; Aëtius recommends emetics in ſimple anaſarca. Our countryman, Sydenham, uſed them largely in the cure of dropſy, eſpecially the draſtic antimonial emetics, which he preſcribed in large doſes, frequently repeated, and at ſhort intervals. A copious purging generally followed the emetic effect of theſe remedies. Sydenham, as well as the ancient writers, ſeems to have conſidered the concuſſion and commotion of the viſcera, as the chief curative effect of emetics, which thus were ſuppoſed to occaſion the reſorption of the fluids, as well as to open obſtructions of the viſcera. And if purging did not enſue, after the concuſſion of vomiting, Sydenham ordered a briſk purgative to carry off the water, ſo abſorbed, from the inteſtines. (Syden. Tract. de Hydrope.) It is obvious, however, that the antihydropic effects of vomiting are extremely uncertain; and that, where the patient is already much debilitated, their operation in a violent way muſt be attended with detriment, if not with danger. The practice is, on the whole, therefore, little reſorted to at preſent.

The emetic operation of a ſubſtance much uſed in dropſy, the *ſcilla*, or ſquill, has been the ſubject of ſome difference of opinion. Van Swieten, Ruſſell, and others, conſider this medicine as more effectually relieving dropſy, when its emetic operation is avoided; (Swieten ad Aph. 1243. Ruſſell de tabe glandul. p. 68.) whereas Dr. Home deems it moſt chiefly uſeful, when vomiting is excited by it. Of *ten* hydropic patients, who took the ſquill, ſeven were cured, in each of whom it produced vomiting; and three were not cured, none of whom had any vomiting, but in all of whom the other evacuations were increaſed. "During the vomiting," he obſerves, "much fluid is thrown up, and the abdomen falls in proportion. Sometimes a pint or two only, ſometimes twelve pints are evacuated, in one paroxyſm. In this way the hydropic ſymptoms diſappear, and take from two to ſixteen days before that happens." (Clin. Exper. p. 371.)

Cathartics, however, are among the more powerful remedies againſt dropſy, and patients more readily ſubmit to purging, than to the operation of emetics. This practice was alſo employed by the ancients, and was ſuggeſted probably by the occaſional natural cure of dropſy, by a ſpontaneous diarrhœa. Hippocrates, in ſeveral places in his writings, notices the ſalutary effects of ſuch a diarrhœa in the *beginning* of dropſy. "If a ſpontaneous diarrhœa come on," he ſays, "in the beginning of the diſeaſe, the patient will probably recover: but if there be no ſuch diarrhœa, let a cathartic be given." (De Morbis, lib. ii. cap. 28.) There are certainly no means in our power of procuring a copious evacuation of ſerous fluids more effectually than by the operation of purgative medicines, and none perhaps more ſucceſsfully employed in the cure of dropſy. (See CATHARTICS.) The relief is generally in proportion to the quantity of fluids diſcharged; whence it is the cuſtom to employ purgatives of the more active or draſtic kind, ſuch as jalap, alone, or combined with calomel, gamboge, or cryſtals of tartar, ſcammony, and even elaterium. The employment of cathartics ſhould be regulated, however, with ſome caution and diſcrimination. Where the conſtitution is obviouſly much broken by age, long continued diſeaſe, or intemperance, all violent operations and copious diſcharges will be detrimental; they will tend but farther to weaken the body, and to render it leſs able to ſupport the ravages of a ſevere diſorder. When the ſtrength, age, and other circumſtances of the patient admit of the uſe of cathartics, they ſhould be repeated at ſhort intervals. They are more beneficial and ſafe in ſimple *aſcites*, than in the other forms of dropſy, or in the combination of them. For the watery fluids diſcharged by purging, are evacuated from branches of the ſame arteries, which pour out water into the abdomen, and the ſtimulus of the purgative is moſt directly communicated to the abſorbents of the abdominal ſurfaces.

It has been obſerved, however, of late years, that ſome cathartic medicines, of milder qualities than thoſe juſt enumerated, are beneficial in dropſy, eſpecially the *cryſtals of tartar*, or acidulous tartrite of potaſs. In conſequence of the ſuggeſtions of Manghini, (in the Comment. Bonon. tom. 4.) Dr. Home inſtituted a ſeries of experiments upon the effects of this ſalt in the various forms of dropſy; and his report of the reſult was very favourable. Since that period, the medicine has been again made the ſubject of comparative trial by Dr. Ferriar, who has alſo experienced much benefit from its adminiſtration. Of twenty caſes under Dr. Home's care, the dropſical ſymptoms diſappeared in thirteen, under the uſe of the cryſtals of tartar, and in ſeven they were not removed. He obſerved it to be more ſucceſsful in anaſarca, next in aſcites, and leſs in hydrothorax than in the other two. He generally ordered half an ounce to be taken in the morning, at different times, before breakfaſt, diſſolved in about ten ounces of water; afterwards increaſing the doſe. It generally purged the patient twice or thrice a day with eaſe, and alſo acted as a diuretic. But Dr. Home remarks that its antihydropic powers were much greater than thoſe of many articles which are much ſtronger diuretics; and, therefore, he conſiders that its principal mode of operation is deobſtruent: for it ſometimes cured the dropſy, when little or no evacuation, either by ſtool or urine, was produced. (Clin. Exper. p. 326. *et ſeq.*) Dr. Ferriar found the cream of tartar the moſt effectual remedy for dropſy. He gave it, after the manner of Dr. Home, in forty-three caſes; of theſe thirty-three recovered, nine died, and three were relieved. He generally found it purge the patient four or five times a-day; ſo that inſtead of increaſing the doſe, he was often obliged to order tonics and cordials, to enable the patient to bear the uſual quantity. In the ſucceſsful caſes, it operated early, and generally produced alſo an increaſed flow of urine within twenty-four hours. But he adds, that it diminiſhes the ſwellings more ſpeedily than the increaſe of urine would lead us to expect. (Med. Hiſt. &c. vol. i. p. 88, & ii. p. 162.) This medicine, however, like all other evacuants, employed for the cure of dropſy, frequently diſappoints the practitioner.

The kidnies afford a natural outlet for the watery part of the circulating fluids; and the diminution of the urine being a prominent ſymptom, under every form of dropſy, the re-excitement of that excretion at once ſuggeſts itſelf as a probable means of carrying off the preternatural accumulation of water, which conſtitutes the diſeaſe. *Diuretic* medicines have, therefore, been always properly adminiſtered in the treatment of dropſies. Unfortunately, however, all medicines of this claſs are very uncertain in their operation; and we are ignorant of the circumſtances which cauſe them ſometimes to ſucceed, and ſometimes to fail, and which render one article beneficial, and another inert. At all events diuretics, like other evacuants, are rarely of themſelves adequate to a cure, inaſmuch as the effuſion of the water, which they remove, generally depends upon ſome diſeaſe of the conſtitution at large, or upon ſome local obſtruction.

The *ſquill*, in a variety of forms of preparation, is often uſeful as a diuretic, and has been uſed from ancient times for the purpoſe of increaſing the urinary diſcharge. The *digitalis*, or foxglove, has been introduced in our own time by Dr. Withering, as a powerful diuretic: but on account of its powerful effects on the pulſe and nervous ſyſtem, much caution is requiſite in adminiſtering it. It appears that, where it proves ſucceſsful, it generally gives relief early, and in ſmall doſes; hence, if it do not produce any deciſive effects within the firſt week or ten days, it is adviſeable to exchange it for ſome other diuretic, or to interpoſe a cathartic. This obſervation, indeed, is applicable to diuretic medicines in general. It has been obſerved, that when given in ſuch quantities as to excite nauſea, or to produce evident narcotic effects, the digitalis does not operate as a diuretic. Others, however, have aſſerted the contrary. Dr. Withering early remarked, that a relaxed, weakened, and depreſſed ſtate of the ſyſtem, was moſt favourable for procuring the full effects of this medicine; and that in perſons of tenſe fibre, florid complexion, and much natural ſtrength, labouring under dropſy, it ſeldom ſucceeded; whereas, when the pulſe was feeble or intermitting, the anaſarcous limbs and body ſoft and yielding, the countenance pale, and the ſkin cold, the diuretic powers of the plant were conſpicuous. The laſt writer on the ſubject, Dr. Hamilton, of Bury St. Edmund's, confirms this fact; as does the general experience, we believe, as far as regards *aſcites* and *anaſarca*; but with reſpect to *hydrothorax*, he aſſerts that the digitalis ſucceeds in the oppoſite ſtate of the ſyſtem. (Obſerv. on the preparation, &c. of Digitalis purpurea, 1807.) Dr. Careno of Vienna affirms, that the digitalis *lutea* poſſeſſes ſtronger diuretic powers than the D. *purpurea*, in common uſe.

Bacher's tonic pills, (the principal article in which is the *melampodium*, or hellebore,) are among the diuretics often employed in dropſy. They generally purge alſo when ſucceſsful; but in caſes of long ſtanding they evidently weaken the patient. Yet whenever they produce a *diureſis*, they reduce the ſwellings, according to Dr. Ferriar. Theſe two effects, Dr. Home long ago obſerved, are by no means reciprocal in the uſe of all diuretics. The *ſpiritus ætheris nitroſi*, for inſtance, is an active diuretic, but has a very feeble antihydropic power.

Among other diuretic medicines, which, in caſe of failure with the more common articles, may be reſorted to, are, the *nicotiana*, or tobacco, in tincture, as recommended by the late Dr. Fowler, of York; the *lactuca viroſa*, as employed by Collin of Vienna, (ſee Lond. Med. Journal, vol. i p. 263, for 1781);—the ſulphat of copper, or *cuprum vitriolatum*, uſed with ſucceſs by Dr. Wright, (ſee the ſame Journal, vol. i. and x.);—and the mild neutral ſalts, ſuch as nitre, *kali acetatum*, &c. A number of more ſtimulant diuretics may likewiſe be employed on particular occaſions, eſpecially in the dropſies of the old and debilitated. The tincture of *cantharides*, the turpentines, and the æthers are medicines of this claſs;—and ſeveral vegetable ſubſtances may be alſo included under this head, ſuch as an infuſion of muſtard ſeed, of the wild carrot, of the *raphanus ruſticus*;—a decoction of the tops of green broom, (*geniſta*,) of the *petroſelinum*, of the artichoke, &c.

It muſt be particularly obſerved, that a practice prevailed for many ages of interdicting the uſe of drink of any kind in dropſies, and that ſuch an opinion is ſtill extenſively prevalent among the vulgar. It was ſuppoſed that watery liquors taken in by drinking muſt run off by the exhalents into the dropſical parts, and augment the diſeaſe. "Creſcit, indulgens ſibi, dirus hydrops" was the notion of phyſicians as well as of poets. But a more accurate inveſtigation has taught us, that the thirſt attendant on dropſy, like the ſuggeſtions of nature in general, is not a deceptive ſenſation, tending to pernicious ends; but, on the contrary, that a free uſe of diluent drink is abſolutely medicinal, and that, as Dr. Cullen ſays, "there is hardly any *diuretic* more certainly powerful than a large quantity of common *water* taken in by drinking." Dr. Home obſerves, "I have known ſeveral cured by drinking Dunſe water plentifully, even after it had been carried home, and ſo no better than common water;" and he quotes Dr. Baker, who has related many caſes in which cold water, in great quantity, brought on a flow of urine, and cured the dropſy. Dr. Milman has alſo ſtrongly recommended the uſe of diluent drink, upon the authority both of his own experience, and of that of ſeveral eminent phyſicians in other parts of Europe. (Tractat. de Hydrope.) In ſhort, the teſtimonies in favour of this practice are copious and unqueſtionable; while it is not leſs ſatisfactorily aſcertained, that abſtinence from drink is detrimental, rather than beneficial. Dr. Cullen, indeed, is diſpoſed to attribute much of the good effects of the cryſtals of tartar, to the quantity of water in which it is adminiſtered; ſince Dr. Home found that it produced no benefit, when given undiſſolved. Wherever, therefore, diuretics are particularly uſeful, water may be taken largely with advantage. Dropſy, it is true, has been ſaid to be induced by a free potation of watery liquids; but ſuch a caſe is, at all events, rare, and occurs only under particular circumſtances of the conſtitution; as when a perſon is much overheated, or when the hydropic *diatheſis* is extremely great. In general, large quantities of diluents excite the action of the kidnies, if not of the bowels and ſkin, and run off readily by thoſe excretories.

Diaphoretic medicines have alſo been employed as the means of producing a ſerous excretion, with a view to the cure of dropſy. But, although there are ſome inſtances on record of the ſucceſs of ſweating in dropſical affections, yet they are comparatively rare, and little certainty is to be looked for in the operation of ſudorific medicines. This function of the ſkin is indeed generally impaired in dropſy, and is with difficulty reſtored; and when it has been readily affected by medicine, we may generally conclude that there was a returning diſpoſition to health already exiſting in the habit.

Mercury is a medicine often adminiſtered in dropſical diſeaſes with much advantage. From its univerſal ſtimulant agency on the vaſcular and abſorbent ſyſtem, it ſeems particularly calculated to be uſeful in thoſe ſpecies of dropſy in which there is viſceral obſtruction, by at once exciting the action of the excretory organs, the kidnies, bowels, &c. and of the other glandular viſcera, in which diſeaſe exiſts, eſpecially the liver. It is ſometimes employed externally by friction on the ſurface of the abdomen, particularly in aſcites, by which means the action of the abſorbents is ſuppoſed to be aided: and it is often advantageouſly combined, as an internal medicine, with other diuretics, eſpecially the ſquill and fox-glove, or with the alcoholized æthers. Dr. Ferriar found the diuretic effect of mercurial friction joined with *ſpiritus ætheris vitriolici*, ſo powerful as to produce a conſtant flow, amounting to an incontinence of urine, in a very old and much enfeebled ſubject. Mercury ſeems to be improper where the diſeaſe exiſts in broken down and aged conſtitutions, or where it ariſes from an extreme dropſical *diatheſis*; and to be chiefly indicated in aſcites, connected with viſceral diſeaſe, and occurring in habits which retain ſomewhat of their original ſtamina. The intelligent phyſician, juſt quoted, is of opinion, that mercury ſhould be conſidered as a reſource, only after the failure of milder remedies, which produce a leſs ſudden and a leſs permanent impreſſion on the conſtitution.

The *direct* methods of removing the effuſed fluid conſiſt, as we have ſtated, of artificial openings into the dropſical cavities, by tapping, punctures, iſſues, bliſters, &c. The three laſt-mentioned modes of evacuations apply principally to ANASARCA, which ſee.

The operation of *paracenteſis*, or tapping, may be ſometimes reſorted to with great benefit, and often at leaſt with temporary relief, in *aſcites*, whether of the *encyſted* kind, or in the cavity of the abdomen. In the encyſted *ovarial* dropſy, we have already remarked, that tapping affords the only means of alleviation which we poſſeſs, and we have mentioned ſome inſtances in which life was prolonged, even to a late period, by ſucceſſive repetitions of the operation. It is not eaſy to determine, under what circumſtances of the diffuſed abdominal aſcites the tapping is to be particularly employed. The very early uſe of it is often injurious; and yet it may be detrimental to poſtpone it too long: for if the tenſion is extreme, the functions of reſpiration, and of the ſtomach and bowels, are much impaired by the extreme compreſſion of the water upon theſe organs and upon the diaphragm, and the danger of a fatal inflammation of the inteſtines is incurred. Such a ſtate of the inteſtines is often obſerved on diſſection, eſpecially when the patient had been carried off by a diarrhœa, which Hippocrates and his followers have pronounced fatal, when ſupervening at a late period in a dropſy of long continuance. Tapping muſt not be employed, of courſe, in the old and debilitated; and it can only afford an uncertain temporary relief when the diſeaſe depends upon a general hydropic diatheſis. The water, in moſt inſtances, is ſpeedily poured out again, after the evacuation by tapping; but ſometimes the removal of it favours the operation of diuretics, and a long interval of freedom from the effuſion is thus occaſioned.

The manner of performing the operation, and the management requiſite during and after the performance of it, belong to the province of ſurgery. See PARACENTESIS.

The *paracenteſis* of the thorax, in dropſy of that cavity, was practiſed by the ancients, and by ſome of the moderns, with occaſional ſucceſs. (See many authorities collected by Van Swieten Comment. ad Aph. 1219.) But from the numerous well-founded objections which occur to that practice, it is ſeldom or never attempted at preſent. In the firſt place, the ſymptoms, we have ſeen, are ſo equivocal, that there is much room for miſtake as to the actual exiſtence of hydrothorax; and it is ſtill more difficult to aſcertain the ſeat of the diſeaſe, whether it be in one ſac of the *pleura* or in both, or in the *pericardium* only, or in the cellular tiſſue of the lungs themſelves. In the next place, a wound of the lungs, or pericardium, in a bad habit of body, cannot be deemed free from danger. And thirdly, the tapping of the cheſt, like that of the belly, does not remove the *cauſe* of the diſeaſe, and therefore can at beſt but afford a temporary relief.

Some practitioners have ſo far loſt ſight of the nature of the functions of the living body, as to propoſe the injection of ſtimulating liquids into the cavities of the thorax and abdomen, after the evacuation of the water by tapping; in order to excite an univerſal adheſive inflammation in the peritoneum and pleura, by which thoſe cavities might be obliterated, by the adheſion of the inteſtines and lungs to them reſpectively; and thus a recurrence of the effuſion prevented. This is done effectually in the caſe of dropſy of the ſcrotum, or HYDROCELE. But, not to mention the extreme danger of a general pleuritic or peritoneal inflammation, however excited, it muſt be obvious, that a general adheſion of thoſe organs to the *parietes* of their reſpective cavities, muſt be altogether inconſiſtent with the performance of their functions; and that neither reſpiration, nor the periſtaltic motion of the bowels, could afterwards go on. A proof that this is the conſequence of general adheſion of the lungs to the ribs may be found in a caſe related by Dr. Marcet, in the Edinburgh Med. and Surg. Journal, vol. i. p. 412.

Fatal experience has ſhewn, that the *paracenteſis* cannot be applied to the chronic *hydrocephalus*, with any chance of ſucceſs. The operation has proved ſpeedily mortal whenever performed. (Swieten ad Aph. 1218.)

II. The *ſecond* indication to be purſued in attempting the cure of dropſy, is to obviate or remove ſuch of the cauſes, which gave riſe to it, as ſtill continue to operate. The external cauſes, which may ſtill continue their influence, are the firſt to be combated; ſuch as expoſure to cold and moiſture, ſcanty food, intemperance, &c. It will avail but little to have removed the effuſed fluids, if theſe cauſes are permitted to keep up their morbid operation. It will be alſo neceſſary to inveſtigate accurately the internal cauſe or cauſes, immediately producing the loſs of balance between the exhalation and abſorption.

Where the internal cauſe appears to be a general debility, operating more eſpecially upon the exhalent veſſels, and conſtituting the hydropic diatheſis, tonic and corroborant medicines muſt be adminiſtered, particularly the ſimple bitters, variouſly combined with ſtimulants, chalybeates, alkalies, &c. as the circumſtances of the caſe may require. Theſe ſtrengthening medicines, indeed, may be often advantageouſly combined from the beginning with the diuretics, in dropſical caſes, connected chiefly with debility. Friction may be likewiſe employed in ſuch caſes, to aid the action of the blood-veſſels, and prevent the ſtagnation of fluids in their extremities. The uſe of the fleſh bruſh has often contributed to diſcuſs œdematous ſwellings; and in aſcites, a long continued gentle friction of the ſkin over the whole abdomen, by the fingers dipped in oil, has been ſometimes uſeful in exciting an increaſed flow of urine. Exerciſe, too, is uſeful, not only by contributing to obviate general debility, but by promoting the motion of the venous blood, to which the action of the muſcles, eſpecially in walking, greatly contributes. In ſome inſtances exerciſe has proved a cure to the diſeaſe, by exciting a copious flow of urine. This occurred in a lady, between 40 and 50 years old, after the operation of tapping had been performed ſixteen times. (See Lond. Med. Journ. vol. vii. p. 54.)

Where the internal cauſe is *obſtruction*, from congeſtion of blood, weak inflammatory action, torpor or morbid change of ſtructure, in any conſiderable viſcus, (as the lungs, liver, ſpleen, &c.) the uſe of bliſters is indicated; and mercury may be adminiſtered in combination with opiates, and antimonials, with *cicuta*, *hyoſcyamus*, and other medicines, which are believed to poſſeſs a deobſtruent power, by the ſtimulus which they impart to the extremities of the arterial ſyſtem.

III. When the effuſed fluids have been fortunately removed, and the cauſes obviated, by the means recommended above, the next object is to adopt ſuch means as are likely to reſtore the ſtrength of the patient, and to prevent a recurrence of the diſeaſe. A perſeverance in the uſe of exerciſe, of tonic medicines, and of a light, but nutritious diet, temperately taken, muſt be principally enjoined. Exerciſe is ſuited to promote the regular performance of every function of the animal economy, particularly to promote perſpiration, and thereby prevent the accumulation of watery fluids in the body, and to increaſe the digeſtive powers of the ſtomach. The latter function, digeſtion, is likewiſe greatly promoted by the uſe of chalybeate, bitter, and aromatic medicines, and the tone of the ſyſtem in general is thus alſo greatly reſtored. The cold bath is, on many occaſions, the moſt powerful ſtrengthener that we can employ; but at the beginning of dropſy, when the debility of the ſyſtem is conſiderable, it cannot be attempted with ſafety; neither, after the waters have been fully evacuated, can it be ſafely employed, as a means of preventing a relapſe, until the ſyſtem has otherwiſe recovered a good deal of its vigour. Then cold bathing may be very uſeful in confirming and completing it. But while the means of ſtrengthening the ſyſtem are thus adopted, it will be proper to keep in view for ſome time the ſupport of the watery excretions; not only of the perſpiration by a great deal of exerciſe, but alſo of the urinary excretion by the frequent uſe of diuretics.

It were impoſſible to point out every variety of treatment more particularly ſuited to each individual form or kind of dropſy. A few general principles, as we have endeavoured to ſtate above, include the whole of its modifications; and an attention to them will readily ſuggeſt the means adapted to the particular circumſtances of individual caſes.

DROPWORT, in *Botany*. See SPIRÆA.

DROPWORT, *Hemlock* and *Water*. See OENANTHE.

DROSACHA, or DROSICHA, in *Ancient Geography*, a town of Aſia, in the country of the Serres, according to Ptolemy.

DROSCHOLM, in *Geography*, a town of Denmark, in the iſland of Zealand; 40 miles W. of Copenhagen.

DROSENDORF, a ſmall town of Auſtria, with an ancient caſtle, ſituated in Lower Auſtria, in the circle above the Manhartsberge, on the river Teya, on the borders of Moravia; 24 miles S. W. of Znaim. It is ſometimes miſſpelt Droſſendorf.

DROSERA, in *Botany*, (Δροσερα, *dewy*, from Δροσος. *dew*, becauſe of the moiſture which always ſtands on the ſurface of its leaves, and exudes from the glandular hairs that cover them,) Sun Dew.—Linn. Gen. 154. Schreb. 207. Willd. Sp. Pl. v. i. 1543. Juſſ. 245. Gærtn. t. 61. Claſs and order, *Pentandria Hexagynia* (not *Pentagynia*). Nat. Ord. *Gruinales*, Linn. *Capparidibus affines*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, in five acute ſegments; erect, permanent. *Cor.* funnel ſhaped, of five obovate, obtuſe petals, rather larger than the calyx. *Stam.* Filaments five, rarely ten, awl-ſhaped, the length of the calyx; anthers ſmall. *Piſt.* Germen roundiſh; ſtyles ſix or eight, ſimple, the length of the ſtamens; ſtigmas ſimple. *Peric.* Capſule ſuperior, ſomewhat ovate, of one cell, with three or four valves. *Seeds* numerous, minute, nearly ovate, rough, fixed to a central ridge in each valve.

Eſſ. Ch. Calyx in five ſegments. Petals five. Capſule ſuperior, of one cell and three or four valves, with many ſeeds.

Linnæus mentions eight ſpecies, Willdenow 10, but ſome probably remain latent in the unexplored bogs of India and New Holland. The whole genus delights in a wet, turfy, or moſſy ſoil, and, as far as we know, is incapable of tranſplantation, or of cultivation from ſeed. Its habit is characterized by the numerous, prominent, hair-like, glutinous glands, generally coloured, which clothe the upper ſurface of its leaves, and which ſeem to be irritable, cloſing over and enfolding any ſmall inſect that ſettles upon the leaf. At leaſt ſuch is the caſe with our three Britiſh ſpecies, *Droſera rotundifolia*, Engl. Bot. t. 867, *longifolia*, t. 868, and *anglica*, t. 869; which laſt is diſtinguiſhed by having eight ſtyles, and a capſule with four valves. The flowers of theſe are white, or ſlightly tinged with pink; the glandular parts of the herbage bright red. *D. capenſis* is ſaid to have a violet-coloured bloſſom. Beſides the elegant *D. peltata*, Sm. Exot. Bot. t. 41. Willd. Sp. Pl. v. 1. 1546, whoſe ſtem bears triangular peltate leaves fringed with numerous glands, and ſeveral roſe-coloured flowers, we have from the ſame country, New South Wales, a larger and ſtill more remarkable ſpecies, named by ſir Joſeph Banks and Dr. Solander *D. dichotoma*, hitherto not deſcribed by any author. The *leaves* are all radical, ſtalked, once or twice forked, linear, narrow, acute, their upper ſide clothed with glandular hairs, the margins entire. *Stalk* ſolitary, naked, corymboſe, a foot or more in height, ſmooth, bearing numerous, large, elegant, white flowers, much reſembling thoſe of *Dionæa muſcipula*, which ſee. This herb turns entirely black in drying, except the petals, which become of a light brown.

Dodonæus mentions that ſome phyſicians of his time, obſerving the permanent moiſture of our European ſun-dew, which is never dried up by the moſt burning ſun, conceived the plant muſt be an admirable medicine to reſtore the vital moiſture of conſumptive patients. He confeſſes, however, that experience did not confirm this ingenious hypotheſis; for the diſtilled water being uſed, which, like the whole plant, is acrid and even cauſtic, the unfortunate patients who took it died ſooner than thoſe who did not. An admirable illuſtration of theoretical phyſic!

DROSING, in *Geography*, a town of Germany, in the archduchy of Auſtria; ſix miles E. of Ziſterſdorf.

DROSSEN, a ſmall town of Pruſſia, in the New Mark of Brandenburg, on the river Lenzen; 12 miles off Cuſtrin. It is neatly built, and has a flouriſhing manufacture of woollen cloth.

DROSSENFELD, a town of Germany, in the circle of Franconia and principality of Culmbach on the Maine; ſix miles S. of Culmbach.

DROST, in *Biography*, painter of hiſtory and portrait, about the year 1636. He was a diſciple of Rembrandt, whoſe manner he imitated. He afterwards travelled to Italy, ſettled at Rome, and adopted the ſtyle of the Roman ſchool. Deſcamps. Vie des Peintres Flamands, &c.

DROT, in *Geography*, a river of France, which runs into the Garonne, at Gironde.

DROTNINGHOLM, a ſmall town of Sweden, in Upland, about nine miles to the weſt of Stockholm, remarkable for a royal palace built in an iſland called *Loſon*, which is indebted for its preſent magnificence to Eleonora, the conſort of prince Charles Guſtavus, to whom it devolved in 1652. The name of Drotningholm ſignifies Queen's iſland.

DROTZDORF, a town of Sileſia, in the principality of Neyſza; three miles S. of Grotkow.

DROVA-DRUE, or DROU, a town of Africa, on the Grain Coaſt; 60 miles N. W. of cape Palmas.

DROUE', a ſmall town of France, in the department of Loir and Cher, chief place of a canton in the diſtrict of Vendôme, with a population of 896 individuals. Its canton comprizes 12 communes and 7336 inhabitants, upon a territorial extent of 265 kiliometres.

DROVERS, are perſons that buy cattle in one place, and drive them for ſale to another. They are to be married men, and houſholders, and to be licenſed by ſtatute 5 Eliz. cap. 12; and if they drive their cattle on the Lord's day, they ſhall forfeit 20*s*. by 1 Car. I. cap. 1. 29 Car. II. c. 7.

DROUGHT, in the *Natural Hiſtory of the Air*, is a long continuance of dry weather. Great droughts are very prejudicial to the farmer and his paſture; and ſuch years afford but very little reward for the labour and expence of keeping it in order. The only remedies are high incloſures, and plenty of water at hand. The firſt of theſe is always in the farmer's power, and ſhould be carefully provided by planting hedges in a proper manner, in counties moſt ſubject to ſuffer by this diſadvantage. The other is not always ſo eaſy, but may be managed ſeveral ways, as by ſinking wells; but theſe, when deep, are very expenſive; or by bringing the water in pipes, gutters, or other conveyances; and this is eaſily done where there is a ſpring or brook in the neighbourhood higher than the lands. Pumps, wheels, and ſuch other engines, are alſo uſed in ſome places to bring on the water; and in others, ponds, ciſterns, and receptacles, are made to take in the rains and winter floods, and retain the water till ſummer, when it is wanted.

The farmers of England are very deficient in this laſt method, which they might uſe to their great benefit in many places. In Spain they have no water in many parts but what they preſerve in this manner; and at Amſterdam and Venice they have whole cellars made into ciſterns, which receive the water that falls in rains, and preſerve it all the year. Want of water for the cattle in ſummer, in many places, might be eaſily remedied by ſome care of this kind, and many thouſand acres of land made uſeful, which are now left as waſte, by this means alone. The practicability of thus obtaining water is evinced by its being done in places where there falls much leſs rain annually than with us; and yet by this the inhabitants have always freſh water enough for the uſe of their houſes, cattle, and gardens, none of which ever fail. See CISTERN.

DROUN, in *Geography*, a ſmall town of France, in the department of the Upper Vienne; ſix miles S.E. of Dorat.

DROWNED LANDS. See ORANGE.

DROWNING, the act of ſuffocating, or being ſuffocated by water.

People not accuſtomed to diving, Dr. Halley obſerves, begin to drown in about half a minute's time.

Drowning was anciently a kind of puniſhment. In the time of Louis XI. of France, the chronicles aſſure us, that they frequently drowned their criminals, inſtead of hanging them. Chron. Scand. See FOSSA and FURCA. Natural hiſtorians and phyſicians furniſh us with divers well atteſted inſtances of ſurpriſing recoveries of perſons drowned; which, if maturely conſidered, might perhaps let a little light into the dark notions of life and death.

We ſhall not particularly recite the improbable ſtories mentioned by Pechlin, De Aer. & Alim. Def. cap. 10. of one who was under water ſixteen hours, of another who was under water three whole days, and of a third, who was in this ſtate ſeven weeks, and recovered. "Sit penes ipſum fides." But there are ſeveral unqueſtionable facts, though they have rarely occurred, in every country, which ſhew the poſſibility of a recovery from ſudden death, whether by apoplexy, convulſive fits, ſuffocation by noxious vapours, ſtrangulation by the cord, or drowning. However, inſtances of this kind merely excited tranſient attention and ſurprize, and many perſons were loſt for want of proper attempts for their recovery. This was particularly the caſe in Holland, where, from the great abundance of canals and inland ſeas, the inhabitants are much expoſed to accidents by water; and where many perſons were drowned every year for want of aſſiſtance. In 1767, a ſociety was formed at Amſterdam, which offered premiums to thoſe who ſhould ſave the life of a citizen in danger of periſhing by water; and which propoſed, from time to time, to publiſh the treatment, and method of recovery, obſerved in ſuch caſes.

This inſtitution was every where encouraged through the United Provinces, by the magiſtrates, and by the States General, and has been attended with very conſiderable ſucceſs; and it appears that no leſs than two hundred perſons have been recovered from death, by this inſtitution, in the ſpace of about ſix years. In ſeveral of theſe caſes, the recovered patients had continued upwards of an hour, without any ſigns of life, after they had been taken out of the water. Inſtigated by this example, the magiſtrates of health at Milan and Venice iſſued orders, in 1768, for the treatment of drowned perſons. The city of Hamburgh appointed a ſimilar ordinance to be read in all their churches, extending their ſuccour not only to the drowned, but to the ſtrangled, to thoſe ſuffocated by noxious vapours, and to the frozen. The firſt part of the Dutch Memoirs was alſo tranſlated into the Ruſſian language, by command of the empreſs. In 1769, an edict was publiſhed in Germany, extending its directions and encouragement to every accident, like death, that afforded a poſſibility of relief. In 1771, the magiſtrates of the city of Paris alſo founded an inſtitution in favour of the drowned; and in France they have been inſtrumental in ſaving forty-five perſons out of ſixty-nine, in about ſixteen months. In 1773, Dr. Cogan, and Dr. Hawes, of London, propoſed a plan for the introduction of a ſimilar inſtitution into theſe kingdoms. The plan was ſo well received and encouraged, that they were ſoon, *viz.* in 1774, enabled to form a ſociety, ſince called the Humane Society, for promoting its laudable deſigns.

The following abſtract of the plan of this ſociety, and method of treatment recommended by it, will not, we apprehend, be unacceptable to our readers. This ſociety has undertaken to publiſh, in as extenſive a manner as poſſible, the proper methods of treating perſons in the unfortunate circumſtances, to which they extend their relief; to diſtribute a premium of two guineas among the firſt perſons, not exceeding four in number, who attempt to recover any perſon, taken out of the water for dead, within thirty miles of the cities of London and Weſtminſter, provided they have not been longer than two hours under the water, and provided the aſſiſtants perſevere in the uſe of the means recommended for the ſpace of two hours, whether their attempts are ſucceſsful or not. Theſe rewards are alſo to include every other inſtance of ſudden death, whether by ſuffocation from noxious vapours, hanging, ſyncopies, freezing, &c. They propoſe to diſtribute, in like manner, four guineas, wherever the patient has been reſtored to life; to give to any publican, or other perſon, who ſhall admit the body into his houſe, without delay, and furniſh the neceſſary accommodations, the ſum of one guinea, and to ſecure them from the charge of burial in unſucceſsful caſes; and to preſent an honorary medal to thoſe medical gentlemen, or others, who give their aſſiſtance *gratis*, and who are provided with a fumigator, and other neceſſaries always in readineſs, in all thoſe caſes in which they may prove inſtrumental of ſucceſs. The device on one ſide of their medal is a boy, who is repreſented blowing an extinguiſhed torch, with the hope, as the legend, “ Lateat ſcintillula forſan,” imports, that a little ſpark may ſtill remain. The reverſe exhibits a civic wreath, which was the Roman reward for ſaving the life of a citizen, with a blank for the name of a perſon to whom the medal may be given; the inſcription round the wreath, “ Hoc pretium cive ſervato tulit,” expreſſes the merit which obtained it.

Before giving any directions concerning the treatment of the drowned patient, it will be neceſſary to deſcribe the method of recovering the body; the implements for this purpoſe are termed *drags*. In navigable rivers, and where the perſon falls into the river clothed, the common boat-hook is likely to prove the moſt uſeful, from the circumſtance of its being almoſt always at hand; and though not otherwiſe well adapted for the purpoſe, a body may often be recovered by it, before other drags, kept for the purpoſe, can be procured; another circumſtance in their favour is, that in towns (where ſuch accidents moſtly occur) there are generally ſeveral boats near, each furniſhed with its hook or hitcher, and may be employed all at the ſame time, while on the other hand it cannot be expected, that more than one drag can be got to the place in any reaſonable time; for theſe reaſons it ſeems, that if any drag were contrived which would anſwer well, for both boat-hook and hitcher, it would be the beſt for rivers and canals, where the drowning ſubjects are moſtly clothed.

Dr. Cogan has lately invented two drags, for which the Society of Arts preſented him with their gold medal in 1806. The firſt, which is a ſimple one, is ſhewn in *fig.* 2. *Plate* XV. *Miſcellany;* it is compoſed of two iron prongs *a*, *b*, attached to the end of a pole: at the ends of the prongs jointed hooks are fixed, which can be placed ſo as to project beyond the prongs, when the drag is uſed to get up a body that is clothed, but for a naked ſubject they muſt be withdrawn, by means of the ſcrew *b*, *fig.* 3, which ſlides in the groove in the end of the iron prong, and faſtens the hook at any place, ſo that it may project beyond the prong, as A, *fig.* 3, or be placed by the ſide of it, as B, *fig.* 3.

The other drag has three prongs *a*, *b*, *d*, *fig.* 1, each divided into two at their extremities, and is furniſhed with ſix moveable hooks like the laſt; this drag is fitted to a pole *f*, and a long cord is faſtened to it at *e*, and paſſing through a hole in the top or other end of the pole. It is intended to be thrown into the water as far as it can, and then drawn along the bottom to find the body; a ſmall line *g* is faſtened to it at *h*, to draw it back in a contrary direction, to diſengage it from weeds, roots, or other obſtacles which it may meet with in being drawn along the bottom. This drag is particularly adapted to ponds and other places where a boat cannot be had; while it may alſo greatly expedite the recovery of the body, if boats are at hand, owing to the eaſe and certainty with which it can be thrown to a conſiderable diſtance.

Fig. 4. is a drag, or rather a pair of tongs, well adapted for the purpoſe when they can be uſed in a boat, or in ſmall and deep waters, like the locks on canals, wells, not deeper than the pole's length: *a a* is a pole, on the lower end of which an iron ſocket is fixed, forming a centre for two crooked irons *b a d'*, *b' a' d'*; *e* is a ſtrong ring ſliding on the pole, having two iron rods *f*, *f*, joined to it, and thereby connecting it with the ends *a*, *a'*, of the crooked irons; the ring has a double rope *g*, tied to it to move the tongs by; the weight of the ring *e* always cauſes the tongs to open, as in the figure, and in this ſtate the body is ſearched for; when it is found the rope is pulled, and the tongs thereby ſhut up, (as ſhewn by the dotted lines,) encloſing the body in them. The ends *b* of the tongs ſhould be forked, and may be furniſhed with ſliding-hooks, the ſame as Dr. Cogan's above.

The following is the method of treatment recommended by the ſociety.

1. In removing the body to a convenient place, great care muſt be taken that it be not bruiſed, nor ſhaken violently, nor roughly handled, nor carried over the ſhoulders with the head hanging downwards, nor rolled upon the ground, or over a barrel, nor lifted up the hills. For experience proves, that all theſe methods are injurious, and often deſtroy the ſmall remains of life. The unfortunate object ſhould be cautiouſly conveyed by two or more perſons, or in a carriage, upon ſtraw, lying as on a bed, with the head a little raiſed, and kept in as natural and eaſy a poſition as poſſible.

2. The body being well dried with a cloth, ſhould be placed in a moderate degree of heat, but not too near a large fire. The windows, or door of the room, ſhould be left open, and no more perſons be admitted into it than thoſe who are abſolutely neceſſary; as the life of the patient greatly depends upon having the benefit of a pure air. The warmth moſt promiſing of ſucceſs is that of a bed, or blanket, properly warmed. Bottles of hot water ſhould be laid at the bottom of the feet, in the joints of the knees, and under the arm-pits; and a warming-pan, moderately heated, or hot bricks, wrapped in cloths, ſhould be rubbed over the body, and particularly along the back. The natural and kindly warmth of a healthy perſon lying by the ſide of the body has been found in many caſes very efficacious. The ſhirt, or cloaths, of an attendant, or the ſkin of a ſheep freſh killed, may alſo be uſed with advantage. Should theſe accidents happen in the neighbourhood of a warm-bath, brew-houſe, baker, glaſs-houſe, ſaltern, ſoap-boiler, or any fabrick where warm lees, aſhes, embers, grains, ſand, water, &c. are eaſily procured, it would be of the utmoſt ſervice to place the body in any of theſe, moderated to a degree of heat, but very little exceeding that of a healthy perſon.

3. The ſubject being placed in one or other of theſe advantageous circumſtances as ſpeedily as poſſible, various ſtimulating methods ſhould next be employed. The moſt efficacious are, to blow with force into the lungs, by applying the mouth to that of the patient, cloſing his noſtrils with one hand, and gently expelling the air again by preſſing the cheſt with the other, imitating the ſtrong breathing of a healthy perſon. The medium of a handkerchief, or cloth, may be uſed to render the operation leſs indelicate. If the lungs cannot be inflated in this manner, it may be attempted by blowing through one of the noſtrils, and at the ſame time keeping the other cloſe. Dr. Monro, for this purpoſe, recommends a wooden pipe, fitted at one end for filling the noſtril, and at the other for being blown into by a perſon's mouth, or for receiving the pipe of a pair of bellows, to be employed for the ſame purpoſe, if neceſſary. Whilſt one aſſiſtant is conſtantly employed in this operation, another ſhould throw the ſmoke of tobacco up the fundament into the bowels, by means of a pipe, or fumigator, ſuch as are uſed in adminiſtering clyſters; or by a pair of bellows, till the other inſtrument can be procured. A third attendant ſhould, in the mean time, rub the belly, cheſt, back, and arms, with a coarſe cloth, or flannel, dipped in brandy, rum, or gin, or with dry ſalt, ſo as not to rub off the ſkin; ſpirits of hartſhorn, volatile ſalts, or any other ſtimulating ſubſtance, muſt alſo be applied to the noſtrils, and rubbed upon the temples very frequently. Electrical ſhocks, made to paſs in different directions through the body, and particularly through the heart and lungs, have been recommended as very powerful ſtimuli; and from the trials that have already been made, promiſe conſiderable ſucceſs. The body ſhould, at intervals, be ſhaken alſo, and varied in its poſition.

4. If there be any ſigns of returning life, ſuch as ſighing, gaſping, twitching, or any convulſive motions, beating of the heart, the return of the natural colour and warmth, opening a vein in the arm, or neck, may prove beneficial; but the quantity of blood taken away ſhould not be large; nor ſhould an artery ever be opened, as profuſe bleeding has appeared prejudicial, and even deſtructive to the ſmall remains of life. The throat ſhould be tickled with a feather, in order to excite a propenſity to vomit; and the noſtrils alſo with a feather, ſnuff, or any other ſtimulant, ſo as to provoke ſneezings. A tea-ſpoonful of warm water may be occaſionally adminiſtered, in order to learn whether the power of ſwallowing be returned; and if it be, a table-ſpoonful of warm wine, or brandy and water, may be given with advantage; but not before, as the liquor may get into the lungs, before the power of ſwallowing returns. The other methods ſhould be continued with vigour, until the patient be gradually reſtored.

When the patient has been but a ſhort time ſenſeleſs, blowing into the lungs, or bowels, has been, in ſome caſes, found ſufficient; yet a ſpeedy recovery is not to be expected in general. On the contrary, the above methods are to be continued with ſpirit for two hours, or upwards, although there ſhould not be the leaſt ſymptoms of returning life. The ſame means of reſtoration are applicable to the various other caſes of ſudden death, recited in the beginning of this article.

When theſe meaſures prove unſucceſsful, the ſurgeon's laſt reſource is *bronchotomy*, or opening the *arteria trachæa;* for perhaps the air entering freely into the lungs, through the aperture made in the canal, through which they received it in their natural ſtate, will reſtore the play of the lungs, and all the motions of the breaſt.

Mr. Hunter, F. R. S. has, at the requeſt of a member of the Humane Society, publiſhed propoſals for recovering perſons apparently drowned. In the caſe of apparent death by drowning, he conſiders that a ſuſpenſion of the actions of life has taken place, owing to the loſs of reſpiration, and the immediate effects which this has on the vital motions of the animal; at leaſt, he ſays, this privation of breathing appears to be the firſt cauſe of the heart's motion ceaſing; therefore, moſt probably, the reſtoration of breathing is all that is neceſſary to reſtore the heart's motion. The loſs of life in drowned people has been accounted for, by ſuppoſing that the blood, damaged by want of the action of the air in reſpiration, is ſent, in that vitiated ſtate, to the brain, and other vital parts; by which means the nerves loſe their effect upon the heart, and the heart, in conſequence, its motion. But Mr. Hunter concludes from experiments on a dog, in which a large column of bad blood, *viz.* all that was contained in the heart and pulmonary veins, was puſhed forward, without producing any ill effect, and alſo from the recovery of drowned perſons, and ſtill-born children, that the heart's motion muſt depend immediately on the application of air to the lungs, and not on the effects which air has on the blood, and which that blood has on the vital parts. Therefore, blowing air into the lungs, ſoon after the immerſion, may be ſufficient to effect a recovery; and the dephlogiſticated air of Dr. Prieſtley may prove more efficacious than common air. But if a conſiderable time, as an hour, has been loſt, it may be neceſſary to apply ſtimulating medicines, as the vapour of volatile alkali, mixed with the air; and theſe are beſt thrown in by the noſtrils, as applications of this kind to the olfactory nerves rouſe the living principle, and put the muſcles of reſpiration into action, while ſome applications to the mouth rather depreſs than rouſe, by producing ſickneſs. The larynx ſhould be at the ſame time preſſed againſt the œſophagus and ſpine, which will prevent the ſtomach and inteſtines from being too much diſtended by the air; however,

ever, the trachæa, and the aperture into the larynx, ſhould be both left perfectly free. Heat alſo is congenial with the living principle, which by increaſing the neceſſity of action, increaſes action; and to a due proportion of heat the living principle owes its vigour. Bed-cloaths, properly heated, ſhould, therefore, be gently laid over the patient, and the ſtream of volatile alkali, or of warm balſams, and eſſential oils, may be thrown in, ſo as to come in contact with many parts of his body. The ſame ſtream may alſo be conveyed into the ſtomach by means of a hollow bougie, and a ſyringe; together with ſpirits of hartſhorn, pepper-mint-water, juice of horſe-raddiſh, and alſo balſams and turpentines, in ſuch ſmall quantities, as not to produce ſickneſs. Theſe may alſo be thrown up by the anus. When the heart begins to move, Mr. Hunter adviſes to leſſen the application of air to the lungs; he abſolutely forbids bleeding, becauſe it weakens the animal principle, or that principle which preſerves the body from diſſolution, and is the cauſe of all its actions, and which Mr. Hunter ſuppoſes to be inherent in the blood, and conſequently leſſens both the power and diſpoſitions to action. Nothing ſhould be adminiſtered that ordinarily produce a nauſea or vomiting, or by the anus, that has a tendency to produce an evacuation that way; becauſe every ſuch evacuation tends to leſſen the animal powers. On this account he does not particularly recommend the fumes of tobacco, becauſe they always produce ſickneſs or purging, according to the mode of their application. He recommends the following apparatus, with a view to the purpoſes of this ſociety. Firſt, a pair of bellows; ſo contrived with two ſeparate cavities, that by opening them, when applied to the noſtrils or mouth of a patient, one cavity may be filled with the common air, and the other with air ſucked out from the lungs; and by ſhutting them again, the common air may be thrown into the lungs, and that ſucked out of the lungs diſcharged into the room. The pipe of theſe ſhould be flexible, in length a foot or a foot and a half, and at leaſt three eighths of an inch in width; by this the artificial breathing may be continued, while the other operations, the application of the ſtimuli to the ſtomach excepted, are going on, which could not conveniently be the caſe, if the muzzle of the bellows were introduced into the noſe. The end next the noſe ſhould be double, and applied to both noſtrils. Secondly, a ſyringe with a hollow bougie, or flexible catheter, of ſufficient length to go into the ſtomach, and to convey any ſtimulating matter into it, without affecting the lungs. Thirdly, a pair of ſmall bellows, ſuch as are commonly uſed in throwing fumes of tobacco up the anus. Phil. Tranſ. vol. lxvi. part ii. p. 412. 425.

Fig. 5, *Plate* XV, *Miſcellany*, repreſents a pair of reſpiration bellows, by which this artificial breathing may be performed: theſe bellows are compoſed of two diſtinct pair of bellows, ſeparated by a thick board *a b*; below this one pair of bellows, *a b c d*, is placed, and above it another, *a b e f*; in the top board, *e f*, is a valve *g*, opening upwards; and in the lower board, *c d*, the valve, *h*, is placed, opening upwards. The middle board of the bellows is made up of three boards, two thin ones and a thicker one between them, as is plainly ſeen in the figure; the middle board is cut through with a channel, repreſented in the figure by a dark ſpace; the lower board is glued to it, and the upper one ſcrewed down on it with leathered joints. This channel forms a pipe, which communicates with the long flexible pipe *i k*; in this paſſage are two valves, one repreſented opening into the paſſage from the lower bellows, and the other opening out of it into the upper bellows. The bellows act in this manner: the upper one is intended to draw the foul air from the lungs, and the lower one to ſupply them with freſh. In the figure it is repreſented, as though the lower one was in the act of ſhutting, and forcing its air through the valve in the dark paſſage and pipe, *i k*, into the lungs of the patient: when theſe lower bellows are completely cloſed, a ſtuffed cuſhion at *l* cloſes the valve through which the air before iſſued, and the operator keeps it ſo: he now opens the upper bellows, which draw the impure air out of the dark paſſage through the valve which is within them, from the lungs of the patient; the ſtuffed cuſhion preventing the air from coming through the valves of the lower bellows: the upper lid, *e f*, is then to be forced down again; this cloſes the valve on the dark paſſage, and opens the valve at *g* in the lid, the foul air ruſhing out thereat. The operator now holds down the upper lid, that it may preſs upon the valve within the upper bellows, and keep it ſhut, and he then opens the lower bellows; this raiſes the valve at *h*, and fills them with freſh air, or with gas from a bladder, previouſly prepared, as ſhewn in the figure (when the ſtop-cock and ſcrew-plate, deſcribed below, are removed); he then cloſes them, and expels the air they contain, through the valve in the dark paſſage and pipe *i k*, into the lungs. Theſe operations are to be repeated as often as neceſſary, and repreſent the action of reſpiration very naturally, if it be done by a careful operator.

To render the bellows very portable, they may be made ſmall. The drawing is one-fourth the real ſize, which may be 9 inches long, 4 broad, and opens 3 inches at the fartheſt. When both bellows are ſhut, they will be only 1½ inch thick, which is but the uſual ſize of an octavo volume, and may be carried in the pocket. It will be remembered, that though this ſize may not contain quite air enough for a grown perſon, yet it will be rather more than neceſſary for a child, and may therefore be a proper average ſize; and they will be very convenient to uſe, as the operator may hold them in his hands without a ſupport. To render them more portable, the flexible pipe unſcrews at *i*, and the handles, *p* and *g*, turn round upon centres, ſo as to lay acroſs the boards, without projecting from them; the middle handle, *n*, turns half round into a receſs made in the middle board, ſo as to be out of the way. The pipe, *k*, at the end of the leather pipe, is of ivory, to be introduced into the noſe or mouth of the patient.

Some phyſicians have recommended various gaſſes to be thrown into the lungs: this may be eaſily done, by applying a bladder of ſuch gas, furniſhed with a ſtop-cock and ſcrew-plate, to the lower valve of the bellows, as ſhewn in the figure, and forcing its contents into the lungs, inſtead of pure air; but from the difficulty of procuring ſuch gaſſes in time, we fear that this plan (whatever may be its merits in other reſpects) cannot be generally applied.

The Humane Society, ſince its firſt eſtabliſhment, to the preſent time, has been inſtrumental in recovering a great number of perſons out of the multitude of caſes to which their attempts have been applied. See Reports of the Society for the Recovery of Perſons apparently drowned.

Societies of a ſimilar nature have been formed at Norwich, Briſtol, Liverpool, Colcheſter, Hull, &c. and likewiſe at Cork, in Ireland. The board of police in Scotland has alſo intereſted itſelf in favour of the ſame benevolent deſign.

DROYE, in *Geography*, a river of Pruſſia, which runs into the Pregel; 4 miles W. of Inſterburg.

DROYSZIG, a town of Germany, in the circle of Upper Saxony, in Thuringia; 6 miles S. E. of Stoſſen.

DRUCKEBACH, a river of Germany, in Upper Bavaria, which runs into the Inn, about 3 miles below Kuffſtein.

DRUENSIS, in *Ancient Geography*, an epiſcopal ſee of Africa.

DRUENT, in *Geography*, a town of the principality of Piedmont; 4 miles S.W. of Turin.

DRUG, in *Commerce*, a general name for all ſpices, and other commodities, brought from diſtant countries, and uſed in the buſineſs of medicine, and the mechanic arts. The drugs uſed in medicine are very numerous, and make the greateſt part of the commerce of our druggiſts. Some of them grow in England, France, &c. but the greateſt part are brought from the Levant, and the Eaſt Indies.

A liſt of all of them would be endleſs. Some of the principal are, aloes, ambergris, amber, aſſa-fœtida, antimony, bezoar, borax, benjoin, camphor, cantharides, cardamum, caſſia, caſtoreum, coloquintida, civet, coral, cubebs, coffee, cocoa, gum anime, armoniac, adraganth, elemi, gamboge, labdanum, opopanax, ſagapenum, ſandarac, lacca, jalap, manna, maſtic, myrrh, muſk, opium, pearls, quinquina, hel ebore, galanga, zedoary, rhubarb, ſarſaparilla, ſtorax, galbanum, ſanguis draconis, ſenna, ſpermaceti, ſpica nardi, ſcammony, ſal ammoniac, tamarinds, tea, turpentine, turbith, tutia, &c.

The natural hiſtory, &c. whereof, ſee under their reſpective articles Aloes, Ambergris, &c.

The drugs uſed by dyers are of two kinds: the *colouring*, which give a dye, or colour; and *non colouring*, which only diſpoſe the ſtuffs to take the colours the better, or to render the colours more ſhining. Of the firſt kind are, paſtels, woad, indigo, kermes, cochineal, madder, turmeric, &c. Of the ſecond kind are, alum, tartar, arſenic, realgal, ſalt-petre, common ſalt, ſal gemmæ, ſal ammoniac, cryſtals of tartar, agaric, ſpirit of wine, urine, pewter, iron, bran, ſtarch, lime, aſhes, &c.

There is a third ſort of drugs, which anſwer both intentions; as the root, bark, and leaf, of the walnut-tree, galls, copperas, &c.

DRUGGET, a ſort of ſtuff, very thin, and narrow, ſometimes all wool, and ſometimes half wool, and half thread; having ſometimes the whale, but more uſually without.

Thoſe without the whale in the plain druggets are woven on a loom with two treddles, after the ſame manner as linen, camblet, &c. Thoſe with the whale, or the corded druggets, are wrought on a loom with four treddles. Thoſe are called threaded druggets that have the woof of wool, and the warp of thread. M. Savary invented a kind of gold and ſilver druggets; the warp being partly gold and ſilver thread, and the woof of linen.

DRUIA, in *Geography*, a town of Lithuania, in the palatinate of Wilna; 16 miles N.E. of Breſlaw.—Alſo, a town of Ruſſia, in the government of Polotſk, ſeated on the Duna; 50 miles N.W. of Polotſk.

DRUIDS, Druides, or *Druidæ*, the philoſophers, as well as the prieſts, or miniſters of religion, among the ancient Gauls, Britons, and other Celtic nations.

Etymology of the Name.—Some authors derive the word from the Hebrew דרושים, *deruſſim*, or *druſſim*, which they tranſlate, *contemplatores*. Picard, Celtopæd. lib. ii. p. 58. believes the Druids to have been thus called from Druis, or Dryius, their leader, the fourth or fifth king of the Gauls, and father of Saron, or Naumes. Pliny, Salmaſius, Vigenere, &c. derive the name from δρυς, *oak*; on account of their inhabiting, or at leaſt frequenting, and teaching in foreſts; or perhaps, becauſe, as Pliny ſays, they never ſacrificed but under the oak. But it is hard to imagine, how the Druids ſhould come to ſpeak Greek. Menage derives the word from the old Britiſh *drus*, dæmon, magician. Gorop. Becanus, lib. i. takes *druis* to be an old Celtic, and German word, formed from *trowis*, or *truwis*, a doctor of the truth and the faith; in which etymology Voſſius acquieſces: accordingly M'Pherſon derives Druid from the Teutonic word *Druthin*, a ſervant of truth. Borel deduces it from the Saxon *dry*, magician; or rather from the old Britiſh *dru*, or *derw*, oak; whence he takes δρυς to be derived, which is the moſt probable ſuppoſition. This laſt derivation is much countenanced by a paſſage in Diodorus Siculus (l. 5.), who, ſpeaking of the philoſophers and prieſts of Gaul, the ſame with our Druids, ſays they were called *Saronidæ*, from Σαρον, the Greek name of an oak, and alſo from the above-mentioned etymology aſſigned by Pliny, &c. They were alſo called *Semnothei*, from their profeſſion of conducting the worſhip of the gods. and alſo *Senani*.

Hiſtory of their origin and ſettlement in Britain.—The Druids are ſaid by ſome to have been a tribe of the ancient Celts or Celtæ, (ſee that article,) who migrated, as Herodotus informs us, from the Danube towards the more weſterly parts of Europe; and to have ſettled in Gaul and in Britain at a very early period. Accordingly they have traced their origin, as well as that of the Celts, to the Gomerians, or the deſcendants of Gomer, the eldeſt ſon of Japhet. But little certain is known concerning them before the time of Cæſar, who ſays, that they were one of the two orders of perſons, that ſubſiſted in Gaul, the other being the *nobles*. The caſe was the ſame in Britain, where it is ſuppoſed the principles and rites of Druidiſm originated, and from whence they were transferred to Gaul. This ſeems to have been the cuſtom according to the account of the hiſtorian; ſuch of the Gauls as were deſirous of being thoroughly inſtructed in the principles of their religion, which was the ſame with that of the Britons, uſually took a journey into Britain for that purpoſe. It is univerſally acknowledged, that the Britiſh Druids were at this time very famous, both at home and abroad, for their wiſdom and learning, as well as for their probity; and that they were held in high eſtimation as the teachers both of religion and philoſophy. But it has been diſputed whether they were the original inventors of the opinions and ſyſtems, which they taught, or received them from others; ſome have imagined, that the colony of Phocæans, which left Greece and built Marſeilles in Gaul about the ſecond year of the 60th Olympiad (B. C. 539); imported the firſt principles of learning and philoſophy, and communicated them to the Gauls and other nations in the weſt of Europe. (See Gronov. in Ammian. Marcell. l. 15. c. 9.) We learn, indeed, from Strabo (l. 4.) as well as from Ammianus Marcellinus, that this famous colony contributed not a little to the improvement of that part of Gaul where it ſettled, and to the civilization of its inhabitants. (See alſo Juſtin, l. 43. c. 4.) But though it ſhould be allowed, that the Druids of Gaul and Britain borrowed ſome hints and embelliſhments of their philoſophy from this Greek colony, and perhaps from other quarters, there is reaſon to believe that the ſubſtance of it was their own. Others have ſuggeſted that the Druids derived their philoſophy from Pythagoras, who publiſhed his doctrines at Crotona in Italy, and reſided there in the higheſt reputation for virtue, wiſdom, and learning, above 20 years. It is certain, that the philoſophy of the Druids bore a much greater reſemblance to that of Pythagoras, than to that of any other ſage of antiquity: but this reſemblance, as Borlaſe ſuggeſts, (Antiq. of Cornwall, p. 74.) may perhaps be accounted for, by ſuppoſing that Pythagoras learned and adopted ſome of the opinions of the Druids, whilſt he imparted to them ſome of his diſcoveries. It is well known, that this eminent philoſopher, animated by an ardent love of knowledge, travelled into many countries in purſuit of it, and procured admiſſion into every ſociety that was famous for its learning. (Clem. Alex. Strom. 1. p. 304. Burnet, Archeolog. Philoſ. p. 11.) It is, therefore, highly probable in itſelf, as well as directly aſſerted by ſeveral authors, that Pythagoras heard the Druids of Gaul, and was initiated into their philoſophy. Thoſe who trace the religious principles of the Druids, in their primary origin, to the grandſon of Noah, muſt allow, that, at the period to which we now refer, and among the people of whom we are now ſpeaking, religion had degenerated into an abſurd, wicked, and cruel ſuperſtition. It does not appear how widely the Druids were diſperſed through Britain and the adjacent iſles; but it is well known that their chief ſettlement was in the iſle of Angleſey, the ancient *Mona*, which they probably ſelected for this purpoſe, as it was well ſtored with ſpacious groves of their favourite oak. Many of them ſeemed to have lived a kind of collegiate or monaſtic life united together in fraternities, as Ammianus Marcellinus (l. 15. c. 9.) expreſſes it, as the authority of Pythagoras decreed among his followers. As one principal part of their office was to direct the worſhip and religious rites of the people, the ſervice of each temple required a conſiderable number of them, and all theſe lived together near the temple where they ſerved. The arch-druid of Britain is thought to have had his ſtated reſidence in the iſland of Angleſey, above mentioned, where he lived in great ſplendour and magnificence according to the faſhion of the times, ſurrounded by a great number of the moſt eminent perſons of his order. In this iſle, it is aſſerted, that the veſtiges of the arch-druid's palaces, and of the houſes of the other Druids, who attended him, are ſtill viſible. (Rowland's Mona Antiq. p. 83., &c.) But ſeveral of the Druids led a more ſecular and public way of life, in the courts of princes, and families of great men, to perform the various duties of their function; for no ſacred rite or act of religion could be performed without a Druid, either in temples or in private houſes. It is alſo probable, that ſome of theſe ancient prieſts retired from the world, and from the ſocieties of their brethren, and lived as hermits, in order to acquire a greater reputation of ſanctity. In the moſt unfrequented places of ſome of the weſtern iſlands of Scotland, there are ſtill remaining the foundations of ſmall circular houſes, capable of containing only one perſon, which are called by the people of the country Druids' houſes. (Martin's Deſcr. of the Weſtern Iſles, p. 154.) As none of theſe habitations were ſuitable to a married life, it is probable that the Druids generally lived in a ſtate of celibacy, and were waited upon by a ſet of female devotees. (See Druidesses.) Although it is not eaſy to aſcertain the preciſe number of the Britiſh Druids, we have reaſon to believe that it was very conſiderable. Both the Gauls and the Britons of this period were much addicted to ſuperſtition, and of courſe among a ſuperſtitious people there will be many prieſts. Beſides, we are informed by Strabo (l. 4.) that they entertained an opinion highly favourable to the increaſe of the prieſtly order: for they were fully perſuaded, that the greater the number of Druids they had in their country, they would obtain the more plentiful harveſts, and the greater abundance of all things. We learn alſo from Cæſar, (De Bell. Gall. l. 6. c. 13.), that many perſons, allured by the honours and privileges which the Druids enjoyed, voluntarily embraced their diſcipline, and that many more were dedicated to it by their parents. Upon the whole it is not unreaſonable to conclude, that the Britiſh Druids bore as great a proportion in number to the reſt of the people, as the clergy in popiſh countries bear to the laity, in the preſent age.

Claſſes and Gradations of Druids.—Cæſar informs us (ubi ſupra) that the Druids were variouſly diſtinguiſhed by their ranks and dignity; ſome of them being more eminent than others; and the whole order being ſubject to one ſupreme head or arch-druid. This arch-druid was the high prieſt, or "pontifex maximus," in all matters of religion, and the ſupreme judge in all civil cauſes, to whom appeals might be made from the tribunals of inferior judges, and from whoſe tribunal there was no appeal. In ſhort, he had abſolute authority over the reſt, and commanded, decreed, puniſhed, &c. at pleaſure. The chief reſidence of the arch-druid of Gaul was at Dreux, in the Pais Chartrain; and in Britain, as we have already obſerved, in the iſle of Angleſey. He was elected from amongſt the moſt eminent Druids by a plurality of votes; and as this ſtation was attended with very conſiderable power and wealth, and with many privileges and honours of various kinds, the attainment of it was an object of great ambition, and the election of a perſon to occupy it ſometimes occaſioned a civil war. The Druids were alſo divided into ſeveral claſſes, or branches; *viz.* the vacerri, bardi, eubages, ſemnothii, or ſemnothei, and ſaronidæ. The vacerri are held to have been the prieſts; the bardi, the poets; the eubages, the augurs; and the ſaronidæ, the civil judges, and inſtructors of youth. As to the ſemnothei, who are ſaid to have been immediately devoted to the ſervice of religion, it is probable, they were the ſame with the vacerri.

Strabo, however, lib. iv. p. 197. and Picard after him, in his Celtopædia, do not comprehend all theſe different orders under the denomination of Druids, as ſpecies under their genus, or parts under the whole; but make them quite different conditions, or orders.

Strabo, in effect, only diſtinguiſhes three kinds; bardi, eubages, or vates, and Druids, though the laſt name was frequently given to the whole order. The bards were the heroic, hiſtorical, and genealogical poets of Gaul and Britain. They did not properly belong to the prieſtly order, nor had they any immediate concern with the offices of religion; on the contrary, they carefully abſtained from introducing any thing of a religious nature into their poems. (See Bard.) Thoſe of the ſecond claſs were called by the Greeks Ουατες, by the Romans *Vates*, and by the Gauls and Britons *Faids*. (See Faids.) The Druids were by far the moſt numerous claſs; and they performed all the offices of religion.

Learning of the Druids.—It is not eaſy to aſcertain the nature and extent of their learning, though we have no reaſon to doubt their having poſſeſſed various kinds of literature and philoſophy in an eminent degree, conſidering the period in which they lived. Diogenes Laertius aſſures us (in his Prologue), that the Druids were the ſame, among the ancient Britons, with the Sophi, or philoſophers, among the Greeks; the Magi, among the Perſians; the Gymnoſophiſts and Brachmans, among the Indians; and the Chaldæans, among the Aſſyrians. As the Druids ſtudiouſly concealed their principles and opinions from all the world but the members of their own ſociety, neither the Greeks nor Romans could obtain a perfect and certain knowledge of their ſyſtems either of religion or philoſophy; and, on this account, we find few remains of them in the works of the ancients. Beſides, they ſtrictly obſerved the ſubſiſting law, which forbade them to commit any of their doctrines to writing. (Cæſ. de Bell. Gall. l. 6. c. 13.) Accordingly, when the living repoſitories of theſe doctrines were deſtroyed, they were irrecoverably loſt, as they had not been preſerved in any written monuments. Some few ſcattered fragments, however, may be ſtill collected. It appears, that phyſiology, or natural philoſophy, was the favourite ſtudy of the Druids both in Gaul and in Britain. Cicero tells us (De Divinatione, l. 1.), that he was perſonally acquainted with one of the Gauliſh Druids, Divitiacus the Æduan, a man of quality in his country, who profeſſed to have a thorough knowledge of the laws of nature, or that ſcience which the Greeks call phyſiology. (See on this ſubject, Diod. Sicul. l. 5. c. 31. Strabo, l. 4. Cæſ. de Bell. Gall. l. 6. c. 13. Mela, l. 3. c. 12. Ammian. Marcell. l. 15. c. 9.) According to the authors here cited, they entered into many diſquiſitions and diſputations in their ſchools, concerning the form and magnitude of the univerſe in general, and of the earth in particular, and even concerning the moſt ſublime and hidden ſecrets of nature. On theſe and the like ſubjects they formed a variety of ſyſtems and hypotheſes, which they delivered to their diſciples in verſe, that they might the more eaſily retain them in their memories, ſince they were not allowed to commit them to writing. Strabo has preſerved one of the phyſiological opinions of the Druids concerning the univerſe, *viz.* that it was never to be entirely deſtroyed or annihilated, but was to undergo a ſucceſſion of great changes and revolutions, which were to be produced ſometimes by the power and predominancy of water, and ſometimes by that of fire. In this reſpect the Druids agreed in opinion with the philoſophers of many other nations; and they alſo coincided with them in their notions with regard to the origin of the univerſe from two diſtinct principles, the one intelligent and omnipotent, which was God, the other inactive and inanimate, which was matter. To this purpoſe Cæſar informs us, that they had many diſquiſitions about the power of God, and, without doubt, among other particulars, about his creating power. But it does not appear, whether they believed with ſome, that matter was eternal, or, with others, that it was created, and in what manner they endeavoured to account for the diſpoſition of it into the preſent form of the univerſe. On theſe heads they expreſſed their ſentiments, whatever they were, in a dark, figurative, and enigmatical manner. They alſo diſputed about the magnitude and form of this world, and of the earth in particular; and though we are not informed what were their opinions concerning the dimenſions of the univerſe or of the earth, yet we have reaſon to conclude, that they believed both to be of a ſpherical form; the circle being the favourite figure of the Druids, as appears from the form both of their houſes and temples. The Druids likewiſe employed themſelves in particular inquiries into the natures and properties of the different kinds of ſubſtances; but the reſult of theſe inquiries has not been tranſmitted to us. Aſtronomy ſeems to have been one of the chief ſtudies of the Druids of Gaul and Britain; and accordingly Cæſar ſays, that they had many diſquiſitions concerning the heavenly bodies and their motions, in which they inſtructed their diſciples; and Mela alſo obſerves, that they profeſſed to have great knowledge of the motions of the heavens and of the ſtars. This laſt author ſuggeſts, that they were pretenders to the knowledge of aſtrology, or the art of diſcovering future events and the ſecrets of providence, from the motions and aſpects of the heavenly bodies; for he expreſsly ſays, that they pretended to diſcover the counſels and deſigns of the gods. The Druids, beſides theſe inducements which led them in common with others to the ſtudy of aſtronomy, in order to enable them to meaſure time, to mark the duration of the different ſeaſons, and thus to regulate the operations of the huſbandman, and to direct the courſe of the mariner, and to ſubſerve many other purpoſes in civil life; had other motives peculiar to themſelves, as they would thus be able to fix the times and regular returns of their religious ſolemnities, of which they had the ſole direction; ſome of which were annual, and others monthly. This kind of knowledge was the more neceſſary, as theſe ſolemnities were attended by perſons from very different and diſtant countries, who were all to meet at one place on the ſame day, ſo that they muſt have had ſome rule for diſcovering the annual return of that day. Beſides, the circumſtances of the Druids were favourable to the ſtudy of aſtronomy: the ſun and moon, and perhaps the planets, were the great objects of their adoration; and therefore attracted their frequent attention; and the places of their worſhip, in which they ſpent much of their time, both by day and night, were all uncovered, and ſituated on eminences, from which they had a full view of the celeſtial bodies. That the Britiſh Druids actually devoted themſelves to the ſtudy of aſtronomy may be inferred from the veſtiges that remain in the iſle of Angleſey, concerning which Mr. Rowland remarks, that as the ancients deciphered aſtronomy by the name of "Edris," a name attributed to Enoch, whom they took to be the founder of aſtronomy, ſo there is juſt by a ſummit of a hill, called "Caer Edris," or "Idris," and not far off, another place called "Cerrig-Brudyn," *i.e.* the aſtronomers' ſtones or circle; the former of theſe places may have been the reſidence, and the latter the obſervatory of theſe Druids in the iſle of Angleſey. If we advert to the fact, it is well known that the Druids computed their time by nights and not by days, in conformity to a cuſtom which they had received by tradition from their remote anceſtors, and in which they were confirmed by their meaſuring time very much by the moon, the empreſs and queen of the night. By the age and aſpect of the moon the Druids regulated all their great ſolemnities, both ſacred and civil. Their moſt auguſt ceremony of cutting the miſſeltoe from the oak by the arch-druid was always performed on the 6th day of the moon, as Pliny informs us. (l. 16. c. 44.) And Cæſar ſays (De Bell. Gall. l. 1. c. 50.), that their military operations were very much regulated by this luminary, and that they avoided, as much as poſſible, to engage in battle while the moon was on the wane. Whilſt they directed their attention to this planet, they would ſoon find, that ſhe paſſed through all her various aſpects in 30 days; and by more accurate obſervations they would diſcover, that the regular period of her entire revolution was very nearly 29½ days. Hence they would be furniſhed with the diviſion of their time into months, or revolutions of the moon, of which it is known they were poſſeſſed. In proceſs of time, they would perceive that about 12 revolutions of the moon comprehended the whole variety of ſeaſons, which recommenced and revolved again every 12 months. Thus was ſuggeſted to them the larger diviſion of time, called a year, conſiſting of 12 lunations, or 354 days, which was the moſt ancient meaſure of the year in all nations. That this was, for ſome time at leaſt, the form of the Druidical year, is both probable in itſelf, and from the following expreſſion of Pliny (l. 16. c. 44.): "that they began both their months and years, not from the change, but from the 6th day of the moon;" which expreſſion plainly proves, that their years conſiſted of a certain number of lunar revolutions, as they always commenced on the ſame day of the moon. Pliny alſo informs us, that the Druids had a cycle or period of 30 years, commencing on the 6th day of the moon, which they called an age. It is not poſitively aſcertained what this cycle was, nor to what uſes it was applied. It is not improbable that, while the Druids uſed the year of 12 lunar months, and had not invented a method of adjuſting it to the real revolution of the ſun, they obſerved that the beginning of this year had paſſed through all the ſeaſons, and returned to the point from whence it ſet out, in a courſe of about 33 years, which they might, therefore, call an age. Others may perhaps be of opinion, that this 30 years' cycle of the Druids is the ſame with the great year of the Pythagoreans, or a revolution of Saturn. Some have imagined that the Druids were acquainted with the cycle of 19 years, commonly called the cycle of the moon; but this ſuppoſes that the Hyperborean iſland, mentioned by Diodorus Siculus, was Britain, or one of the Britiſh iſles. The Druids, in their numerous obſervations on the moon, could not fail to diſcover that ſhe ſhone by means of rays borrowed from the ſun; and concurring with philoſophers of other countries, they might conclude that ſhe was inhabited. Such were the doctrines of Pythagoras, and we have, therefore, no reaſon to doubt that they were entertained by the Druids of Gaul and Britain. It is poſſible alſo, that they might have predicted eclipſes both of the ſun and moon, in a vague and uncertain manner, as modern aſtronomers predict the return of comets. We are further informed by Cæſar and Mela, that the Druids ſtudied the ſtars, as well as the ſun and moon; and that they diſtinguiſhed theſe from the planets, with the motions and revolutions of which they were acquainted; but though they knew their number, and obſerved their motions, it is doubtful whether they had aſcertained the time in which they performed their ſeveral revolutions. If Plutarch's teſtimony may be credited (De Defectu Oracul. et De Facie in Orbe Lunæ), we ſhall have poſitive proof that the Druids of the Britiſh iſles were acquainted with the conſtellations, and the ſigns of the zodiac; and that they meaſured the revolutions of the ſun and planets, by obſerving the length of time between their departure from, and return to, one of theſe ſigns. Some have ſuppoſed that the Druids had inſtruments of ſome kind or other, which anſwered the ſame purpoſes with our teleſcopes, in making obſervations on the heavenly bodies. But this depends on an improbable conjecture of Diodorus Siculus (l. 2. § 47.), in his deſcription of the famous Hyperborean iſland.

As the Druids applied themſelves to the ſtudy of philoſophy and aſtronomy, we cannot doubt their having poſſeſſed ſome degree of acquaintance with arithmetic and geometry. In this reſpect the want of written rules could be no great diſadvantage to them, as the precepts of this, as well as of the other ſciences, were couched in verſe, which would be eaſily committed to memory and retained. Unacquainted with the Arabic characters now in uſe, they probably made uſe, in their calculations, of the letters of the Greek alphabet. To this purpoſe Cæſar expreſsly ſays, that the Druids of Gaul, in almoſt all their tranſactions, and private accounts or computations, made uſe of the Greek letters. Their knowledge of geometry is confirmed by the beſt hiſtorical evidence; for Cæſar ſays (l. 6. c. 13.), that when any diſputes aroſe about their inheritances, or any controverſies about the limits of their fields, they were entirely referred to the deciſion of their Druids. Moreover, both Cæſar and Mela plainly intimate, that the Druids were converſant in the moſt ſublime ſpeculations of geometry, "in meaſuring the magnitude of the earth, and even of the world." It is certain that the Britiſh Druids were well acquainted with the geography at leaſt of their own iſland; and it is not improbable, that their knowledge in this reſpect extended much farther. As ſeveral monuments were erected by the Druids for religious and other purpoſes, to ſay nothing here of *Stone-henge* (which ſee), we cannot queſtion their having made great progreſs in the ſcience of mechanics, and in the mode of applying mechanical power, ſo as to produce very aſtoniſhing effects. Medicine, or the art of healing, muſt alſo have been the object of attention and ſtudy among the Druids; for they were the phyſicians, as well as the prieſts, both of Gaul and Britain. To this purpoſe Cæſar ſays (De Bell. Gall. l. 6.), that, being much addicted to ſuperſtition, thoſe who are afflicted with a dangerous diſeaſe ſacrifice a man, or promiſe that they will ſacrifice one for their recovery; and with this intention, they recur to the miniſtry of the Druids, becauſe they declared, that the anger of the immortal gods (to which they imputed various diſeaſes) cannot be appeaſed, ſo as to ſpare the life of one man, but by the life of another. Hence their medical practices were attended with a great number of magical rites and incantations. They are alſo ſaid to have applied to the ſtudy of anatomy; but to what extent we are not able to ſay. It is affirmed, however, that they diſſected a prodigious number of human ſubjects; and that they encouraged the ſcience of anatomy to ſuch an exceſs, and ſo much beyond all reaſon and humanity, that one of their doctors, called Herophilus, is ſaid to have read lectures on the bodies of more than 700 living men, to ſhew therein the ſecrets and wonders of the human fabric. (Borlaſe's Antiq. of Cornwall, p. 96.) That they had amongſt them ſurgeons, as well as phyſicians, we have no reaſon to doubt: but they concealed their mode of practice from all but the initiated; and of courſe diſguiſed and blended all their applications with a multitude of inſignificant charms. Their materia medica ſeems to have conſiſted only of a few herbs, which were believed to have certain ſalutary and healing virtues. Of the medical virtues of the miſletoe of the oak they entertained a very high opinion, and eſteemed it a kind of panacea, or remedy for all diſeaſes. Pliny ſays, (N. H. l. 16. c. 44. l. 24. c. 4.), that they called it by a name which in their language ſignified "All-heal," becauſe they thought that it cured all diſeaſes; and that it was peculiarly efficacious in the epilepſy or falling ſickneſs. The ſelago, a kind of hedge-hyſſop, reſembling ſavin, was alſo much admired by the Druids both of Gaul and Britain for its ſuppoſed medicinal virtues, particularly in all diſeaſes of the eyes; but its efficacy much depended, as they ſuperſtitiouſly conceived, on the peculiar mode of gathering it. They entertained a high opinion alſo of the herb ſamolus, or marſhwort, for its ſanative qualities, and alſo of other plants, for an account of which we refer to Pliny, (N. H. l. 24. c. 12. l. 25. c. 9. l. 29. c. 3. l. 26. in proem.) From the imperfect hints pertaining to this ſubject that have been collected, it has been inferred, that for the age in which they lived, the Druids were no contemptible botaniſts. Their circumſtances were peculiarly favourable for the acquiſition of this kind of knowledge. For as they ſpent moſt of their time in the receſſes of mountains, groves, and woods, the ſpontaneous vegetable productions of the earth conſtantly preſented themſelves to their view, and engaged their attention. For an account of the ſuperſtitious opinion they entertained of the ſerpent's egg, or ANGUINUM *ovum*, we refer to that article. We learn from Pliny, (ubi ſupra) that they had ſome knowledge of pharmacy, without which their practice of phyſic, imperfect as it was, could not have ſubſiſted. Accordingly we are told, that they ſometimes extracted the juices of herbs and plants, by bruiſing and ſteeping them in cold water, and ſometimes by infuſing them in wine; that they made potions and decoctions by boiling them in water, and other liquors; that they ſometimes adminiſtered them in the way of fumigation; that on ſome occaſions they dried the leaves, ſtalks, and roots of plants, and afterwards infuſed them; and that they were not ignorant of the art of making ſalves and ointments of vegetables.

The noble art of rhetoric, which enabled them to diſplay their wiſdom and learning, and which contributed to the ſupport and advancement of their reputation, was diligently ſtudied and taught by the Druids of Gaul and Britain. Mela ſays expreſsly (De Situ Orbis, l. 3. c. 2.), that they were great maſters and teachers of eloquence. Among their deities was one named Ogmius, ſignifying in their language the power of eloquence, who was worſhipped by them, with great devotion, as the patron of orators and the god of eloquence. He was painted as an old man, ſurrounded by a great multitude of people, with ſlender chains reaching from his tongue to their ears. Lucian, expreſſing his ſurpriſe at this picture, received from a Druid the following explanation of it: "You will ceaſe to be ſurpriſed, when I tell you, that we make Hercules (whom we call Ogmius) the god of eloquence, contrary to the Greeks, who give that honour to Mercury, who is ſo far inferior to him in ſtrength. We repreſent him as an old man, becauſe eloquence never ſhews itſelf ſo lively and ſtrong as in the mouths of old people. The relation which the ear has to the tongue, juſtifies the picture of the old man who holds ſo many people faſt by the tongue. Neither do we think it any affront to Hercules to have his tongue bored: ſince, to tell you all in one word, it was that which made him ſucceed in every thing; and that it was by his eloquence he ſubdued the hearts of all men." (Lucian in Hercule Gallico.) The Druids had many opportunities of exerciſing their eloquence, whilſt they taught their diſciples in their ſchools; when they diſcourſed in public to the people on ſubjects of religion and morality; when they pleaded cauſes in the courts of juſtice; and when they argued in the great councils of the nation, and at the head of armies ready to engage in battle, ſometimes for inflaming their courage, and at other times for allaying their fury, and diſpoſing them to make peace. Such was the effect of their eloquence, that it engaged reſpect both from friends and enemies, and that when hoſtile armies were juſt commencing an engagement, with their ſwords drawn and ſpears extended, they ſtepped in between them and prevented, by the powers of their eloquence, the ſhedding of blood, and prevailed upon them to ſheath their ſwords. (Diod. Sicul. l. 5. c. 8.) Accordingly the Britiſh kings and chieftains, who were educated by the Druids, were famous for their eloquence.

It has been queſtioned, notwithſtanding the wiſdom and learning juſtly attributed to the Druids, whether they had the knowledge of letters, or whether they could read and write. In favour of their knowledge in this department it has been alleged, that though letters were neither generally known nor in common uſe at the period that ſucceeded the Roman invaſion, they muſt have been known to the Druids, and to ſome few of thoſe who had been educated by them. The law of the Druids, it has been ſaid, which is mentioned by Cæſar, againſt committing their doctrines to writing, affords ſufficient evidence, that they were not unacquainted with the uſe of letters; for if they had been ignorant of the art of writing, they could have had no neceſſity for ſuch a law, nor, indeed, any idea of it. Beſides, this hiſtorian ſays, that in all tranſactions, except thoſe of religion and learning, they made uſe of letters; and that the letters which they uſed were thoſe of the Greek alphabet. It has been ſuggeſted, that the Britons, and particularly their Druids, might have received the knowledge of the Greek letters, either directly from the Greek merchants of Marſeilles, which city is repreſented by Strabo (l. 4.) as a kind of univerſity to the Barbarians, for they frequented this iſland on account of trade, or from the Druids of Gaul, with whom they kept up a conſtant and friendly intercourſe. We may therefore conclude, that the letters of the Greek alphabet were known to the learned among the Britons, and uſed by them, on ſome occaſions, in writing contracts, treaties, and other important deeds, before they were invaded and conquered by the Romans. By that conqueſt the Roman letters were introduced, and from that era continued to be uſed, not only by thoſe Britons who learned to write and ſpeak the Latin language, but even by thoſe who ſtill retained the uſe of their native tongue.

Notwithſtanding the proficiency which the Britiſh Druids had made in ſeveral branches of real knowledge and uſeful learning, they were much addicted to magic and divination; and by theſe they pretended to work a kind of miracles, and exhibit aſtoniſhing appearances in nature; to penetrate into the counſels of heaven; to foretel future events, and to diſcover the ſucceſs or miſcarriage of public or private undertakings. Theſe powers were aſcribed to them, not only by their own countrymen, but by the philoſophers of Greece and Rome. "In Britain," ſays Pliny (N. H. l. 30. c. 1.), "the magic arts are cultivated with ſuch aſtoniſhing ſucceſs, and ſo many ceremonies at this day, that the Britons ſeem to be capable of inſtructing even the Perſians themſelves in theſe arts." "They pretend to diſcover the deſigns and purpoſes of the gods," ſays Mela (l. 3. c. 2.) They were ſo famous for the ſuppoſed veracity of their predictions, that they were not only conſulted on all important occaſions by their own princes and great men, but even ſometimes by the Roman emperors. Deriving reputation, and alſo wealth, from their magical and prophetical powers, they employed all their art and cunning, and all their knowledge in philoſophy and mechanics, to encourage and promote the deluſion. Their natural and acquired ſagacity, their long experience, and their great concern in the conduct of affairs, enabled them to form very probable conjectures about the events of enterpriſes. Theſe conjectures they pronounced as oracles, when they were conſulted, and they pretended to derive them from the inſpection of the entrails of victims; the obſervation of the flight and feeding of certain birds; and many other mummeries. By theſe and the like arts, they obtained and preſerved the reputation of prophetic foreſight among an ignorant and credulous people.

Before the invaſion of the Romans, the ancient Britons had among them various ſchools and ſeminaries of learning, which were wholly under the direction of the Druids, to whoſe care the education of youth was altogether committed. Theſe Druidical academies were very much crowded with ſtudents; as many of the youth of Gaul came over to finiſh their education in this iſland. The ſtudents, as well as the teachers, were exempted from military ſervices and from taxes; and enjoyed many other privileges, which much ſerved to increaſe their number. The academies of the Druids, as well as their temples, were ſituated in the deepeſt receſſes of woods and foreſts; partly becauſe ſuch ſituations were beſt adapted to ſtudy and contemplation, and principally becauſe they were moſt ſuitable to that profound ſecrecy with which they inſtructed their pupils, and kept their doctrines from the knowledge of others. Wherever the Druids had any temple of any great note, attended by a conſiderable number of prieſts, there they alſo had an academy, in which ſuch of thoſe prieſts as were eſteemed moſt learned were appointed to teach. Of theſe Britiſh academies the moſt conſiderable was ſituated in the iſle of Angleſey, near the manſion of the arch-druid, who had the chief direction in matters of learning as well as of religion. Here is one place, which is ſtill called "Myfyrion," *i. e.* the place of meditation or ſtudy; another, as we have already mentioned, called "Caer-Edris," the city of aſtronomers; and another "Cerrig-Brudyn," the aſtronomers' circle. In theſe ſeminaries the profeſſors delivered all their lectures to their pupils in verſe; and a Druidical courſe of education, comprehending the whole circle of the ſciences that were then taught, is ſaid to have conſiſted of about 20,000 verſes, and to have laſted, in ſome caſes, 20 years. The ſcholars were not allowed to commit any of theſe verſes to writing, but were obliged to get them all by heart. When the youth were firſt admitted into theſe academies, they were obliged to take an oath of ſecrecy, in which they ſolemnly ſwore, that they would never reveal the myſteries, which they ſhould there learn. They conſtantly reſided with their teachers and fellow-ſtudents, and were forbidden to converſe with any other perſons, till they were regularly diſmiſſed. One leſſon, which was ſedulouſly inculcated upon all their pupils, was a ſupreme veneration for the perſons and opinions of their teachers; nor was this leſſon ever obliterated from their minds. This circumſtance contributed to ſupport the power and influence of the Druids; as all the principal perſons in every ſtate were educated in their academies, where they imbibed a high opinion of the wiſdom and dignity of their inſtructors. From the charge and education of youth the Druids muſt have derived very conſiderable emoluments.

Hornius, in his Hiſtory of Philoſophy, lib. ii. cap. 12. believes all the learning and philoſophy of the Druids to have been derived from the Aſſyrian magi, who are ſtill called, in Germany, *trutten*, or *truttner;* and that as magus has loſt its ancient ſignification, which was honourable, and now ſignifies a magician or ſorcerer; ſo Druid, which had the ſame ſenſe, has likewiſe degenerated, and now ſignifies no other than a perſon who has commerce with the devil, or is addicted to magic. And accordingly, in Frieſland, where there anciently were Druids, witches are now called Druids. Gale, Dickenſon, and ſome others, vainly contend, that the Druids borrowed all their philoſophy, as well as religion, from the Jews.

Religion of the Druids.—The Druids, as well as the Gymnoſophiſts of India, the magi of Perſia, the Chaldæans of Aſſyria, and all the other prieſts of antiquity, had two ſets of doctrines or opinions; one of which they communicated only to the initiated, who were admitted into their own order, and which they ſtudiouſly concealed from the reſt of mankind; teaching it in the caves or receſſes of the foreſts, and forbidding its being committed to writing, left it ſhould be divulged; and another, which was made public, and adapted to the capacities and ſuperſtitious humours of the people, and calculated to promote the honour and opulence of the prieſthood. The ſecret doctrines of our Druids were much the ſame with thoſe of the other prieſts of antiquity, whom we have already mentioned, and are ſuppoſed to have flowed by different ſtreams of tradition, from the inſtructions which the ſons of Noah gave to their immediate deſcendants. Accordingly theſe ſecret Druidical doctrines were more agreeable to primitive tradition and right reaſon, than their public doctrines. It is not, therefore, improbable, that they ſtill retained, in ſecret, the great doctrine of one God, the creator and governor of the univerſe; and Cæſar informs us, (l. 6. c. 13.) that they taught their diſciples many things about the nature and perfections of God. Some writers have, with much reſearch and labour, endeavoured to ſhew, that our Druids, as well as other orders of ancient prieſts, taught their diſciples many things concerning the creation of the world, the formation of man, his primitive innocence and felicity, his fall into guilt and miſery, the creation of angels, their expulſion from heaven, the univerſal deluge, and the final deſtruction of this world by fire; and that their doctrines on theſe ſubjects were not very different from thoſe which are contained in the ſacred writings. (Cluver. Germ. Antiq. l. 1. c. 32.) However this be, it is ſufficiently manifeſt, that the Druids taught the doctrine of the immortality of the ſoul; and Mela ſays (l. 3. c. 11.) that this was one of their ſecret doctrines which, for political reaſons, they were permitted to publiſh in order to render their diſciples more brave and fearleſs.

Cæſar (lib. 6. c. 13.) and Diodorus (l. 5.) ſay, that the Druids taught the Pythagorean doctrine of the metempſychoſis, or tranſmigration of ſouls into other bodies: and this, if they really taught it, was probably their public doctrine, adapted to the conceptions of the vulgar. Others, however, repreſent them as teaching, that the ſoul after death aſcended to ſome higher orb, and enjoyed a more ſublime felicity, which, perhaps, was their private doctrine, and expreſſed their real ſentiments. But as the Druids conceived, in common with the other prieſts of antiquity, that the common people were incapable of comprehending rational principles of religion, or of being influenced by rational motives, and that ſuperſtitious fables were better adapted to their faculties and diſpoſition; their public theology conſiſted of ſuch mythological fables, concerning the genealogies, attributes, offices, and actions of their gods; the various ſuperſtitious methods of appeaſing their anger, gaining their favour, and diſcovering their will. This farrago of fables was couched in verſe, abounding with figures and metaphors, and was delivered by the Druids from little eminences, (of which many ſtill remain) to the ſurrounding multitudes. With this fabulous divinity they intermixed moral precepts, for regulating the manners of their auditors; and they warmly exhorted them to abſtain from doing injury to one another, and to fight valiantly in defence of their country. (Rowland, Mona Antiqua. Diogenes Laert. in Proem.) Theſe pathetic declamations impreſſed their minds, and excited a ſupreme veneration for their gods, an ardent love to their country, an undaunted courage, and a ſovereign contempt of death. (Lucan l. 1. v. 460, &c. Cæſar de Bell. Gall. l. 6. c. 13.) The ſecret and public theology of the Druids, together with their ſyſtem of morals and philoſophy, had ſwelled to ſuch an enormous ſize, that their diſciples employed no leſs than 20 years in acquainting themſelves with it, and committing to memory the great multitude of verſes in which it was contained. At what period a plurality of gods was introduced among them, it is not poſſible to aſcertain; but this innovation was probably introduced by degrees, and the following cauſes might ſerve to promote it. The different names and attributes of the one true God were miſtaken for, and adored as ſo many different divinities. The ſun, moon, and ſtars, which were at firſt regarded with veneration as the moſt glorious works and lively emblems of the Deity, were gradually adored as gods. Illuſtrious princes, who had been the objects of univerſal admiration during their lives, and who had performed ſome ſignal exploits, became objects of adoration after their deceaſe. The Britons had gods of all theſe different kinds. The ſupreme Being was worſhipped by the Gauls and Britons under the name of Heſus, a word expreſſive of omnipotence, as *hizzuz* is in the Hebrew. (Pſ. xiv. 8.) But when the plurality of gods was introduced, Heſus was adored only as a particular divinity, who, by his great power, preſided over war and armies, and was the ſame with Mars. And as the Germans, Gauls, and Britons, were a warlike people, they were great worſhippers of Heſus, whoſe favour and aſſiſtance they endeavoured to gain by ſuch cruel and bloody rites as could be acceptable only to a being who delighted in the deſtruction of mankind. (Cæſar de Bell. Gall. l. 6. c. 17. Lucan, l. 1. v. 445.) Teutates was another name, or attribute, of the ſupreme Being, being compounded of the two Britiſh words, "Deu-Tatt," or God the Father, and was worſhipped by the Gauls and Britons as a particular divinity. By the progreſs of idolatry, Teutates was degraded into the ſovereign of the infernal world, and became the ſame with Dis, or Pluto, of the Greeks and Romans, or, as others think, with Mercury, and was worſhipped in ſuch a manner, as could be agreeable to none but an infernal power. (Baxter, Gloſſ. Brit. p. 277. Cæſar de Bell. Gall. l. 6. c. 18. Dionyſ. Halicarn. l. 1. p. 16.) When gods were multiplied, Taranis, ſo called from taran, thunder, and conſidered as the voice of the ſupreme Being, became a particular divinity, and was worſhipped by very inhuman rites. (Lucan, l. 1. v. 446. Job, xl. 9. Pſ. xxix. 3, 4, 5.) The ſun, the moſt ancient and univerſal object of idolatrous worſhip, received the homage of the ancient Britons, under the names of Bel, Belinus, Blatucardus, Apollo, &c. which names were expreſſive, in their language, of the nature and properties of that viſible fountain of light and heat. To this illuſtrous object of idolatrous worſhip, thoſe famous circles of ſtone, ſeveral of which ſtill remain, ſeem to have been chiefly dedicated; where the Druids kept the ſacred fire, the ſymbol of this divinity, and from whence, as they were ſituated on eminences, they had a full view of the heavenly bodies. The moon alſo obtained an early and large ſhare of the idolatrous veneration of mankind. The Gauls and Britons, ſeem to have paid the ſame kind of worſhip to the moon as to the ſun; and it has been obſerved, that the circular temples dedicated to theſe two luminaries were of the ſame conſtruction, and commonly contiguous. (Martin's Deſcr. of Weſt. Iſles, p. 365.) It farther appears, that thoſe deified mortals, who were adored by the Gauls and Britons, were generally the ſame perſons, who were worſhipped by the Greeks and Romans; and who had been victorious princes, wiſe legiſlators, inventors of uſeful arts, &c. (Cicero de Nat. Deor. l. 1. Diod. Sic. l. 3. Cæſar de Bell. Gall. l. 6. c. 17. Perron. Antiq. Celt. l. 1. c. 9. &c.) The Celtic gods are ſuppoſed by many writers to have been the originals, and thoſe of the Greeks and Romans copies; to which purpoſe, it has been alleged, that all the deified princes, ſuch as Saturn, Jupiter, Mercury, &c. belonged to the Celtæ by their birth, and were ſovereigns of the Celtic tribes, which peopled Gaul and Britain; that all their names were ſignificant in the Celtic language, and expreſſive of their ſeveral characters; and that the Gauls and Britons, and other nations denominated barbarians, were much more tenacious of the opinions and cuſtoms of their anceſtors, than the Greeks and Romans, who diſcovered a great propenſity to adopt the gods and religious ceremonies of other nations. (Dionyſ. Halicar. l. 7. (See DÆMON.) The worſhip of the ancient Britons was expreſſed in four different ways, and conſiſted of ſongs of praiſe and thankſgiving, prayers, and ſupplications, offerings, and ſacrifices, and the various rites of augury and divination. The Druids in Britain directed and ſuperintended theſe different modes of worſhip, and both inſtructed and aided their diſciples in the performance of them. As to their ſacrifices, it is much to be lamented that human victims conſtituted a part of them; for it was an article in the Druidical creed, "That nothing but the life of man could atone for the life of man." In conſequence of this maxim, their altars ſtreamed with human blood, and great numbers of wretched men fell a ſacrifice to their barbarous ſuperſtition. Criminals, who had been guilty of robbery and other crimes, were ſelected in the firſt inſtance; but when there was a ſcarcity of criminals, they did not ſcruple to ſupply their place with innocent perſons. Theſe dreadful ſacrifices were offered by the Druids, on behalf of the public, at the eve of a dangerous war, or in a time of any national calamity; and alſo for perſons of high rank, when they were afflicted with any dangerous diſeaſe. By ſuch acts of cruelty, the ancient Britons endeavoured to avert the diſpleaſure and gain the favour of their gods. Suetonius, in his Life of Claudius, aſſures us, they ſacrificed men; and Mercury is ſaid to be the god to whom they offered theſe victims. Diod. Siculus, lib. 6. obſerves, it was only upon extraordinary occaſions they made ſuch offerings: as, to conſult what meaſures to take, to learn what ſhould befal them, &c. by the fall of the victim, the tearing of his members, and the manner of his blood guſhing out. Auguſtus condemned the cuſtom; and Tiberius and Claudius puniſhed and aboliſhed it. (See Cæſar, lib. 6. cap. 13, and Mela, lib. 3. cap. 2.) We learn from Pliny, that the ancient Britons were greatly addicted to divination, and that they excelled ſo much in the practice of all its arts, as to be able to give a leſſon even to the Perſians. See DIVINATION.

The ancient Britons were ſo much addicted to the ſuperſtitious rites of their religion, that they had daily ſacrifices and other acts of worſhip, at leaſt in their moſt famous places of devotion. The hours of theſe daily ſacrifices were perhaps at noon and midnight, when they imagined, according to Lucan (l. 3. v. 423, &c.), that the gods viſited their ſacred groves. At noon they probably paid their homage to the ſun and the celeſtial gods, and at midnight to the moon and the infernal powers. They were not ignorant of the ancient and univerſal diviſion of time into weeks, conſiſting of ſeven days each; but it is not certain, whether they conſecrated one of theſe ſeven days to acts of religion. They divided their time, as we have already obſerved, by lunar months, commencing with the ſixth day of one moon and terminating with the ſame day of another; and the firſt day of every lunar month, according to their mode of reckoning, or the ſixth according to our computation, was a religious feſtival. Pliny, ſpeaking of one of their religious ſolemnities, ſays, that this was always obſerved on the ſixth day of the moon: a day, he ſays, ſo much eſteemed among them, that they have made their months and years, and even ages, which conſiſt but of 30 years, to take their beginning from it. The reaſon of their chuſing that day is, becauſe the moon is by that time grown ſtrong enough, though not arrived at half its fulneſs. (N. H. l. 16. c. 44.) The Gauls and Britons had ſeveral annual feſtivals, which were obſerved with great devotion; of this kind was the auguſt ſolemnity of cutting the miſletoe from the oak, which was performed by the arch-druid; and it is thus deſcribed by Pliny: "The Druids held nothing ſo ſacred as the miſletoe of the oak; as this is very ſcarce and rarely to be found, when any of it is diſcovered, they go with great pomp and ceremony on a certain day to gather it. When they have got every thing in readineſs under the oak, both for the ſacrifice and the banquet which they make on this great feſtival, they begin by tying two white bulls to it by the horns, then one of the Druids, clothed in white, mounts the tree, and with a knife of gold, cuts the miſletoe, which is received in a white ſagum; this done, they proceed to their ſacrifices and feaſtings." (N. H. l. 14. c. 44.) This feſtival is ſaid to have been kept as near as the age of the moon permitted to the 10th of March, which was their New-year's day. The firſt day of May was a great annual feſtival, in honour of Belinus, or the ſun. (See BEL-TEIN.)

Midſummer day and the firſt of November were likewiſe annual feſtivals; the one to implore the friendly influences of heaven upon their fields, and the other to return thanks for the favourable ſeaſons and the fruits of the earth; as well as to pay their yearly contributions to the miniſters of their religion. It is alſo probable, that all their gods and goddeſſes, their ſacred groves, their hallowed hills, lakes, and fountains, had their ſeveral annual feſtivals; ſo that the Druidiſh calendar was perhaps as much crowded with holy-days as the popiſh one is at preſent. On theſe feſtivals, after the appointed ſacrifices and other acts of devotion were finiſhed, the reſt of the time was ſpent in feaſting, ſinging, dancing, and all kinds of diverſions.

In the Druidical creed it was an article, "that it was unlawful to build temples to the gods, or to worſhip them within walls, or under roofs." (Tacit. de Mor. Germ. c. 9.)

All their places of worſhip, were, therefore, in the open air, and generally on eminences, from whence they had a full view of the heavenly bodies, to whom much of their adoration was directed. But to prevent being incommoded by the winds and rains, or diſtracted by the view of external objects, or diſturbed by the intruſion of unhallowed feet, when they were either inſtructing their diſciples or performing their religious rites, they ſelected the deepeſt receſſes of groves and woods for their ſacred places; theſe groves were planted for that purpoſe, in the moſt proper ſituations, and thoſe trees in which they moſt delighted. The chief of theſe trees was the ſtrong and ſpreading oak, for which the Druids had a very high and ſuperſtitious veneration. "The Druids (ſays Pliny) have ſo high an eſteem for the oak, that they do not perform the leaſt religious ceremony, without being adorned with garlands of its leaves. Theſe philoſophers believe, that every thing which grows upon that tree comes from heaven; and that God hath choſen that tree above all others." (N. H. l. 16. c. 44.) In this reſpect they reſembled the prieſts of other ancient nations, and particularly the Hebrew patriarchs. (Gen. xxvi. 4. 8. Joſh. xxiv. 26.) Theſe ſacred groves were watered by ſome conſecrated fountain or river, and ſurrounded by a ditch or mound, to prevent the intruſion of improper perſons. In the centre of the grove was a circular area, incloſed with one or two rows of large ſtones ſet perpendicularly in the earth, which conſtituted the temple within which the altar ſtood, on which the ſacrifices were offered. In ſome of theſe moſt magnificent temples, they laid ſtones of prodigious weight on the tops of the ſtanding pillars, which formed a kind of circle aloft in the air, and added much to the grandeur of the whole; ſuch was STONE-HENGE, if it was a Druidical temple. Near to the temple, ſo called for want of a proper word, they erected their *carnedde*, or ſacred mounts; their *cromlechs*, or ſtone tables, on which they prepared their ſacrifices, and other things neceſſary for their worſhip. Of theſe temples, carnedde, and cromlechs, there are ſtill many veſtiges in the Britiſh iſles, and other parts of Europe. Lucan has poetically deſcribed one of the Druidical groves above mentioned, in the following manner.

"Lucus erat longo nunquam violatus ab ævo, &c."
Pharſ. l. 3. v. 399.

"Not far away, for ages paſt had ſtood
An old unviolated ſacred wood:
Whoſe gloomy boughs thick interwoven made
A chilly cheerleſs everlaſting ſhade:
There, nor the ruſtic gods, nor ſatyrs ſport,
Nor fawns, and ſylvans with the Nymphs reſort;
But barb'rous prieſts ſome dreadful pow'r adore,
And luſtrate ev'ry tree with human gore, &c. &c."
Rowe's Lucan, b. 3. l. 594.

Although the ancient Britons had no images of their gods, at leaſt none in the ſhape of men or other animals, in their ſacred groves, yet they had certain viſible ſymbols or emblems of them. "All the Celtic nations," ſays Maximus Tyrius (Diſſ. 38), "worſhipped Jupiter, whoſe emblem or repreſentation among them was a lofty oak." The oaks which they uſed for this purpoſe were truncated, that they might be the better emblems of unſhaken firmneſs and ſtability. Such were thoſe in the Druidical grove deſcribed by Lucan, (l. 3. v. 412.)

" —— Simulacraque mœſta deorum
Arte carent. Cæſiſque extant informia truncis."

" —— Strong knotted trunks of oak ſtood near,
And artleſs emblems of their gods appear."

Reputation, Authority, and Influence of the Druids.—The Druids were the firſt and moſt diſtinguiſhed order, in a variety of reſpects, among the Gauls and Britons. They were choſen out of the beſt families; and the honours of their birth, joined with thoſe of their function, procured for them the higheſt veneration among the people. They were verſed, as we have already ſtated, in aſtronomy, aſtrology, arithmetic, geometry, natural philoſophy, geography, and politics; they were well acquainted with the arts of divination and magic; and they had the adminiſtration of all ſacred things, being the interpreters of religion, and the judges of all affairs. Whoſoever refuſed obedience to them was declared impious and accurſed. As religion ſeems to have been the chief bond of union among the Britiſh tribes and nations, the Druids, as the miniſters of their religion, appear to have poſſeſſed the ſole authority of making, explaining, and executing the laws. Theſe laws were not conſidered, among the ancient Britons, as the decrees of their princes, but as the commands of their gods: and the Druids were ſuppoſed to be the only perſons to whom the gods communicated the knowledge of their commands, and conſequently they were the only perſons who could declare and explain them to the people. The violations of the laws were not conſidered as crimes againſt the prince or ſtate, but as ſins againſt Heaven; for which the Druids, as the miniſters of Heaven, had alone the right of taking vengeance. All theſe important prerogatives of declaring, explaining, and executing the laws, the Druids enjoyed and exerciſed in their full extent. "All controverſies (ſays Cæſar), both public and private, are determined by the Druids. If any crime is committed, or any murder perpetrated; if any diſputes ariſe about the diviſion of inheritances, or the boundaries of eſtates, they alone have the right to pronounce ſentence; and they are the only diſpenſers both of rewards and puniſhments." (De Bell. Gall. l. 6. c. 13.) "All the people (ſays Strabo), entertain the higheſt opinion of the juſtice of the Druids. To them all judgment, in public and private, in civil and criminal caſes, is committed." The Druids poſſeſſed ſo fully the power of judging in all caſes, that they were not under the neceſſity of calling in the aſſiſtance of the ſecular arm to execute their ſentences, but performed this alſo by their own authority, inflicting with their own hands ſtripes, and even death, on thoſe whom they had condemned. Their deciſions claimed at all times implicit ſubmiſſion, as it belonged to them to pronounce the ſentence of excommunication or interdict againſt all perſons, or whole tribes, when they refuſed to ſubmit to their decrees. This ſentence was ſo awful, that the perſons againſt whom it was fulminated were not only excluded from all ſacrifices and religious rites, but they were held in univerſal deteſtation, as impious and abominable; their company was avoided as dangerous and contaminating; they were declared incapable of any truſt or honour, put out of the protection of the laws, and expoſed to injuries of every kind. (Cæſ. De Bell. Gall. l. 6. c. 13.) Although it is not poſſible to obtain accurate information

formation concerning the times, places, forms, and circumſtances of the judicial proceedings of theſe awful judges; yet there can be no doubt of their attention to theſe particulars. That the ſeaſons or terms of their judicial proceedings might not interfere with thoſe devoted to religion, nor with thoſe appropriated by the people to their neceſſary occupations, ſuch as ſeed-time and harveſt, which were vacations, they held only two law-terms in very ancient times; one in ſummer, from the 9th day of May to the 9th of Auguſt, and the other in winter, from the 9th of November to the 9th of February. Whilſt the right of adminiſtering juſtice belonged to the order of Druids in general, there were, however, particular members of that order who were appointed to exerciſe this right, and to execute the office of judges. Their courts were probably held in the open air, for the convenience of all who had occaſion to attend them; and on an eminence, that all might ſee and hear their judges; and near their temples, to give the greater ſolemnity to their proceedings. There was at leaſt one of theſe places of judicature in the territories of every ſtate, perhaps in the lands of every clan or tribe. The arch-druid, who was the ſupreme judge, held, for the purpoſe of hearing and determining all cauſes in the laſt reſort, a grand aſſize once in the year, at a fixed time and place; which was commonly at his ordinary or chief reſidence. The chief reſidence of the arch-druid of Gaul was at Dreux, and here the grand aſſize for Gaul was held; and that of Britain was in the iſle of Angleſey. Of this latter Mr. Rowland deſcribes the veſtiges: "In the other end of this townſhip of Tre'r Dryw, there firſt appears a large cirque or theatre, raiſed up of earth or ſtones to a great height, reſembling a horſe-ſhoe, opening directly to the weſt, upon an even fair ſpot of ground. This cirque or theatre is made of earth and ſtones, carried and heaped there to form the bank. It is, within the circumvallation, about 20 paces over; and the banks, where they are whole and unbroken, above 5 yards perpendicular height. It is called "Bryn-gwyn," or "Brein-gwyn," that is, the ſupreme or royal tribunal: and ſuch the place muſt have been, wherever it was, in which a ſupreme judge gave laws to a whole nation." (Mona Antiq. p. 89, 90.) The laws, enacted and enforced among the ancient Britons, were compoſed in verſe, and they were never committed to writing. Whilſt theſe laws were unwritten, they were more entirely at the diſpoſal of the Druids, who alone could make themſelves complete maſters of them: and, therefore, when they were deſtroyed, their laws in a great degree periſhed with them. Thoſe which related to their religion, the worſhip of the gods, and the privileges of their miniſters, obtained, of courſe, the firſt place in their ſyſtem of juriſprudence; and the obligation of theſe was declared to be moſt ſacred and inviolable. That the gods are to be worſhipped was, probably, the very firſt law in the Druidical ſyſtem. To this all the other preſcriptions relating to the rites, times, places, and other circumſtances of that worſhip would naturally follow, accompanied with proper ſanctions to ſecure obedience. The laws aſcertaining the honours, rights, and privileges of the Druids; thoſe declaring their perſons inviolable, and providing for their immunity from taxes and military ſervices, were not forgotten. (Cæſ. De Bell. Gall l. 6. c. 14.) The Druids exerciſed a degree of authority, which was paramount to that of the Britiſh ſovereigns. They conſtantly attended their armies; and to them it belonged, independently of the kings, to impriſon or puniſh any of their ſoldiers. Nor could the princes give battle until the prieſts had performed their auguries, and declared that they were favourable.

Revenues of the Druids.—Theſe cannot, at this diſtance of time, be accurately aſcertained: but conſidering their influence and ſervices, and the ſuperſtitious veneration with which they were regarded by the people, we may naturally imagine, that they were as great as the people could afford. Thoſe who have obtained the entire direction of men's conſciences may ſecure to themſelves, without much difficulty, a conſiderable portion of their poſſeſſions. The Druids ſeem to have had the ſuperiority, if not the entire property, of certain iſlands on the coaſts both of England and Scotland, as Angleſey, Man, Harris, &c.; and it is highly probable, that they had alſo territories in different parts of the continent, near their ſeveral temples. Beſides, a great part of the offerings, which were brought to their ſacred places, and preſented to their gods, and theſe were frequent, and ſometimes very great, fell to their ſhare. Among the nations of Gaul and Britain, it was a common practice to dedicate all the cattle, and other ſpoils taken in war, to that deity by whoſe aſſiſtance they imagined they had gained the victory. Of theſe devoted ſpoils the prieſts were at leaſt the adminiſtrators, if not the proprietors. They were frequently conſulted, both by ſtates and private perſons, about the ſucceſs of intended enterpriſes, and other future events; and were well rewarded for the good fortune which they promiſed, and the ſecrets of futurity which they pretended to reveal. (Æl. Var. Hiſt. l. 2. c. 31.) They derived alſo conſiderable profits from the adminiſtration of juſtice, the practice of phyſic, and teaching the ſciences, all which were in their hands; and alſo from the inſtruction they gave to their diſciples in the principles and myſteries of their theology. We are alſo traditionally informed, that there were certain annual dues exacted from every family, by the prieſts of that temple within whoſe diſtrict the family dwelt; and theſe artful prieſts had invented a moſt effectual method to ſecure the punctual payment of theſe dues. All theſe families were obliged, under the dreadful penalties of excommunication, to extinguiſh their fires on the laſt evening of October, and to attend at the temple with their annual payment; and the firſt day of November to receive ſome of the ſacred fire from the altar, to rekindle thoſe in their houſes. By this device, they were obliged to pay, or to be deprived of the uſe of fire, at the approach of winter, when the want of it would be moſt felt. If any neighbours out of compaſſion ſupplied them with fire, or even converſed with them in their ſtate of delinquency, they were laid under the ſame terrible ſentence of excommunication, which excluded them not only from all the ſacred ſolemnities, but from all the ſweets of ſociety, and all the benefits of law and juſtice. (Toland's Hiſt. of the Druids, p. 71, 72. Cæſ. De Bell. Gall. l. 6. c. 13.) When we advert to theſe ſeveral ſources of wealth, we may reaſonably conclude, that the Britiſh Druids were the moſt opulent, as well as the moſt reſpected body of men in the country, in the times in which they flouriſhed.

Decline and Extinction of the Druids.—At the period of the firſt invaſion of Britain by the Romans under Julius Cæſar, B. C. 55, the Britiſh Druids were in the zenith of their power and glory; but as the Romans gained ground in the iſland, their power generally declined, until it was almoſt quite deſtroyed. Theſe victorious people, contrary to their uſual policy, diſcovered every where a great animoſity againſt the perſons and religion of the Druids. This animoſity was partly owing to their abhorrence of the cruel rites, of which the Druids were guilty, and partly to conſiderations of a political nature. The Druids, dreading the prevalence of the Romans, as threatening deſtruction to the authority and influence, which belonged to them under the character of miniſters of religion, and alſo under the rank of civil judges, legiſlators, and even ſovereigns in their ſeveral countries, animated their countrymen to reſiſt theſe invaders, and excited frequent revolts among them, after they had ſubmitted. The Romans, at the ſame time, knew that they could not eſtabliſh their own authority, and ſecure the obedience of Gaul and Britain, without deſtroying the authority and influence of the Druids in theſe countries. With this view, they obliged their ſubjects in theſe provinces to build temples, to erect ſtatues, and to offer ſacrifices after the Roman manner; and enacted ſevere laws againſt the uſe of human victims. They deprived the Druids of all authority in civil matters, and ſhewed them no mercy when found tranſgreſſing the laws, or concerned in any revolt. By theſe means, the authority of the Druids was brought ſo low in Gaul, in the reign of the emperor Claudius, about A. D. 45, that he is ſaid by Suetonius (in Vit. Claud. c. 25.) to have deſtroyed them in that country. About the ſame time they began to be perſecuted in the Roman province, newly erected by that emperor, in the ſouth-eaſt parts of Britain; from whence many of them retired into the iſle of Angleſey, which was a kind of little world of their own. But they did not long remain undiſturbed in this retirement. For Suetonius Paulinus, who was governor of Britain under Nero, A. D. 61, obſerving that the iſle of Angleſey was the great ſeat of diſaffection to the Roman government, and the aſylum of all who were forming plots againſt it, determined to ſubdue it. Having conducted his army to the iſland, and defeated the Britons, who attempted to defend it, though they were animated by the preſence, the prayers, and the exhortations of a great multitude of Druids and Druideſſes, he made a very cruel uſe of his victory. Not contented with cutting down their ſacred groves, demoliſhing their temples, and overturning their altars, he burnt many of them in the fires, which they had kindled for ſacrificing the Roman priſoners, if the Britons had gained the victory. (Tacit. Annal. l. 14. c. 3.) So many of the Druids periſhed on this occaſion, and in the unfortunate revolt of the Britons under Boadicea, queen of the Iceni, which happened ſoon after, that they were never able to make any conſiderable figure after this period in South Britain. Thoſe, however, who did not think fit to ſubmit to the Roman government, and comply with the Roman rites, fled into Caledonia, Ireland, and the leſſer Britiſh iſles, where they maintained their authority and ſuperſtition for ſome time longer. But though the dominion of the Druids in South Britain was deſtroyed at this time, their pernicious principles and ſuperſtitious practices continued much longer. Nay, ſo deeply rooted were theſe principles in the minds of the people both of Gaul and Britain, that they not only baffled all the power of the Romans, but even reſiſted the ſuperior power and divine light of the goſpel for a long time after they had embraced the Chriſtian religion. Hence we meet with many edicts of emperors and canons of councils, in the 6th, 7th, and 8th centuries, againſt the worſhip of the ſun, moon, mountains, rivers, lakes, and trees. This wretched ſuperſtition was afterwards revived, firſt by the Saxons, and next by the Danes; and even at ſo late a period as the reign of Canute, in the 11th century, it was neceſſary to enact a law againſt theſe heatheniſh ſuperſtitions in the following terms: "We ſtrictly forbid all our ſubjects to worſhip the gods of the Gentiles; that is to ſay, the ſun, moon, fires, rivers, fountains, hills, or trees, and woods of any kind."

Druideſſes.—Theſe were females, who aſſiſted in the offices, and ſhared in the honours and emoluments of the Druidical prieſthood. When Suetonius invaded the iſle of Angleſey, his ſoldiers were ſomewhat daunted by the appearance of a great number of theſe conſecrated females, who ran to and fro among the ranks of the Britiſh army, like enraged furies, with their hair diſhevelled, and flaming torches in their hands, imprecating the wrath of heaven on the invaders of their country. The Druideſſes of Gaul and Britain are ſaid to have been divided into three ranks or claſſes. Thoſe of the firſt claſs had vowed perpetual virginity, and lived together in ſiſterhoods, very much ſequeſtered from the world. They were great pretenders to divination, prophecy, and miracles; and they were held in high eſtimation by the people, who conſulted them on all important occaſions as infallible oracles, and gave them the honourable appellation of "Senæ," that is, venerable women. Mela, who has deſcribed one of theſe Druidical nunneries, ſays, that it was ſituated on an iſland in the Britiſh ſea, and contained nine of theſe venerable veſtals, who pretended to raiſe ſtorms and tempeſts by their incantations, to cure the moſt inveterate diſeaſes, to transform themſelves into all kinds of animals, and to predict future events. However, they diſcloſed the things which they diſcovered to none but thoſe who came into their iſland for the avowed purpoſe of conſulting their oracle; none of whom, we may well imagine, would come empty-handed. The ſecond claſs conſiſted of certain female devotees, who were, indeed, married, but ſpent the greateſt part of their time in the company of the Druids, and in the offices of religion, and converſed only occaſionally with their huſbands. The third claſs was the loweſt of all, and was compoſed of ſuch as performed the moſt ſervile offices about the temples, the ſacrifices, and the perſons of the Druids. Henry's Hiſt. of England, vol. i. ii.

DRUIVENSTEIN, Aart, or Arnold, Janze, in *Biography*, painter of landſcape and animals, born at Haerlem in 1564, died 1607. He was a burgomaſter of Haerlem, of eaſy fortune, and practiſed his art without a view to pecuniary advantage. Deſcamps. Vie des Peintres, &c.

DRULINGEN, in *Geography*, a ſmall town of France, in the department of the Lower Rhine in the diſtrict of Saverne. It is the chief place of a canton, but contains only 272 inhabitants. The whole canton, however, has an extent of 175 kiliometres, and a population of 10,368 individuals, diſperſed in 30 communes.

DRUM *of the Ear*, in *Anatomy*, is a ſmall cavity in the petrous part of the temporal bones, ſituated within the membrana tympani, and called in Latin the tympanum. See Ear, and Cranium.

Drum, in *Architecture*, the bell-formed part of the Corinthian or Compoſite capitals, concave in the upper part under the abacus, and as it deſcends towards the aſtragal approaches to a cylindric ſurface: from this the leaves and volutes project.

Drum end of the ſtep of a ſtair, is when the firſt aſcending ſtep has the end of its riſer made with a convexity inſtead of a curtail ſtep.

Drum, in *Geography*, a town of Bohemia, in the circle of Leitzmeritz; 3 miles S. of Leypa.

Drum, or *Drom*, which ſignifies in the Iriſh language a high narrow ridge of hills, is applied to a range of mountains in the county of Waterford, near Durgarvan, which divide two baronies, called *Decies within Drum*, and *Decies without Drum*. It forms part of the name of many villages and pariſhes in Ireland.

Drum, in *Ichthyology*, is uſed to ſignify a kind of fiſh in Virginia. The oil of this fiſh is ſaid to cure pains in the limbs, frequent in that country. See Phil. Trans. N° 454. § 1.

Drum, in *Mechanics*. See Capstan.

Drum, is a term applied to any ſhort cylinder (which in ſhape reſembles a muſical drum): it is, however, moſtly reſtricted to thoſe which revolve on an axis, as the drum of a thraſhing-mill, coal-gin, &c. A drum is frequently uſed to turn ſeveral ſmall wheels, by means of ſtraps paſſing round its periphery; of this ſpecies is the expanding rigger invented by Mr. Andrew Flint, and rewarded by the Society of Arts in 1805. See EXPANDING RIGGER, and MINE-WINDING-ENGINE. In ſmaller machines, the parts anſwering the purpoſes of a drum are frequently called *Barrels*, as of a *Clock*, a *Jack*, &c. which ſee.

DRUM, in the *Military Art*, an inſtrument uſed particularly in martial muſic; and in ſome inſtances to be found in modern orcheſtras. It is ſaid by Le Clerc to be an oriental invention, and brought by the Arabians, or perhaps the Moors, into Spain. The ordinary military or ſide-drum is made either of braſs or of very thin board, turned round into a cylinder; in which form it is well ſecured by glue and rivets; and further, to ſtrengthen it, is lined throughout with a ſtrong kind of hempen cloth, or coarſe Holland, cemented to its interior; ſo as to prevent the wood from ſplitting. The drum thus made, will not, however, ſtand great heats or intenſe cold; nor will it in damp weather yield ſo full a tone as one with a braſs barrel. Within each end of the barrel there is a flat wooden hoop firmly fixed, and projecting about the third of an inch beyond the braſs or wood: theſe, which are called the batten-hoops, ſerve to prevent the head from being cut by the edges. The head is made of parchment cut to a circular form, about two inches each way larger than the ends of the drum-barrel: it is faſtened, while moiſt, to a ſmall ring of copper, or of very firm, tough wood, called the fleſh-hoop, ſo as juſt to exceed the ſize of the band. The *head* properly means the parchment covering of that end which is beat upon: the other end, which is covered with a coarſer parchment, is called the *reverſe*. The head and the reverſe, being applied to their reſpective ends of the barrel; over each a hoop, of about an inch and a half broad, and about the third of an inch in thickneſs, is drawn, to preſs the parchments cloſe over the ends of the barrel, but not to paſs over the fleſh-hoops. The bracing-hoops, having holes made for paſſing a cord alternately from one to the other, backwards and forwards, are pulled down as near as poſſible towards each other, thereby to ſtrain the head and reverſe parchments very tight; but as the cord is ſubject to relax, it is neceſſary to have ſliders of very ſtrong buff leather, called *braces*, which being preſſed downwards from the head hoop, towards the reverſe hoop, cauſe them to approach ſtill nearer, and to tighten the two parchments to an extreme.

When in this ſtate the drum is ſaid to be "braced;" when otherwiſe, "unbraced." To give greater effect, and to cauſe that vibration which occaſions a rough intonation, three pieces of thick cat-gut are ſtretched acroſs the reverſe, flat upon it, and parallel. When theſe, which are called "ſnares," are ſlackened, ſo as not to vibrate when the head is beat upon, the drum is ſaid to be "damped," or "unſnared;" ſome, inſtead of ſlackening the ſnares, put a cloth between them and the reverſe; whereby the ſound is conſiderably deadened: this properly is termed "muffling;" though moſt perſons conſider that term to be appropriate only when the head is covered with crape, &c. as at funerals.

After all the foregoing preparation, the drum would have little or no ſound, were it not that a round hole, about the ſize of a large pea, is left in the centre of that ſide which is neareſt the body when the inſtrument is ſuſpended by means of a "ſling" paſſing over the right ſhoulder and under the left arm.

However ſimple the beats of the drum may appear, it is, nevertheleſs, by long practice only, that perfection can be attained; and then requiring both a correct ear, and a very nimble wriſt. Every beat is perfectly regular in the number and diviſion of the ſtrokes from the two ſticks; of which that held by the right hand is ſlightly graſped, while that in the left hand is retained in an oblique poſition; paſſing between the middle and third fingers, and being held by the two firſt fingers and the thumb; the two lower fingers croſſing under it, and the palm being turned upwards. Such is the eſtabliſhed preciſion in which the drum-majors take great pride, that if all the drummers of the Britiſh ſervice were aſſembled together, they would be found to beat perfectly alike throughout what is called "the duty;" that is to ſay, all the beats in uſe; of which the following may be conſidered the principal.

The Roll, which is a continued rolling ſound, without the leaſt inequality or intermiſſion; this is produced by giving two taps with the ſame ſtick, uſing the different ſticks alternately, each beating twice. The ordinary mode of teaching the roll is by the beat of "daddy-mammy;" ſo called from the double taps, in which each hand, after its two taps, is raiſed as high as the ſhoulder; thus forcing the pupil to ſtrike diſtinctly and leiſurely. By degrees he is able to beat quicker, and, ultimately, "to roll," in the manner above deſcribed, with ſuch incredible celerity and evenneſs, as to produce a cloſe and ſmooth ſound.

The Swell is nothing more than the roll occaſionally beat ſo ſoftly as ſcarce to be heard; then increaſing to the utmoſt of the performer's ſtrength; and again lowering ſo as almoſt to die away upon the ear: the great difficulty is to raiſe and to lower the ſound very gradually. This beat is merely ornamental; it is uſually performed in the reviellez, &c., while the fifes are ſilent: it is quite arbitrary, being an *ad libitum* performance.

The Flam is a beat made by the two ſticks ſtriking almoſt at the ſame inſtant on the head, but ſo as to be heard ſeparately: it is uſed as a ſignal for various motions and manœuvres.

The Preparative cannot be deſcribed in letter-preſs; it is the ordinary ſignal for the firings to commence.

The General is an air, which, when performed at full length, is the ſignal for marching to ſome new ground, or to ſome other ſtation: the firſt bar of its meaſure is beat as a ſignal for the firings to ceaſe.

The Aſſembly, or *Aſſemblez*, is a ſignal for the line to fall in; and, when beat after the *general*, is followed by the *march*, which is beat by each corps as it moves from its ground.

The March is almoſt indefinite, but is ordinarily beat in compliment to a reviewing, or a paſſing, field marſhal, general, prince of the blood, &c.; as alſo during ſalutes, when the battalion preſent their arms. "The Dead March" is beat with muffled drums, as already deſcribed. "The Grenadiers' March," and "The Lilies of France," are complimentary marches, and, in ſtrictneſs, ought not to be beat but to a corps of grenadiers, or when a grenadier officer commands, or when the colours of the regiment are flying. "Slow March" is in ſlow, ſolemn time; and "Quick March" is in quick time: what are commonly called *marches*, and which have no particular diſtinguiſhing character, are uſually performed in ordinary time. "The Rogue's March" is played when men, and "The Whore's March" when women, are drummed out of a town.

The Ruffle is a ſhort roll; perhaps of five or ſix ſeconds duration, beat very cloſe and firm, decreaſing a little in force juſt before it concludes, which it does in an abrupt and ſmart manner, and with a ſtrong flam.

The Reveillez is beat early in the morning, uſually at day-break, to waken the garriſon: it is a medley of various airs and beats.

The Tattoo is always beat at night, at ſuch hour as the garriſon ſhould retire to reſt; it is the ſignal for extinguiſhing fires and light, except in public guard-rooms. All ſoldiers found abroad after the "Tattoo" is beat, are conſidered as treſpaſſers againſt martial law. This beat is a medley of airs and beats; the drums accompanying only at certain intervals.

Beat for Orders; a peculiar mixture of rolls, flams, and ſingle taps, beat at the adjutant-general's quarters, or office, for aſſembling all perſons whoſe duty it is to receive the orders of the day. Each regiment alſo beats *for orders*, to aſſemble the ſerjeants, &c., who keep the order-books of the ſeveral companies.

The Retreat is beat every evening at ſun-ſet, or after a corps has been diſmiſſed to their quarters; it is often beat in rather a quick time along the front of a corps, when paraded for inſpection or roll-call. This beat likewiſe warns corps engaged in action, or performing evolutions, to retreat.

The Troop is beat before the new guards, &c., about to march off from their place of aſſembly, to relieve others then on duty. This, as well as the "Retreat," is ordinarily in triple time of three crotchets or quavers; not unlike the "Waltz," when performed rather ſlowly.

To Arms is a beat reſorted to on all emergencies, whether owing to diſturbances, fire, invaſion, &c.

There is a kind of accompaniment performed on the drum, when beating to marches, and to other airs played by a fife. This is called the *Drag*, and is either double or ſingle, according as the muſic may admit. The *Single Drag* is little more than a tap of the drum for each note in the air; the taps being given in exact time with the diviſions of the muſic. This is what we commonly beat as an accompaniment to quick ſteps, "Rule Britannia," &c. The *Double Drag* is a much fuller accompaniment, in which, for the moſt part, two or three taps are given for every note in each bar; or, eventually, the whole is performed in a kind of articulate roll, not to be eaſily deſcribed, in which the accented parts are reinforced with much ſtrength. But to ſay the moſt of the ſide-drum, its monotony ſoon tires the ear; its rattling ſound becomes oppreſſive, and the little variety of its beats, in general not over-well executed, adds to the fatigue of liſtening, and produces ſomething worſe than indifference towards its ſounds. This, however, is a doctrine by no means tolerated among drum-majors, who affect to produce infinite variations from what the vulgar call the "parchment fiddle." They have a long train of "ſingle reveilleze," &c., which are intended to be performed without the fife, and are conſidered as concertantes among the ſages in this branch of muſic: many pride themſelves on the number of thoſe ſolos, which, poſſibly, may have charms for their ears, though failing to faſcinate ours. When we ſpeak of the drum as a muſical inſtrument, we muſt, at all events, exempt the *ſide*, or military drum; which was moſt quaintly and ludicrouſly deſcribed by an American, the author of "Yankee Doodle;" who, in detailing the gay appearance of the firſt regiments which were ſent to ſuppreſs the inſurrection, ſtates:

> "They have got little barrels,
> The heads be kiver'd wi' leather;
> They beats upon 'em wi' little clubs,
> To call their folk together."

Baſs Drum, or *Turkiſh Drum*, is an inſtrument of the ſame conſtruction as the ſide drum above deſcribed; only it is on a very large ſcale, has no ſnares, is flung by the middle acroſs the performer's body, and is beat upon at both ends; the right hand being furniſhed with a large ſtick, having a knob at its end; the left being provided either with a whiſk or a ſtick, whoſe knob is covered with buff leather, to ſoften the tone. The right-hand beats the accented parts of the meaſure, the left filling up the time according to the performer's judgment. This inſtrument is of great ſervice in military bands, giving a marked emphaſis and a fine effect to the muſic, and proving an admirable guide to the corps while marching, ſo as to make them preſerve a correct and regular pace.

The *Kettle Drum*, ſo called becauſe the bottoms, which are made generally of copper, ſtanding upon three or four ſhort legs, like thoſe at the bottom of a caſt iron pot, ſo much reſemble large boilers or kettles. Theſe drums are uſed in pairs, the one being pitched to the key-note, the other to the dominant, or fourth below the key. In ſome inſtances three kettle-drums have been uſed, the third being tuned to the fifth below the key; but this is very rare. It were to be wiſhed that practice were more common; becauſe not only could the kettle drums then accompany in the key, and its two adjuncts, but when performing in the key, the perfect cadence could be completely ſupported by this powerful inſtrument. For example: ſuppoſe a piece to be compoſed in C major; then the centre drum, ſtanding before the performer, would be tuned to C; that to the performer's left would be G; and that to his right would be F. Now the perfect cadence in the key of C compriſes F G C; all which notes are thus attainable. When the modulation paſſes into the key of G, the left hand drum will become the key; and when it paſſes into F, the right hand drum will be the key, with the important advantage of having its dominant, C, ſtanding at its ſide. It is to be obſerved, that the three drums muſt ſtand in a triangular poſition; the two adjuncts rather near to the key, but not quite touching, and the performer ſtanding between the two adjuncts, which would rarely be required in the ſame bar, except in the perfect cadence.

The *Double Drums* and *Tromboni*, which were introduced in the band at the commemoration of Handel, for a *blow* and a *blaſt*, now-and-then, produced an admirable effect; but by a conſtant roll and ſcream they reverſe the effect by ſhortening the concords, and making them as tranſient as the diſcords in *Acciaccatura*, which ſee.

The kettle-drum is furniſhed with ſcrews, whereby the head can be tightened at pleaſure; and that head is faſtened to a large hoop, which being moveable upwards or downwards for ſeveral inches, ſo as to increaſe or to diminiſh the internal area of the inſtrument, it follows that the kettle-drum can be tuned in exact accord with the inſtruments of the band; the ſize of the bottom, or kettle, being duly proportioned to the note it is to yield.

Formerly, kettle-drums, of a ſmall ſize, were in uſe in our ſeveral regiments of horſe, but being found extremely unwieldy, they have been for many years laid aſide. It is difficult to account for our adoption of the Turkiſh cuſtom in a branch ſo peculiarly ill adapted to its reception. Throughout Aſia kettle-drums, of an immenſe ſize, are carried acroſs camels in the train of all crowned heads: the inſtrument is adorned with ſuperb trappings, and beat by a man, who has a kind of ſeat made for him on the ſaddle.

The *Naugaurah*, as it is there termed, is one of the types of royalty, though it is ſometimes uſurped by, and tacitly tolerated with, perſons of diſtinction, when in authority at a diſtance from the court. Theſe alſo imitate their ſovereigns, by having *nobuts*, or bands of muſic, ſtationed in a gallery over the entrance into the palace-yard. The bands, in which the *Naugaurah* is extremely audible, perform at ſtated hours during the day and night, to the great delight of their retainers, but in a ſtrain highly offenſive to a well-tuned ear.

The muſicians of Hindooſtan perform with incredible dexterity on a pair of very ſmall kettle-drums, cauled *Taublahs*, which they faſten before them, by means of a cloth wrapped ſeveral times round their waiſts; they uſe no ſticks, but beat with their fingers in a peculiar ſtyle, ſo as to vary the intonation in a manner far from diſpleaſing, according as the fingers ſtrike more or leſs near to the rims of the *Taublahs*. The note is not pitched to any particular concordance, but, as in the ſide-drum, is perfectly adventitious. Single drums, of the ſame deſcription, and faſtened in front of the performer, by means of leather ſtraps paſſing round the waiſt, are alſo uſed on many occaſions; eſpecially to accompany the poſt, for the purpoſe of intimidating tigers, which are in ſome places very numerous, and not to be deterred either by the ſound of theſe drums, called *Doogdoogies*, which are beat with two ſticks of hard wood, keeping up a continual *roll*, nor by the flambeaus, which likewiſe attend the letter carriers during the night. Many of the poſt-office people are annually carried off by tigers.

The drum uſed by the Hindoos in their religious proceſſions, and in their recreations, is cylindrical, and about 20 inches in length, the diameter about a foot; they are beat with one hand at each end, and are uſually made of wood. The ſame people likewiſe uſe very large drums, perhaps a yard in length, and reſembling a fruſtrated parabolical ſpindle; or, in other words, like a long narrow caſk, whoſe centre may be about double, or even treble, the diameter of either end. Theſe drums, which, as well as the wooden cylindrical kind juſt deſcribed, are called *Doles*, are commonly made of baked earth, and, like the former, have their heads made of parchment.

Drum, or *Drummer*, alſo denotes a ſoldier appointed to beat the drum. When a battalion is drawn up, the drums are on the flank; and when it marches by diviſions, they march between them.

Drum-*major*, is that perſon in a regiment who beats the beſt drum, commands the others, and teaches them their duty. Every regiment has a drum-major.

Drum *Point*, in *Geography*, a cape of America, on the north ſide of the Patuxin, at the mouth oppoſite to Cedar point.

DRUMLANRIG, a town of Scotland, in the county of Dumfries, ſituated on the Nith; 13 miles N. of Dumfries.

DRUMMOND, William, in *Biography*, an elegant Scottiſh poet, was born in 1585. He was inſtructed in grammar-learning at the high ſchool of Edinburgh, and completed his ſtudies at the univerſity there. He then ſpent four years in foreign travel, and in the ſtudy of civil law at Bourges. But, on his return to Scotland, his father being dead, he devoted himſelf to the purſuits of polite literature. A dangerous illneſs gave his thoughts a ſerious turn, and his firſt literary production was a work in proſe, intitled "The Cypreſs Grove," containing reflections on death; and his next was called "Flowers of Sion, or Spiritual Poems." The loſs of a young lady, to whom he was ſhortly to have been united in marriage, threw him into a deep melancholy, which rendered his own home inſupportable. He reſolved, therefore, to ſeek relief by foreign travel, and again to viſit the principal cities on the continent. He remained abroad eight years, cultivating an acquaintance with men of letters, and forming a collection of valuable books in various languages. On his return, he employed himſelf at the ſeat of his brother-in-law, ſir John Scott, in compoſing the hiſtory of the five Jameſes, kings of Scotland, a work which did not ſee the light till after the death of the author. In his 45th year, he married a lady of the family of Logan, by whom he had ſeveral children. He was a zealous friend to high monarchical principles, and was deeply afflicted when the civil war broke out: it is thought to have been the means of ſhortening his life. He died in his 64th year, in December, 1649. It is as a poet that Mr. Drummond is now remembered, and in that claſs he claims as high a rank as any of his contemporaries. His diction is Engliſh of the moſt cultivated kind then in uſe, and muſt have been derived from the ſtudy of the beſt models. He excels chiefly in the tender and delicate, particularly in thoſe ſonnets which celebrate the virtues of the ladies to whom he was attached. He poſſeſſed that gentle and unambitious diſpoſition which fits a man for the retired walks of life, and which becomes a votary of the muſes. Beſides the occupations of reading and writing, which he conſidered as the buſineſs of his life, he amuſed himſelf with cheſs, and playing on the lute. He maintained a correſpondence and intimacy with many literary characters, particularly with Drayton and Ben Jonſon, the latter of whom regarded him with ſo much enthuſiaſtic veneration, that he walked from London to Drummond's ſeat in Scotland on purpoſe to viſit him. Biog. Brit.

Drummond, or *Accomac Court-houſe*, in *Geography*, is ſituated in Virginia, America, on the poſt road from Philadelphia to Norfolk; 20 miles from Belhaven, and 194 from Philadelphia.

DRUMSLADE, the performer on the kettle-drum in the time of Edward VI., perhaps from *trommel ſchlager*, drum-beater.

DRUMSNAW, in *Geography*, a neat village in the county of Leitrim, Ireland, charmingly ſituated on the wooded banks of the Shannon. Near it is a chalybeate ſpring, which has been much eſteemed for its medicinal virtues. It is 73 miles N.W. from Dublin, and within four miles of Carrick, the county-town. Beaufort's Memoir.

DRUNA, in *Ancient Geography*, a river of Gaul, which, according to M. D'Anvilie, is the *Drome*; which ſee.

DRUNGUS, Δρȣγγος, a body, or company of forces; thus called in the latter times of the Roman empire.

The name drungus, as appears from Vegetius, lib. iii. cap. 16. was at firſt only applied to foreign, and even enemies' troops; but under the Eaſtern empire, it came in uſe for the troops of the empire itſelf; where it amounted, pretty nearly, to what we call a regiment, or brigade.

The ſame author notes, that Δρȣγγος, among the modern Greeks, ſignifies a ſtaff, or rod, the badge of a dignity, or office, as *agla* among the Turks; and he thinks, that the name may be formed from the Latin *truncus*. But it appears from Vegetius, that drungus is a barbarous, not a Latin word. Spelman takes it for Saxon; becauſe, at this day, *throng*, in Engliſh, ſignifies a multitude. Salmaſius derives it from ῥυγχος, *beak*; on account of the drunguſes being diſpoſed beak-wiſe, or terminating in a point.

Leunclavius obſerves, that the drungus was not leſs than one thouſand men, nor more than four thouſand.

DRUNKENNESS, Ebrietas, conſidered in a *Phyſical* point of view, ſignifies that derangement of the functions of the animal economy, which is produced by drinking ſpirituous, or fermented liquors.

Theſe liquors have been principally uſed in all ages and countries, for the purpoſes of exhilaration and inebriation: but, in the eaſtern parts of the globe, in which the religion of Mahomet has interdicted the uſe of wines, other ſubſtances have been adopted, by which that agreeable derangement of the animal functions, which amounts to intoxication, is readily produced. In Turkey the inſpiſſated juice of the poppy is eaten in large quantities for that purpoſe, and gives riſe to very ſimilar feelings, and, when confirmed into a habit, brings on many diſeaſes of the conſtitution, like thoſe conſequent on the potation of vinous liquors. (See the Memoirs of Baron de Tott. See alſo Opium.) In Perſia the leaves of the hemp plant, *cannabis*, are prepared in various ways, and ſwallowed as a means of intoxication, under the name of *Bangue*. This ſubſtance is ſaid to produce a pleaſing ſort of delirium, during which the perſon under its influence talks incoherently, laughs, and ſings in a merry mood ; "yet is he not giddy, or drunk, but walks and dances, and ſheweth many odd tricks." The fit is terminated by ſleep, from which he awakes refreſhed, without any untoward ſymptom, as giddineſs, pain in the head, or ſtomach, &c. (See Dr. Hook's Philoſ. Exper. and Obſervat. p. 211.) A pleaſing temporary intoxication, of a ſimilar deſcription, was lately diſcovered by Mr. Davy, to reſult from breathing an artificial *gas*, the nitrous oxyd, or gaſeous oxyd of azot. The effects of this *gas* are generally a brief and ſlight delirium, accompanied with a conſiderable propenſity to motion, which, when it ceaſes, leaves the individual in a ſtate of agreeable exhilaration for ſome hours. (See Davy's Chemical Reſearches.) The uſe of this inebriating gas has as yet, however, been confined to a few of the curious in chemical experiments.

Our ſole object, then, at preſent, is to inquire into the nature and effects of intoxication, produced by the ſpirit of fermented liquors, which, whether under the title of wine, malt-liquors, cyder, perry, mead, *koumiſs*, &c. yield the ſame eſſence on diſtillation ; namely, *alcohol*, or ſpirit of wine, which is itſelf variouſly modified, by intermixture with colouring, ſapid, and odorous ſubſtances, in the form of gin, brandy, rum, whiſky, noyau, and other *liqueurs*. In ſome of the varieties of fermented liquor, in addition to the ſpirit, there is preſent a conſiderable portion of *carbonic acid*, or *fixed air*, (alſo one of the products of the vinous fermentation,) which is diſengaged by uncorking the veſſel, and gives a ſparkling and pungency to the liquors, ſuch as champaign, cyder, bottled beer, &c. while it adds to their inebriating quality. But this kind of ebriety appears to be of ſhort duration, ariſing only from the temporary action of the *gas* on the nerves of the ſtomach.

The effects of fermented liquor on the animal economy, ariſe principally from its *ſtimulating* power, or the power which it poſſeſſes of exciting the muſcular parts to an increaſed rapidity and ſtrength of action, as well as the nervous and mental qualities, to an unuſual degree of acuteneſs. When the animal functions are carried on with langour and feebleneſs, from whatever cauſe, the general ſenſations of the body are uneaſy, ſometimes to a degree of pain. Thus, after long faſting, want of ſleep, fatigue, or diſeaſe, this condition of the frame exiſts, and prompts us inſtinctively to the employment of ſome ſtimulus, as food, tepid, or fermented drink, the warm bath, &c. The immediate effect of ſuch ſtimuli, eſpecially of fermented liquors, is the diffuſion of a grateful ſenſation throughout the body ; the languor and liſtleſsneſs of the previous ſtate are ſuperſeded by a general pleaſureable feeling of warmth, energy, and ſelf-command, accompanied with an indeſcribable tranquillity and complacency of mind ; the countenance is enlivened with a glow of animation, in conſequence of the free circulation through the cutaneous blood-veſſels, and the renewed energy of the muſcular parts, which were before languid and relaxed. From the ſame moderate excitement of the circulation and nervous ſyſtem, the flow of animal ſpirits becomes more free and ſpontaneous, giving birth to lively converſation, to the flow of eloquence, and the ſallies of wit ; anxieties and corroding cares reſpecting the buſineſs of life are laid aſide for the time ; and good humour and cheerfulneſs prevail. With thoſe who are habitually temperate, this degree of excitement, both mental and corporeal, is the reſult of a very moderate ſtimulus ; taking food alone is adequate to produce it, with little aid from fermented liquors. This is the excitement of nature, is conſiſtent with, and conducive to, the healthy operations of the conſtitution, and contributes to cheriſh the flame of life to its lateſt ſpark. But

> ——————"Know, whate'er
> Beyond its natural fervour hurries on
> The ſanguine tide ; whether the frequent bowl,
> High ſeaſon'd fare, or exerciſe to toil
> Protracted, ſpurs to its laſt ſtage tir'd life,
> And ſows the temples with untimely ſnow."
>
> Armſtrong.

If the heating draught is continued beyond this moderate excitement, the increaſing effects of the ſtimulation become obvious. The circulation is farther quickened and ſtrengthened, ſo that the whole ſurface glows with redneſs and warmth, the face is fluſhed, the eyes, which were at firſt bright, become ſuffuſed with a degree of redneſs, from the blood being carried into the ſmaller veſſels, which are ordinarily tranſparent with lymph only. The muſcles acquire a greater power of action, and a greater propenſity to exertion enſues, whether to dancing, wreſtling, or to whimſical geſticulations: and the mental faculties are in a ſimilar manner rouſed. Cheerfulneſs ariſes to boiſterous mirth ; noiſe and ribaldry, paſſing with rapidity from ſubject to ſubject, ſucceed to the eloquence of rational converſation and chaſte wit ; the ſong becomes louder, and exceſſive laughter marks the high excitement of the mind. The paſſions and diſpoſitions are alſo elevated beyond their natural pitch. "In the bottle," as Dr. Johnſon obſerves, "diſcontent ſeeks for comfort, cowardice for courage, and baſhfulneſs for confidence." In a word, the whole man, mind and body, is elevated by the uſe of vinous liquors, in all his qualities and functions, far above the accuſtomed powers naturally inherent in his conſtitution.

This ſtate of inordinate excitement manifeſts itſelf in various ways, in different individuals, and alſo under the influence of different ſpecies of liquor. Thus, intoxication from drinking porter, or other malt liquors which contain the narcotic ſubſtance of the hop, or other vegetables, together with much mucilaginous matter, and require to be drank in large quantities, is generally accompanied with more of ſtupor, than the inebriation occaſioned by wines, or diſtilled ſpirits ; and the ſame may be ſaid of the heavier wines, as compared with the lighter, or thoſe which contain carbonic acid gas. But the variety of the ſymptoms of drunkenneſs depends much more on the natural diſpoſition, and on the corporeal temperament of the individual, than on the ſpecies of the intoxicating liquors. We thus ſee ſome, in their cups, mild, good-natured, and gentle ; while others are fierce, iraſcible, and implacable : this one is complaiſant to his enemy, and forgetful of injury ; that is inſulting to his friend, and thoughtful of revenge. This perſon is gay, muſical, and loquacious ; that one is dull, ſullen, and ſilent ; and a third is turbulent and loud, making the dome echo with oaths and imprecations. As in other ſpecies of inſanity, ſo under the influence of intoxication, the inebriate feels not the bluſh of ingenuous ſhame, and commits many indecencies.

The doctrine of temperaments is not well underſtood ; and it would be difficult to explain the peculiar actions of perſons under the excitement of wine, upon the principles of ſuch doctrine. "The ſanguineous and choleric temperaments, I conceive," ſays Dr. Trotter, in his "Eſſay on Drunkenneſs,"

Drunkenneſs," "to be moſt prone to reſentment and ferocity; as may be obſerved in thoſe whoſe countenance becomes very much fluſhed or bloated, with their eyes as if ſtarting from their ſockets: the former of the two is the moſt laſcivious and amorous. The nervous temperament exhibits moſt ſigns of idiotiſm, and is childiſh and fooliſh in its drunken pranks. The phlegmatic temperament is difficult to be rouſed; is paſſive and ſilent, and may fall from the chair before many external ſigns of ebriety appear. The melancholic temperament, as when ſober, is tenacious of whatever it undertakes, and ſhews leaſt of the inebriate in its manner. But all conſtitutions have ſomething peculiar to them, and the ſhades of diſtinction blend ſo inſenſibly with one another, that diſtinction becomes difficult." P. 27. 2d edit.

On the whole, however, the ſort of delirium, which the fever of intoxication will produce in any individual, cannot be known *à priori*, either from the nature of the liquor employed, or of the diſpoſition and temperament of the drinker. It will neceſſarily vary, like delirium under other circumſtances, according to the particular ſenſations which prevail, and therefore according to the facility of derangement, in different organs of the body, as well as to the general idioſyncraſis. (See Delirium.) So that the diſpoſition of many perſons, in a ſtate of inebriation, is often obſerved to be the reverſe of their ſober diſpoſition; the placid man will become iraſcible, and the ſurly man kind and complaiſant; in conſequence, no doubt, of the new ſtate of feeling induced by the ſtimulus of the liquor. In this view of the ſubject, the adage *in vino veritas*, is altogether untrue; for the natural diſpoſition is changed, or repreſented in an unnatural light. And even when unaltered in kind, it is exaggerated in degree: ſo that it has been juſtly remarked by the Spectator, that the perſon you converſe with, after the third bottle, is not the ſame man who at firſt ſat down at table with you. "Wine heightens indifference into love, love into jealouſy, and jealouſy into madneſs. It often turns the good natured man into an ideot, and the choleric into an aſſaſſin; it gives bitterneſs to reſentment, and makes vanity inſupportable," &c. In a word, it exhibits the individual in a new and foreign character, and infuſes qualities into the mind, to which it is a ſtranger in its ſober moments. Hence the juſtice, as well as neatneſs, of the ſaying of Publius Syrus; "He who jeſts upon a man that is drunk, injures *the abſent*." Spectator, vol. viii. No. 569.

We ſhall not ſtop here, to amuſe our readers with a narration of the follies and vices, which men have been induced to commit, under the influence of that degree of delirious excitement, which we have above deſcribed; when the rapidity of the conceptions, the vigour of the paſſions, and the ſtrength and propenſity to muſcular motions, all ſtimulated to a morbid pitch, conſtitute what may be conſidered the firſt ſtage of intoxication. For ſuch narrations, we refer to Dr. Trotter's eſſay before quoted, and to the works of ſatyrical writers. See alſo Burton's Anat. of Melancholy, part 1. § 2. mem. 5. Brydone's Tour through Sicily, let. xx.

If the ſtimulus of the inebriating liquor continues to be applied, a conſiderable change, both in the mental and corporeal faculties, ſoon enſues. This change is partly to be attributed to the debility, which reſults from every exceſs of ſtimulation in the animal economy (ſee Debility); and partly to the narcotic effects of the liquors on the *ſenſorium*, through the medium of the nerves of the ſtomach; but it is, perhaps, chiefly owing to the increaſing preſſure on the brain, occaſioned by the increaſing fulneſs of the blood-veſſels in that organ, from the continued ſtimulus to the action of the heart and arteries. This concluſion is deducible, both from the phenomena, which reſemble the ſymptoms of oppreſſed brain, from other cauſes; and from the conſequences, in the laſt ſtage of drunkenneſs, as we ſhall preſently ſhew.

The vivacity and active powers and propenſities, before deſcribed, are now gradually ſucceeded by an imbecility of all the faculties. The corporeal ſtrength is diminiſhed; giddineſs comes on; the voluntary power over the muſcles fails; ſo that the attempt to walk is marked by a tottering and ſtaggering, and the hands cannot be directed ſteadily to any object: the muſcles of the countenance at length relax, the lip falls, the eyelids are half cloſed, and the head nods, depicting the enervated condition of the frame. The muſcular organs of the mouth, throat, and cheſt, become alſo enfeebled, and the powers of voice and articulation are by degrees diminiſhed. The eyes are no longer directed to the ſame focus by the muſcles of the orbits, and viſion becomes double, or indiſtinct, as if a miſt were floating in the atmoſphere. The firſt of theſe conditions conſtitutes the *aphonia temulentorum*, the latter the *diplopia à temulentia*, in the arrangement of diſeaſes by Sauvages. Thomſon has accurately deſcribed them:

> ————————"Their feeble tongues,
> Unable to take up the cumbrous word,
> Lie quite diſſolved. Before their maudlin eyes,
> Seen dim and blue, the double tapers dance,
> Like the ſun wading through the miſty ſky."

Sometimes this loſs of muſcular contraction extends even to the ſphincters of the bladder and *rectum*, et ebrius improviſo minget, et alvum exonerat.

The debility of the mental powers keeps pace with the corporeal relaxation. The flow of ideas becomes more tardy, and leſs various, till at length the conceptions are incoherent and indiſtinct, and the perſon is altogether incapable of converſation, and is ſilent, or mutters an unintelligible ſoliloquy. The ſenſations become extremely obtuſe, ſo that external impreſſions produce no effect on any of the ſenſes, and paſs altogether unregarded. The paſſions partake of the general enervation of the frame, and ceaſe to excite any emotion, or to prompt any action or effort.

In this ſtate of intoxication there is a conſiderable reſemblance to the condition of the maniac, in reſpect to the power with which the body reſiſts the action of cold, and of contagion, as well as to its inſenſibility to pain.

No ſtronger proofs of the power of the conſtitution, under ſuch a ſtate of inebriation, in reſiſting the operation of cold, need be adduced, it is obſerved by Dr. Trotter, than what are daily witneſſed among our ſeamen in the great ſea-ports. "Theſe men are permitted to come on ſhore to recreate themſelves; but, from a thoughtleſſneſs of diſpoſition, and the cunning addreſs of their landlords, they drink till the laſt ſhilling is ſpent; they are then thruſt out of the door, and left to paſs the night on the pavement. It is ſurpriſing how they ſhould eſcape death on ſuch occaſions; for I have known many of them who have ſlept on the ſtreet the greateſt part of the night in the ſevereſt weather." *Loc. cit.* The following fact alſo affords a ſtriking illuſtration of the reſiſtance of cold under ſimilar circumſtances. A miller, very much intoxicated, returning from market late at night, while it ſnowed and froze very hard, miſſed his way, and fell down a ſteep bank into the mill dam. By the fright and ſudden immerſion he became ſo far ſenſible as to recollect where he was. He then thought the ſureſt way home would be to follow the ſtream, which would take him within piſtol-ſhot of his own door. Inſtead, however, of taking that courſe, he waded againſt the current, without knowing it, till his paſſage was oppoſed by a wooden bridge. This bridge he knew; and though he felt ſome diſappointment, he ſtill thought his beſt way was to follow the ſtream, for the banks were ſteep and difficult to climb. He now found himſelf in a comfortable glow, turned about, and arrived at his own houſe at midnight, perfectly ſober, after having been nearly two hours in the water, and often up to the breech. He went immediately to bed, and roſe in perfect health. Trotter.

With reſpect to contagion, the ſame author ſtates, that men in a ſtate of inebriation have certainly, on many occaſions, been expoſed to typhous contagion, and eſcaped, while others have ſuffered. And inſenſibility to pain, in the ſame condition, is daily exemplified among ſeamen, whoſe heedleſs revels expoſe them to more diſaſters than other deſcriptions of mankind. The moſt dreadful wounds and bruiſes are thus often inflicted without the ſmalleſt ſigns of feeling, and often without the ſlighteſt recollection how they were effected. Dr. Trotter mentions the circumſtance of a ſailor belonging to a king's ſhip, in which he then ſerved, having quarrelled, while drunk, with his wife; in the fury of paſſion, he ſeized a butcher's cleaver, and cut off two of his fingers by the root. The wounds were dreſſed, and the man put to bed. When he waked in the morning, he had no remembrance of what had happened, ſhewed the utmoſt contrition, and wept like a child for his misfortunes, when he was told that he had done it himſelf.

This ſecond ſtage of inebriation, characteriſed by relaxation and enervation of the animal powers, as the former was diſtinguiſhed by inordinate excitement, generally terminates in ſleep, which continues for the ſpace of ſeveral hours. After this period, the offending liquors being neutralized or decompoſed by the action of the digeſtive organs, and evacuated through the perſpiratory and urinary paſſages, or more directly by vomiting, the drunkard awakes, feeling head-ach, languor, and low ſpirits, with nauſea, and loathing of food,—the proofs of a debilitated frame, conſequent on exceſſive ſtimulation.

In this way the fit of drunkenneſs uſually goes off. But ſometimes a third ſtage ſucceeds, in which the ſenſes and voluntary powers are altogether ſuſpended, and the inebriate lies in a ſtate of *ſopor*, or profound ſleep, from which nothing can rouſe him. In this condition, (as in a paroxyſm of apoplexy,) the only ſigns of life are a ſlow and ſtertorous breathing, with a full and ſlow pulſe, and the remaining warmth of the body;—ſymptoms, which are often only to be diſtinguiſhed from thoſe of true APOPLEXY, by a knowledge of their cauſe, (fermented liquors;) or, where this cannot be learnt, by a conjecture, from the ſmell of liquor in the breath, or the ejection of it from the ſtomach. The inebriate is ſaid, in the vulgar phraſe, to be "dead drunk;" and occaſionally the obſervation proves to be literally true; for actual and fatal APOPLEXY (the *apoplexia temulenta* of Sauvages) ſometimes cloſes the ſcene; or the oppreſſed ſtate of the brain is evinced by the occurrence of PALSY and CONVULSIONS, ſcarcely leſs fatal.

In ſuch caſes, the condition of the brain has been aſcertained, by diſſection after death, to be the ſame as it is commonly obſerved to be, when apoplexy and convulſions prove mortal, under other circumſtances. Morgagni has related ſome examples of this ſort, in his great work, *De ſedibus et cauſis Morborum*. In one of theſe caſes, a man was brought home drunk, and apoplectic, and died in the courſe of the night. On examination, the veſſels of the inveſting membrane (*pia mater*) of the brain, as well as thoſe of the *plexus choroides*, and other internal parts of that viſcus, were found filled and diſtended with blood, in an extraordinary degree; and there was ſome water effuſed into the lateral ventricles. (See Epiſt. lx. art. 12.) In another caſe, in which convulſions and palſy were induced by the ſame cauſe, and which terminated fatally in ſix or ſeven days, nearly the ſame appearances preſented themſelves on diſſecting the brain: the veſſels of the *pia mater* ſeemed as if they had been filled by injection, even to the ſmalleſt branches; and thoſe of the ventricles (in which a conſiderable quantity of limpid water was found) as well as of the medullary ſubſtance itſelf, were alſo much diſtended. (Epiſt. lxii. art. 5.)

Such are the phenomena and conſequences of a fit of intoxication. It is rarely, indeed, carried to a fatal extent at once; and in the leſſer degrees, or when ſeldom repeated, it may not materially injure a hardy conſtitution: nay, ſome men have ſufficient ſtrength of frame, to bear the habitual repetition of it, during many years. But theſe are, in truth, rare exceptions, and more rare than the world at large is aware of. As the ſtimulus of fermented liquors is more frequently reſorted to, it becomes gradually leſs efficient; and, therefore, a greater quantity, or a ſtronger ſpecies of it, becomes neceſſary to produce the uſual degree of excitement. For it is a general law, in the animal economy, that as the conſtitution becomes habituated to any ſtimulus, the effect of that ſtimulus decreaſes, whether it be of a mental, or corporeal nature. Hence, the charm of novelty and variety in all our gratifications; and hence the pampered voluptuary, who has exhauſted every ſource of pleaſure, exclaims in diſguſt, that "all is vanity." But great as the *ennui* of the voluptuary may be, in the intervals of pleaſure, there is a degree of horror and painful depreſſion conſequent on the over-excitement by ſpirituous liquors, (when habit has rendered the extreme of ſtimulation requiſite to produce the ordinary effect,) which is, perhaps, the moſt intolerable of all ſenſations, that follow exceſſive excitement from any cauſe, if we except that from ſwallowing opium.

> ——"An anxious ſtomach well
> May be endured; ſo may the throbbing head:
> But ſuch a dim delirium, ſuch a dream
> Involves you, ſuch a daſtardly deſpair
> Unmans your ſoul, as maddening Pentheus felt,
> When, baited round Cithæron's cruel ſides,
> He ſaw two ſuns, and double Thebes aſcend."
> Armſtrong.

Hence, then, the danger of frequent indulgence in the agreeable ſtimulation of fermented liquors. However innocently begun, or moderately taken at firſt, the continuance of the practice may gradually induce a diſpoſition to increaſe the quantity and ſtrength of the liquor, and to ſhorten the intervals of drinking, until the caſual gratification become converted into an *appetite*; *i. e.* until the call for the ſtimulus of ſpirituous liquors become as much a part of the conſtitution, as the demand for food; with this difference, that the ſenſations of languor and pain, and the ſinking and daſtardly deſpair that accompany them, are infinitely more urgent and more inſupportable than the keeneſt pain of hunger. The condition of the ſpirit drinker, then, while it is a ſubject of juſt reproach, is likewiſe truly pitiable. He may be conſidered as labouring under a conſtitutional diſeaſe, the removal, or palliation of which muſt be difficult, in proportion to its inveteracy.

But this is not the whole of the evil. The habit of intemperance in the uſe of ſpirituous liquors, (we ſay *ſpirituous*, becauſe, when the habit is confirmed, the weaker and more dilute ſorts of fermented drink are ſeldom adequate to the proper ſtimulating effect,) is, ſooner or later, productive of a ſeries of painful and fatal diſeaſes, of a chronic nature, and conduces to render fevers, internal imflammations, and many pulmonic diſorders, inveterate, and even mortal. This fact, it is true, ſome will pretend to queſtion, and cite the longevity of individual drunkards as a perfect refutation of the poſition; forgetting that individual ſtrength of conſtitution, in thoſe inſulated examples, had withſtood the deleterious effects of the practice, but as exceptions to a general rule; and that both theory and experience concur in diſproving their hypotheſis. Mark, ſays Darwin, what happens to a man, who drinks a quart of wine, if he has not been habituated to it. "He loſes the uſe both of his limbs and of his underſtanding! He becomes a temporary ideot, and has a temporary ſtroke of the palſy! and though he ſlowly recovers after ſome hours, is it not reaſonable to conclude, that a perpetual repetition of ſo powerful a poiſon muſt at length permanently affect him?" (See Zoonomia, vol. i. ſect. xxi. 10.) To this queſtion the following obſervation may be ſtated, as the anſwer of experience. "On comparing my own obſervations with the bills of mortality, I am convinced, that conſiderably *more than one-eighth of all the deaths which take place in perſons above twenty years old happen prematurely, through exceſs in drinking ſpirits.*" (See Dr. Willan's Report on the Diſeaſes in London, p. 152.) Among the diſeaſes thus brought on, and prematurely terminating life, are enumerated many caſes of what are called *bilious* and *nervous* diſorders, pain in the ſtomach, pain in the bowels, inteſtinal hæmorrhage, palſy, apoplexy, gravel, or dyſury, ſchirrous liver, jaundice, and dropſy. And beſides the aggravation of the febrile, inflammatory, and pulmonic complaints above-mentioned, the habitual drinking of ſpirits manifeſtly augments every ſymptom of ſea-ſcurvy in our fleets, and retards the healing of wounds, converting them into ulcers. (See Dr. Trotter *loc. cit.*) We have already had occaſion to remark, that in all the examples of Europeans wintering within the arctic circle, thoſe who drank ſpirits died from ſcurvy, while thoſe who poſſeſſed no ſuch liquors, and drank water only, ſurvived. See COLD.

Although theſe various diſeaſes and injuries are occaſioned by drinking ſpirituous and vinous liquors, in various conſtitutions, yet there is a certain gradual progreſs of decay and diſorder, which may be obſerved to go on in general, as the pernicious practice is continued. It is generally ſuppoſed that theſe deleterious liquors have an immediate and ſpecific effect on the liver: which viſcus has been often found after death, in drinkers of ſpirits, hardened or altered as to its texture, diſcoloured, enlarged, or diminiſhed. It appears, however, that the ſtomach and bowels ſuffer firſt from the uſe of ſpirits; and that their baneful influence is afterwards extended gradually to every part of the body, producing a variety of morbid ſymptoms, nearly in the following order of ſucceſſion.

The firſt appearances of diſeaſe are the uſual ſymptoms of indigeſtion, or *dyſpepſia*, attended with a diſreliſh of plain food, with a frequent nauſea, heat, and oppreſſive pain at the ſtomach, particularly ſoon after taking victuals; with ſudden, ſlightly convulſive diſcharges of a clear, acid, or ſweetiſh fluid from the ſtomach into the mouth. This ſymptom (the *Pyroſis* and *Cardialgia*, or *Gaſtrodynia ſputatoria* of authors) is termed the *water-braſh* in Scotland, where it is an uſual effect of the deleterious ſpirit, whiſkey. Along with theſe ſymptoms, there is frequently an inexpreſſible ſenſation of ſinking, faintneſs, and horror, eſpecially at thoſe times when the influence of the ſtimulating liquor has gone off. Racking pains and violent contractions of the bowels and of the abdominal muſcles ſucceed: often returning periodically, about four in the morning, being attended with extreme depreſſion, or langour, a ſhortneſs of breath, and the moſt dreadful apprehenſions.

The unhappy patient ſometimes drags on a miſerable life, rendered now and then more ſupportable by renewed potations, for ſeveral years. But other ſymptoms ſooner or later enſue. The ſtomach will take and retain food, but after receiving it, it is oppreſſed, and feels tightened or contracted in its dimenſions; the patient expreſſes it as if it were tied by a ſtraight bandage, and the muſcles being drawn into irregular contractions the ſurface of the belly is diverſified with protuberances and cavities. The pain continues increaſing to ſuch exceſs, that the miſerable patient is obliged to preſs againſt a table or ſome hard body, to mitigate his diſtreſs, till vomiting brings a reſpite; or he haſtens this operation, by thruſting his finger into his throat, and thus relieves himſelf, till the next reception of nouriſhment, when the ſame ſuffering is repeated. In perſons of the ſanguine temperament, inflammations of the peritoneal membrane enſue, which continue long, producing intenſe pain, ſo that the ſlighteſt preſſure on the abdomen cannot be endured.

The lower extremities now become emaciated, and are attacked with frequent cramps and pains in the joints, which finally ſettle in the ſoles of the feet; theſe, as well as the legs, become ſmooth and ſhining, and at the ſame time ſo tender, that the weight of the finger excites exclamations of pain, yet in a moment's time heavy preſſure ſometimes gives no uneaſineſs. To theſe ſucceed a degree of *paralyſis* in all the limbs, or at leaſt an incapacity of moving them with any conſiderable effect, ſo that, wherever they are placed, there they generally remain till removed again by the attendant. The whole of the ſkin becomes dry and ſcaly, and the complexion ſallow. As the powers of the circulation are more and more impaired, the red veſſels diſappear from the white of the eye, the ſecretion of bile is imperfectly performed, and the ſmall hairs of the ſkin fall off, leaving the ſurface ſmooth, eſpecially on the legs, as we have already mentioned. After ſome time jaundice begins to appear, the belly fills with water, and dropſical ſwellings ariſe in the legs, with general redneſs or inflammation of the ſkin, terminating in black ſpots and grangrenous ulcers. Sometimes *petechiæ*, or purple ſpots, appear and diſappear for many months, and if the ſurface of the extremities be ſcratched, blood exudes. The *melæna*, or *morbus niger*, conſiſting of a diſcharge of grumous blood from the bowels, or vomitings of a ſimilar fluid, like coffee-grounds from the ſtomach, ſucceed: often, indeed, profuſe diſcharges of blood take place from the noſtrils, ſtomach, bowels, kidnies, or bladder; and from the lungs in perſons of a conſumptive habit. Women of a ſanguine temperament, who indulge to exceſs, frequently have the catamenia very profuſely, long after the uſual period; even, ſometimes, beyond the ſixtieth year of age. A frequent recurrence of aphthous ulcerations in the mouth and throat takes place, and the ſmell of the breath is offenſive, being ſimilar to that of rotten apples.

In the courſe of theſe bodily complaints, the mental powers ſuffer a change no leſs remarkable. At firſt, low ſpirits, ſtrange ſenſations, and groundleſs fears occur to the patient;—"ſuch horrors take place," it is remarked by Dr. Lettſom, "as are dreadful even to a by-ſtander; the poor victim is ſo depreſſed, as to fancy a thouſand imaginary evils; he expects momentarily to expire, and ſtarts up ſuddenly from his ſeat, walks wildly about the room, breathes ſhort, and ſeems to ſtruggle for breath: if theſe horrors ſeize him in bed, when waking from ſlumber, he ſprings up like an elaſtic body, with a ſenſe of ſuffocation, and the horrors of frightful objects around him." Yet theſe painful depreſſions ſometimes alternate with unſeaſonable, and even boiſterous mirth. But at length a degree of ſtupidity, or confuſion of ideas, ſucceeds. "The memory," to uſe the words of Dr. Willan, "and the faculties depending on it, being impaired, there takes place an indifference towards uſual occupations, and accuſtomed ſociety or amuſements: no intereſt is taken in the concerns of others; no love, no ſympathy remain. Even natural affection to neareſt relatives is gradually extinguiſhed, and the moral ſenſe ſeems obliterated. The wretched victims of a fatal poiſon fall, at length, into a ſtate of fatuity, and die with the powers both of body and mind wholly exhauſted. Some, after repeated fits of derangement, expire in a ſudden and violent phrenzy: ſome are hurried out of the world by apoplexies: others periſh by the ſlower proceſs of jaundice, dropſy, aphthous ulcerations of the alimentary canal, and gangrenous ulcers of the extremities." (See Dr. Willan, Reports, &c. p. 132, *et ſeq.* Dr. Lettſom on Hard Drinking, and alſo in the Memoirs of the Med. Soc. of London, vol. i. p. 152. Dr. A. Fothergill on the Abuſe of Spirituous Liquors.)

This is the moſt uſual courſe of the deleterious operation of ſpirituous liquors on the human conſtitution. It is not to be inferred, however, that this ſeries of ſymptoms is obſerved in every drunkard, without variety; or that other complaints do not often occur, as a conſequence of habitual inebriation: nor, on the other hand, is it to be concluded, that any, or all of theſe morbid changes, are not frequently produced by that degree of *tippling*, which many people practice without getting drunk, and without acquiring the character of intemperate drinkers. Fatal caſes of jaundice, dropſy, ſchirrous liver, apoplexy, &c. from the latter degree of habitual potation, are but too numerous in the experience of every phyſician. Theſe ſober drunkards, if the expreſſion may be allowed, deceive themſelves, as well as others; they advance more ſlowly, but not leſs certainly, in the road to the ruin of their health. And even this is not invariably true; for intemperance is a relative term: what is an active poiſon to one individual, the conſtitution of another will enable him to bear with a trivial detriment. We have no accurate accounts of the quantity of liquor which ſome inebriates are capable of conſuming. Even now, when barbarous exploits in drinking are no longer the ſubject of rival boaſting, as in the time of the Spectator, ſome men may be found to equal "honeſt *Will Funnel*," in the hogſheads of October, and tons of Port, that have paſſed through them. (See vol. viii. N° 569.) But this, as well as the effects on the conſtitution, will depend on the ſtrength and kind of the liquor, and its combinations with other ſubſtances. Dr. Trotter mentions a marine, in a king's ſhip, who drank four gallons of beer in the day; he ſoon grew bloated and ſtupid, and died of apoplexy. A ſimilar caſe fell under the obſervation of the writer of this article, in a ſedentary man, employed in writing; he took little ſolid food, but drank 12 or 13 quarts of porter daily, and ſoon grew corpulent, with a pallid or leucophlegmatic complexion, and exceſſively dull and incapable of exerciſe, and at length was ſeized with a fit of apoplexy, of which he died in a few hours. Wine of courſe may be taken in much larger quantities than the pure ſpirit, but it produces nearly the ſame effects; a purple redneſs of the complexion, with eruptions called *gutta roſacea*, eſpecially about the noſe; of which Shakeſpeare has given a humourous caricature in Falſtaff's deſcription of Bardolph's noſe. (Henry IV. Part i. act 3.) An officer of the hoſpital ſhip of the fleet in which Dr. Trotter ſerved, beſides his allowance of wine at the meſs table, uſually drank a bottle and a half of gin in twenty-four hours: his face at times was equal to Bardolph's, with bloodſhot eyes, fœtid breath, &c.; he died of apoplexy and diſeaſed liver.

Spirits, like other poiſons, if taken in a ſufficient *doſe*, prove immediately fatal. The newſpapers frequently furniſh us with examples of almoſt inſtantaneous death, occaſioned by wantonly ſwallowing a pint or other large quantity of ſpirit for the ſake of a wager, or in boaſt. The author laſt quoted obſerves, that "among the numerous deaths from intoxication, which have come under his own obſervation, or been reported to him by ſurgeons, no ſeaman ever exceeded *the bottle* of ſpirit," (p. 163.) But ſmaller quantities, if repeated at ſhort intervals, will induce diſeaſes, that ſpeedily terminate life, without running the courſe which we above deſcribed; of which two inſtances are related by Dr. Rollo, in the ſeventh vol. of the London Medical Journal (of Dr. Simmons) for 1786, p. 33.

Prevention and Cure.—When it is conſidered that the deſire for ſtimulating liquors, with which the habitual tippler or drunkard is actuated, is in fact a conſtitutional feeling, an appetite, an inclination of nature for the time (a morbid one, it is true) as much as the thirſt of the parched and panting traveller for a draught of cold water, or of the feveriſh man for the ſame refreſhment; it muſt be obvious, that, as in other chronic diſeaſed conditions of the body, it may be moſt effectually checked in its commencement, and that much more is to be hoped from a ſyſtem of prevention, than from any attempts to cure. *Venienti occurrite morbo*, ſhou'd be the maxim of every individual in this matter, for in ſuch a caſe, "the patient muſt miniſter to himſelf." "I would guard every perſon," ſays Dr. Lettſom, "from beginning with even a little drop of this faſcinating poiſon, which, once admitted, is ſeldom, if ever, afterwards overcome." *Loc. cit.*

The moſt important preventive caution that can be given, eſpecially to the female ſex, is to avoid the firſt encroachments of the enemy *in diſguiſe*. Many of the unhappy victims to drinking, have to date their firſt propenſity to that practice from the frequent uſe of ſpirituous tinctures, uſed as *medicines*, raſhly preſcribed for languors, ſtomachic pains, and other *nervous* and hyſterical complaints; or from the time when, by the unguarded advice of ſome medical practitioner, or good lady-doctor, a little brandy and water was ſubſtituted for wine, under an idea that the latter turned ſour on the ſtomach. But if much miſchief has accrued from theſe ſources, what a catalogue of moral and phyſical evils is to be attributed to the circulation of thoſe diſguiſed and medicated *drams*, which the avarice and *charlatanerie* of the quack impoſtors of this country palm upon the public, under the titles of *nervous cordials*, *cordial balms*, &c. &c. Theſe potions of coloured whiſkey not only become the origin of the pernicious habit of dram-drinking, but afford the means of continuing and increaſing the practice of it, without any of the moral compunction or reproach, with which the potation of vulgar rum and brandy is uſually ſtigmatized. The laſt remark, indeed, applies alſo to the uſe of cordials and *liqueurs*, which is common in many families. The names of *noyau*, &c. ſerve to deceive the unwary; for, doubtleſs, there are many who drink of thoſe *liqueurs*, that would bluſh to taſte brandy: yet they are nothing more than brandy diſguiſed.

There are many well-meaning people, who take frequent drams, under one ſhape or another, to relieve uneaſineſs at the ſtomach, or lowneſs of ſpirits, without at all ſuſpecting that they are doing any harm. They mention theſe ſymptoms ſlightly, as nervous, or gouty, and attempt to avert preſent ſuffering, by indulging more freely in the very cauſe of the miſchief, until the habit, with all its lamentable conſequences, is eſtabliſhed. And it is painful to hear the deluſive arguments, with which they juſtify the choice of their liquor. Some, who avoid brandy, have been induced to take rum, from a vulgar opinion, that it is more oily and balſamic!—others, who condemn both brandy and rum, make no objection to gin, becauſe they think it diuretic; whereas half the dropſies, among the lower claſſes of the people, originate, or are confirmed by the uſe of this ſpirit. They are all nearly alike deleterious.

There is another caution, which the temperate will ever attend to: never to drink wine or ſpirituous liquors on an empty ſtomach, or after long faſting. In this condition the ſtomach is much more eaſily affected, and a ſmall quantity will produce a powerful impreſſion. In the theoretical language of Brown and Darwin, the excitability or ſenſorial power is accumulated in conſequence of the abſence of ſtimulus. A ſtriking illuſtration of this fact is afforded in captain Bligh's narrative. The allowance of water and proviſion was ſo exceedingly ſmall, that it was little better than faſting. The rum was meaſured out to each man in a teaſpoon; yet the body was in that ſtate ſo ſuſceptible of ſtimulus, that this quantity produced a degree of intoxication. When a morning glaſs becomes neceſſary to baniſh the languor, ſinking, and tremors of the tippler, the caſe may be conſidered as a diſeaſe rooted in the habit, and therefore nearly hopeleſs.

For theſe beginnings of the practice of drunkenneſs, each individual is reſponſible chiefly to himſelf; but the foundation of this pernicious vice is, in many caſes, laid by others, even by thoſe who are the natural guardians of the health, which they contribute to undermine, and at a period when the ſufferer is totally unable to reſiſt the miſchief. The ſeeds of the diſeaſe are unqueſtionably often ſown in *infancy*, by the miſtaken indulgence of parents and friends. The mild bland nutriment, which nature has prepared for the young of animals of our own claſs, as ſuited to the delicate excitability of thoſe tender beings, ought ſurely to be the model of the preparations, which we ſubſtitute for it. Natural appetite requires no ſtimulants; and it cannot be doubted, that ſpirits, wine, and fermented liquors of all kinds, ought to be excluded from the diet of infancy, childhood, and youth; except, in the latter period, ill health demand its occaſional uſe medicinally.

> “Nothing like the ſimple element dilutes
> The food, or gives the chyle ſo ſoon to flow;”

is a truth, which, in infancy and childhood, at leaſt, is incontrovertible.

As to the *cure* of drunkenneſs, when the habit is eſtabliſhed, experience teaches us, that it is ſcarcely to be expected, that ſucceſs will attend any ſuch attempt. In the earlier periods of the practice, when the effects of the liquor on the conſtitution, have not greatly contaminated it, beyond the frequent recurrence of indigeſtion, and pains and oppreſſion of the ſtomach, ſpirits ſhould be at once interdicted altogether; and ſome leſs pernicious ſtimulant for a time ſhould be ſubſtituted, as the bitter drugs, *Columbo, Quaſſia*, Peruvian bark, or ſteel in ſmall quantities between the meals. The food ſhould be light, and taken often, at regular intervals. But where the ſtomach is ſtill more affected, and rendered incapable of retaining nutriment in any quantity, a ſmall portion of ſome one light ſubſtance ſhould be taken, until that organ acquire tone enough to digeſt a ſtronger, or more mixed diet. Dr. Lettſom mentions the caſe of a lady, who could not retain any food on her ſtomach above an hour or two. He requeſted her to fix upon ſome light nouriſhment, that ſhe could fancy palatable, and ſhe mentioned milk: he then reſtrained her to four table ſpoonfuls of it every ſix hours, and afterwards increaſed the quantity as the ſtomach could bear it. From this ſhe went to broth, and thus gradually acquired ſuch a ſtate of the ſtomach, as to bear the uſual food of the family: and for two years paſt ſhe had enjoyed good health with the moderate uſe of a glaſs of wine, or of beer, but not one drop of ſpirit. (Memoirs of the Med. Soc. vol. i. p. 164.)

But where the habit of ſpirit drinking has been long continued, and the debility and derangement of the functions brought on by it are very conſiderable, the total and ſudden omiſſion of the uſual ſtimulus, has ſunk the perſon into irretrievable weakneſs. Health can only be recovered in this caſe by a gradual abandonment of the pernicious draughts. Dr Darwin mentions what he calls a golden rule, by which he has ſucceſsfully directed the diminution of the quantity of ſpirit in ſuch caſes. He has preſcribed to ſeveral of his patients to omit one-fourth part of the quantity, they had lately been accuſtomed to, and if in a fortnight their appetite increaſed, they were adviſed to omit another fourth part. But ſo little was his hope of ſucceſs, if the digeſtion appeared to be impaired from the want of that quantity of ſpirituous potation, that he then adviſed them rather to continue as they were, and bear the ills they had, than riſk the encounter of greater. He recommended at the ſame time fleſh-meat, with or without ſpice, with bark and ſteel, and half a grain or a grain of opium, with 6 or 8 grains of rhubarb, at night.

Perhaps, however, this fear of the ſudden omiſſion of the ſtimulus of ſpirits is carried farther, in conſequence of hypothetical opinion, than actual experience would juſtify. Dr. Trotter remarks that, we daily ſee, in all parts of the world, men who by profligacy and hard drinking have brought themſelves to a gaol; yet, if we conſult the regiſter of the priſon, it does not appear that any of theſe habitual drunkards die by being forced to lead ſober lives. And he contends, that whatever debility of the conſtitution exiſts, it is to be cured by the uſual medicinal means, which are employed to reſtore the weakened organs. But the great difficulty in theſe attempts to cure inebriety is in ſatisfying the mind, and in whetting the blunted reſolutions of the patient. And this is, doubtleſs, more eaſily accompliſhed by a gradual abſtraction of his favourite potation. The recommendation of a celebrated phyſician to a Highland chieftain, to put as much ſealing wax daily into his cup, as would receive the impreſſion of his ſeal, is ſaid to have been attended with the happy effect, of curing his habit of inebriation. Dr. Lettſom mentions a perſon who uſually drank twelve *drams* a day, but being convinced of his approaching miſery, took the reſolution to wean himſelf from this poiſon. He always drank out of one glaſs; into this he daily dropped a drop of ſealing wax: by this means he had twelve drops leſs of ſpirit every day, till, at length, his glaſs being filled with wax, his habit was cured.

The waters of Bath are in conſiderable repute for their efficacy in recruiting the worn down conſtitutions of inebriates. To the wealthy, who can afford to procure this remedy by a journey to Bath, the uſe of it is certainly to be recommended. In addition to the warmth, theſe waters contain iron in a very diffuſed ſtate. The change of place and of general habits may contribute to introduce new modes of thinking, to divert the attention from too much brooding over the corporeal feelings, and therefore to change the habit in reſpect to liquors. The uſe of warm, weak, diluent liquors, in any ſituation, with a plain diet, and regular temperance, will effect a great deal, even under the otherwiſe unaided efforts of nature, in removing thoſe violent ſtomachic and hepatic affections, which have been brought on by the free uſe of vinous and ſpirituous potation. Nay, thoſe diſeaſes, when pronounced incurable, have ſometimes yielded, in a few months, to ſuch a ſyſtem of regularity, plain diet, and water-beverage:—an encouraging fact to thoſe perſons, who reſolve firmly to change their pernicious mode of life.

In aiding ſuch a reſolution, the phyſician has unfortunately many prejudices of the mind, as well as diſtreſſing feelings in the nervous ſyſtem of the patient, to encounter. The Spectator juſtly obſerves, that "no vices are ſo incurable as thoſe which men are apt to glory in;" but, he adds, "one would wonder how drunkenneſs ſhould have the good luck to be of this number." (See N° 569.) But the wonder ceaſes, when we reflect, that from our earlieſt education we are accuſtomed to read of the pleaſures of Bacchus, and the praiſes of wine, in the moſt elegant languages of antiquity;—that our own poets and dramatiſts have employed their various talents in extolling the ſame ſubjects;—that not only Horace, and Anacreon, and Shakeſpeare, but even our grave Milton wrote, in a beautiful Latin ode, the praiſes of the ſpirit of the grape. And Haller and Hoffmann, both phyſicians of great learning, have expreſſed an opinion that wine inſpires a genius favourable to the effuſions of the poet. (See Haller Phyſiol. lib. 17. Hoffm. de Temperan.) The opinion, moreover, has extended among the people generally, that a generoſity of ſpirit, a cheerfulneſs, courage, and manlineſs, belong to thoſe only who do not flinch from the cheerful cup; and the high and low, therefore, applaud the ſentiments of Falſtaff: "Good faith, this ſame young ſober-blooded boy doth not love me, nor a man *cannot make him laugh*:—but that's no marvel, he drinks no wine. There's never any of *theſe demure boys come to any proof*: for thin drink doth ſo over-cool their blood, and making many fiſh meals, they fall into a kind of male green-ſickneſs; and then when they marry, they get wenches: they are generally *fools and cowards*, which ſome of us ſhould be too, but for inflammation." (Henry IV. p. ii. act 4.)

Now, it may be an encouragement to the drunkard to know, that theſe are arrant prejudices; and it is happy for the preſent age, that they are much leſs prevalent than in the preceding one, and that drunkenneſs, among the better educated claſſes of the community, is no longer a vice that "men are apt to glory in." The following ſentiments of Dr. Trotter are the reſult of ſtrict obſervation: "My whole experience aſſures me, that wine is no friend to vigour or activity of mind: it whirls the fancy beyond the judgment, and leaves body and ſoul in a ſtate of liſtleſs indolence and ſloth. The man that, on arduous occaſions, is to truſt to his own judgment, muſt preſerve an equilibrium of mind, alike proof againſt contingencies as internal paſſions. He muſt be prompt in his deciſions; bold in enterprize; fruitful in reſources; patient under expectation; not elated with ſucceſs or depreſſed with diſappointment. But if his ſpirits are of that ſtandard as to need a *fillip* from wine, he will never conceive or execute any thing magnanimous or grand. In a ſurvey of my whole acquaintance and friends, I find that *water-drinkers* poſſeſs the moſt equal temper and cheerful diſpoſitions." (Loc. cit. p. 170.) This, we believe, will be confirmed by the experience of every perſon. This denomination, however, does not exclude the idea of an occaſional temperate uſe of wine; for, let us not be miſunderſtood:

> "We curſe not wine: the vile exceſs we blame;
> More fruitful than th' accumulated board
> Of pain and miſery," &c.

In regard to the *cure* of the fit of intoxication, the principal objects are, to evacuate the inebriating fluid from the ſtomach by vomiting, or to dilute it by means of warm water poured down the throat. This laſt expedient will often produce vomiting. If the perſon is in the laſt ſtage of drunkenneſs, having ſo far loſt the power of ſenſe and motion as to be unable to help himſelf, he ſhould be treated as if under the danger of an impending apoplexy. He ought to be placed either in an arm chair, where he cannot fall, or laid on a bed, with the head and ſhoulders raiſed nearly erect; the neckcloth ſhould be removed, and the collar of the ſhirt unbuttoned; a free ventilation ſhould be admitted, and all uſeleſs viſitors excluded. If his face is much ſwollen, and unuſually fluſhed or bloated, his breathing ſtertorous, the eyes fixed, with their veſſels turgid, there is danger of an inſtant fit of apoplexy. In this caſe, bleeding, or cupping the temples, may be adviſable, to relieve the preſſure on the brain; and it will then be deſirable to unload the ſtomach as ſpeedily as poſſible: and this is often readily accompliſhed, by introducing a feather, or any ſuitable ſubſtance into the throat. Throughout the whole paroxyſm, the application of cold water, rectified ſpirit, or æther, to the head and temples, is proper: the actual cold of the firſt, and the cold occaſioned by the evaporaion of the latter, tend to repreſs the inordinate action of the arteries of the head, and therefore to diminiſh the quantity of blood ſent to the brain. Immerſion in the cold bath has often brought a drunkard to his ſenſes, as occurred in the miller before mentioned; and as is often obſerved among ſeamen, who fall over-board in a ſtate of ſtupid intoxication, they are generally ſober when picked up. There was a cuſtom of *ducking* a drunken huſband prevalent in ſome parts of this iſland, of uncertain origin; but it is to be lamented that our fair country-women ſhould not exerciſe ſo wholeſome a privilege more generally.

It might perhaps be conſidered by ſome as too great a compliment to inſtruct the drunkard, how to correct morning headach and ſick ſtomach. A wet cloth over the forehead is effectually employed by ſome perſons for the relief of the former: for the latter, a little ſalted fiſh, ham, &c. is often ſerved up; and kitchen ſalt, in any way, is doubtleſs a very grateful ſtimulus to a ſtomach weakened by exceſs. Dr. Cullen uſed to ſay, in his lectures on Indigeſtion, that he found it repreſs ſickneſs, when every thing elſe failed. Vitriolic acid, riding on horſeback, and even continuance in bed, contribute to the ſame effect, according to Dr. Home. Where acidity prevails, the abſorbent earths, as magneſia and chalk, or alkaline medicines, are uſeful.

We have now to mention one of the moſt formidable effects of habitual intoxication, of which many inſtances are recorded in the Philoſophical Tranſactions, and other works of authority, namely, the *combuſtion* of the individuals ſo habituated. As we do not aſk our readers for that faith in theſe ſtories, which we do not give them ourſelves, we ſhall content ourſelves with relating one example of ſuch burnings; and refer to the authorities before-mentioned for a farther account of them. "Madame de Boiſeon, 80 years of age, exceedingly meagre, who had drunk nothing but ſpirits for ſeveral years, was ſitting in her elbow chair before the fire, while her waiting maid went out of the room a few moments. On her return, ſeeing her miſtreſs on fire, ſhe immediately gave an alarm, and ſome people having come to her aſſiſtance, one of them endeavoured to extinguiſh the flames with his hands, but they adhered to it as if it had been dipped in brandy or oil on fire. Water was brought, and thrown on the body in abundance; yet the fire appeared more violent, and was not extinguiſhed till the whole fleſh had been conſumed. Her ſkeleton, exceedingly black, remained entire in the chair, which was only a little ſcorched; one leg only, and the two hands, detached themſelves from the reſt of the bones." Trotter, p. 76. See Phil. Tranſ.

Act. Med. Hafn. Encyclopedie Methodiq., &c. quoted by Dr. Trotter.

The ancient Lacedæmonians uſed to make their ſlaves frequently drunk, to give their children an averſion and horror for this vice. The Indians hold drunkenneſs a ſpecies of madneſs; and, in their languages, the ſame term *ramjam*, that ſignifies drunkard, ſignifies alſo a phrenetic.

Drunkenneſs is puniſhable by the laws of England. The penalty is five ſhillings fine, or the ſitting ſix hours in the ſtocks in caſe of non-payment. For a ſecond offence, the guilty perſon may be bound with two ſureties in 10*l.* each to his good behaviour. And an alehouſe-keeper, convicted of the ſame offence, ſhall be diſabled to keep any ſuch alehouſe for three years. Tippling is a ſpecies of drunkenneſs. If any inn-keeper, victualler, or alehouſe-keeper, ſhall ſuffer any perſon (except travellers, and labouring people at their dinner hour) to continue drinking or tippling in an alehouſe, &c. he ſhall forfeit ten ſhillings to the poor, to be recovered by diſtreſs; or the party offending to be committed till payment, and diſabled to keep an alehouſe for three years. The perſons tippling ſhall forfeit 3*s.* 4*d.*, or be ſet in the ſtocks for four hours. All flag officers and perſons belonging to his majeſty's ſhips of war, being guilty of drunkenneſs, are liable to ſuch puniſhment as a court-martial ſhall think fit to impoſe. See ſtat. 1 Jac. I. c. 9. 4 Jac. I. c. 5. 7 Jac. I. c. 10. 21 Jac. I. c. 7. 1 Car. I. c. 4. 22 Geo. II. c. 33.

Hobbes makes voluntary drunkenneſs a breach of the law of nature, which directs us to preſerve the uſe of our reaſon. The law of England alſo does not allow it to be an excuſe in any caſe whatſoever, but rather an aggravation of an offence. To this purpoſe ſir Edward Coke obſerves (1 Inſt. 247.), that a drunkard, who is "voluntarius dæmon," hath no privilege thereby; but whatſoever hurt or ill he doth, his drunkenneſs doth aggravate it: "nam omne crimen ebrietas, et incendit, et detegit." It hath been obſerved, that the real uſe of ſtrong liquors, and the abuſe of them by drinking to exceſs, depend much upon the temperature in which we live. The ſame indulgence, which may be neceſſary to make the blood move in Norway, would make an Italian mad. A German, therefore, ſays Monteſquieu (Sp. Laws, l. 14. c. 10.), drinks through cuſtom, founded upon conſtitutional neceſſity; a Spaniard drinks through choice, or out of the mere wantonneſs of luxury: and drunkenneſs, he adds, ought to be more ſeverely puniſhed, where it makes men miſchievous and mad, as in Spain and Italy, than where it only renders them ſtupid and heavy, as in Germany and more northern countries. Accordingly, in the warm climate of Greece, a law of Pittacus enacted, "that he who committed a crime, when drunk, ſhould receive a double puniſhment:" one for the crime itſelf, and the other for the ebriety which prompted him to commit it. (Puffend. L. of N. l. 8. c. 5.) The Roman law, indeed, made great allowances for this vice: "per vinum delapſis capitalis pœna remittitur." But the law of England, conſidering how eaſy it is to counterfeit this excuſe, and how weak an excuſe it is (though real), will not ſuffer any man thus to privilege one crime by another. (Plowd. 19.) It has been held that drunkenneſs is a ſufficient cauſe to remove a magiſtrate; and the proſecution for this offence by ſtat. 4 Jac. I. c. 5. was to be, and ſtill may be, before juſtices of peace in their ſeſſions, by way of indictment, &c. Equity will not relieve againſt a bond, &c. given by a man when drunk, unleſs drunkenneſs is occaſioned through the management or contrivance of him to whom it is given. (3 P. Wm. 130, in n. 1 Inſt. 247.)

DRUPA, in *Botany*, (*drupæ* of the Latin writers are unripe olives, or any other ſimilar fruit.) A ſtone fruit. This conſiſts of a fleſhy coat, not ſeparating into valves, uſually of a juicy ſubſtance, though ſometimes, as in the Cocoa-nut, dry and ſpongy, encloſing a ſingle hard and bony nut, to which it is cloſely attached, as in the Peach, Plum, Cherry, &c. Sometimes the nut, though not ſeparating into diſtinct valves, contains more than one cell, and conſequently ſeveral ſeeds, as in the Cornel-tree, *Cornus*, and the Olive, *Olea*, though only one cell of the latter uſually comes to perfection, the other being entirely obliterated as the fruit advances in growth. Linnæus reckons ſome fruits *drupæ*, in which there are ſeveral ſeparate ſeeds or nuts, on account of the hardneſs of thoſe ſeeds, as in the Medlar, *Meſpilus*; but Gærtner more commodiouſly reckons them berries, *baccæ*, it being found beſt to reſtrain the term *drupa* to a fruit with a ſingle nut, of one or more cells, even though its nut be ſometimes furniſhed with a very tender ſhell, as in *Daphne*. Sm. Intr. to Botany.

DRUPATRIS, (a name contrived by Loureiro, from *Drupa*, a ſtone fruit, and *tres*, three, to expreſs its ternate or three-celled nut,) Loureir. Cochinch. 314. Claſs and order, *Icoſandria Monogynia*. Nat. Ord. *Heſperideæ*, Linn. *Myrti*, Juſſ.

Gen. Ch. *Cal.* Perianth bell-ſhaped, ſuperior, its limb in five acute ſegments. *Cor.* Petals four, roundiſh, concave, ſpreading, rather longer than the calyx. *Stam.* Filaments more than twenty, thick, ſhorter than the corolla, inſerted into the calyx; anthers two-lobed, roundiſh, fixed. *Piſt.* Germen roundiſh; ſtyle thick, equal to the ſtamens; ſtigma thickiſh. *Peric.* Drupa oval, ſmooth, dry. *Seed.* Nut of three cells.

Eſſ. Ch. Calyx five-cleft, ſuperior. Petals four. Drupa with a nut of three cells.

D. *cochinchinenſis*, native of the deep woods of Cochinchina, where it is called *Cây Deung*. A large tree, with a few aſcending branches. *Leaves* alternate, large, ovate-oblong, pointed, ſerrated. ſmooth. *Spikes* numerous, oblong, nearly terminal. *Flowers* white, ſmall. *Drupa* of a middling ſize, not eatable.

Such is Loureiro's account, which is all we know of the plant or its genus. It appears very nearly related to *Eugenia racemoſa* of Linnæus, *Stravadium* of Juſſieu, Rumph. Amboin. v. 3. t. 116, but if the above deſcription be correct it can ſcarcely be the ſame. The name of Loureiro is at leaſt as good as that of Juſſieu, and might remain, if by a compariſon of the two *drupæ* in an early ſtate, each ſhould be found to have three cells. Still there will be ſome difficulty on account of the ſhortneſs of the filaments in Loureiro's plant.

DRURYD, in *Geography*, a river of Wales, in the county of Merioneth, which runs into the Iriſh ſea, about 2 miles N.N.W. of Harlech.

DRUSA, in *Natural Hiſtory*, a name given by ſome of the Saxon miners to the common pyrites, and by others to ſome peculiar kind of it. But in general it is underſtood to ſignify both the pyrites and the marcaſite.

DRUSENHEIM, in *Geography*, a ſmall town of France, in the department of the Lower Rhine, ſituated at the confluence of the Motte and Rhine, in the diſtrict of Wiſſembourg; 18 miles N.E. of Straſbourg.

DRUSES, Druzes, or *Derouz*, a people of Syria, bordering upon the Maronites to the ſouth, and extending from the river Nahr-el-Kell, or the river of the Dog, which diſcharges itſelf into the Mediterranean, in N. lat. 33° 48′, to the neighbourhood of Sour (Tyre), between the valley of Bekaa and the Mediterranean ſea. The whole country contains 100 ſquare leagues, including a population of 120,000, and of which 40,000 are able to bear arms; ſo that each league contains 1090 perſons: a population equal to that of the richeſt provinces in France. This is the more remarkable, as their ſoil is not fertile, and many eminences remain uncultivated; inſomuch, that they do not produce corn enough to ſupport themſelves three months in the year. Beſides, they have no manufactures, and all their exportations are confined to ſilks and cottons, the balance of which exceeds very little the importation of corn from the Hauran, the oils of Paleſtine, and the rice and coffee they procure from Bairout. Volney attributes this extraordinary number of inhabitants, occupying ſo ſmall a ſpace, to that ray of liberty which glimmers in this country. Unlike the Turks, every man lives in a ſtate of perfect ſecurity with regard to his life and property. The peaſant is not richer than in other countries, but he is free, and not ſubject to pillage and oppreſſion, which are unknown among theſe mountains. Security, therefore, has been the original cauſe of population, from that inherent deſire which all men have to multiply themſelves, wherever they find an eaſy ſubſiſtence. The frugality of the nation, which is content with little, has been a ſecondary cauſe; and a third is the emigration of a number of Chriſtian families, who daily deſert the Turkiſh provinces to ſettle in Mount Lebanon, where they are cordially received by the Maronites from ſimilarity of religion, and by the Druzes from principles of toleration, and a conviction how much it is the intereſt of every country to multiply the number of its cultivators, conſumers, and allies. The Druzes, who engaged the attention of Europe about the cloſe of the 16th century, bear a ſtriking reſemblance to the Maronites in their mode of life, form of government, language, and cuſtoms; the principal difference between them conſiſting in their religion. Volney traces their origin to a diſſenſion that took place about the commencement of the 11th century between the followers of Mahomet; and particularly to the contempt manifeſted by the third caliph of Egypt, called Hakem-bamr-ellah, to the Mahometan religion. This caliph cauſed the firſt caliphs, the companions of Mahomet, to be curſed in the moſques, and afterwards revoked the anathema; he compelled the Jews and Chriſtians to abjure their religion, and then permitted them to reſume it; he burnt one-half of the city of Cairo for his diverſion, while his ſoldiers pillaged the other; and not content with theſe extravagant acts, he forbade the pilgrimage to Mecca, faſting, and the five prayers; and at length carried his madneſs ſo far as to deſire to paſs for God himſelf. This impious pretenſion was ſupported by a falſe prophet, who came from Perſia into Egypt, and was called Mohammed-ben-Iſmael. This Mohammed taught that it was not neceſſary to faſt or pray, to practiſe circumciſion, to make the pilgrimage to Mecca, or obſerve feſtivals; that the prohibition of pork and wine was abſurd; and that marriage between brothers and ſiſters, fathers and children, was lawful. To ingratiate himſelf with Hakem, he maintained that this caliph was God himſelf incarnate. Both the impoſtor and the caliph were ſoon brought to an untimely death by the hands of violence. However, the death of theſe two chiefs did not prevent the progreſs of their opinions. A diſciple of Mohammed-ben-Iſmael, named Hamza-ben-Ahmud, propagated them with indefatigable zeal in Egypt, Paleſtine, and along the coaſt of Syria, as far as Sidon and Berytus. His proſelytes underwent the ſame fate with that of the *Maronites* (which ſee); for, being perſecuted by the ſect in power, they took refuge in the mountains of Lebanon, and here, being better able to defend themſelves, they formed an independent ſociety. Notwithſtanding difference of opinions, they find it their intereſt to allow mutual toleration, and they have united in their oppoſition, at different times, to the cruſaders, the ſultans of Aleppo, the Mamlouks, and the Ottomans. The conqueſt of Syria by the latter made no change in their ſituation. The Druzes, thus ſecure, and unmoleſted by Selim I. and his ſucceſſor, Soliman II., but not ſatisfied with their independence, frequently deſcended from their mountains to pillage the Turks. At length, in the year 1588, Amurath III. reſolved to reduce them; and his general, Ibrahim Pacha, marched from Cairo, and attacked the Druzes and Maronites with ſuch vigour, as to force them into their ſtrong holds, the mountains. Diſſenſion took place among their chiefs, of which he availed himſelf, for exacting a contribution of upwards of one million of piaſtres, and for impoſing a tribute which has continued to the preſent time. Until this expedition, the Druzes had lived in a ſort of anarchy, under the command of different ſcheiks, or lords. The nation was alſo divided into two factions, diſtinguiſhed by the appellations of "Kaiſi," and "Yumani," and by the red and white colours of their flags. Ibrahim allowed them only one chief, who ſhould be reſponſible for the tribute, and execute the office of chief magiſtrate; and this governor became king of the republic. As he was always choſen from among the Druzes, he had at his diſpoſal the whole ſtrength of the nation, and being able to give it direction, as well as unanimity and force, he turned it againſt the Turks, engaging in ſecret hoſtilities whenever favourable opportunities occurred, and avoiding open war. About this time, that is, in the beginning of the 17th century, the power of the Druzes attained its greateſt height; which it owed to the talents and ambition of the celebrated Emir Fakr-el-din, commonly called Fakardin. This chief firſt gained the confidence of the Porte, by every demonſtration of loyalty and fidelity; repulſed the Arabs, who infeſted the plain of Balbec, and the countries of Sour and Acre; took poſſeſſion of the city of Bairout, and proceeded in the ſame manner at Saide, Balbec, and Sour; till at length, in the year 1613, he ſaw himſelf maſter of all the country, as far as Adjaloun and Safad. Whilſt he was making this progreſs, the pachas of Tripoli and Damaſcus oppoſed him, ſometimes with open force, and at other times by complaints at the Porte; but the Emir, who there maintained his ſpies and defenders, defeated every attempt. The divan, at length, began to be alarmed by the progreſs of the Druzes, and made preparations for effectually cruſhing them. In the mean while, Fakr-el-din embarked at Bairout for Italy to ſolicit ſuccours, and having reſigned the adminiſtration to his ſon Ali, repaired to the court of the Medici, at Florence. His arrival excited attention and curioſity; and as the hiſtory and religion of the Druzes were little known, it was doubted whether they ſhould be claſſed with the Mahometans, or Chriſtians. In this ſtate of uncertainty, it was ſuggeſted, that a people who had taken refuge in the mountains, and were enemies to the natives, could be no other than the offſpring of the cruſaders. Of this groundleſs conceit, Fakr-el-din availed himſelf, and pretended that he was related to the houſe of Lorraine. The miſſionaries and merchants, who promiſed themſelves a new opening for converſions and commerce, encouraged his pretenſions. The learned in etymology, ſtruck with the reſemblance of the names, inſiſted that "Druzes" and "Dreux" muſt be the ſame word, and thus formed the ſyſtem of a pretended colony of French cruſaders, who, under the conduct of a comte "de Dreux," had formed a ſettlement in Lebanon. The hypotheſis, however, has been totally overthrown, by the diſcovery, that the name of the Druzes is to be found in the Itinerary of Benjamin of Tudela, who travelled before the time of the cruſades. Not to mention other circumſtances, which evince the futility of this hypotheſis, we may remark, that the term "Druzes" is pure Arabic; and that it originates from the founder of the ſect of Mohammed-ben-Iſmael, who was ſurnamed "El-Dorzi." After a ſtay of nine years in Italy, Fakr-el-din returned to reſume the government of his country, which had been preſerved ſecure, and in good order, by his ſon Ali. Upon his arrival, he ſet about perfecting the internal adminiſtration, and promoting the welfare of his country; but in doing this, he purſued the frivolous and extravagant plan, the idea of which he had acquired in Italy. He built numerous villas, conſtructed baths, and planted gardens; and, without reſpect to the prejudices of his country, he employed the ornaments of painting and ſculpture, though they are prohibited by the Koran. The Druzes, who paid the ſame tribute as in time of war, became diſſatisfied; the people murmured at the expence of the prince; and the luxury he diſplayed renewed the jealouſy of the pachas. Hoſtilities commenced; and Fakr-el-din, having loſt his ſon, whilſt he was bravely reſiſting the progreſs of the Turkiſh army, and enfeebled by age and a voluptuous life, loſt both courage and preſence of mind. Having fled from the field of conteſt, and retired to the ſteep eminence of Nitra, he was at length betrayed by the companions of his adverſity, and delivered up to the Turks. Upon his arrival at Conſtantinople, Amurath yielded to the inſtigations of his courtiers, and ordered him to be ſtrangled, about the year 1631. After his death, his poſterity continued in poſſeſſion of the government, at the pleaſure, and as vaſſals, of the Turks. This family, failing in the male line, the authority devolved, by the election of the ſcheiks, on the houſe of Shehab, in which it ſtill continues.

The religion of the Druzes is formed upon the opinions of Mohammed-ben-Iſmael, already mentioned; nevertheleſs, the religious cuſtoms of one claſs of them are very peculiar. Thoſe who compoſe it are, with reſpect to the reſt of the nation, the ſame as the *initiated* were to the *profane:* they aſſume the name of "Okkals," denoting ſpiritualiſts, and beſtow on the vulgar the epithet of "Djahel," or ignorant; and they have various degrees of initiation, the higheſt orders of which require celibacy. Theſe are diſtinguiſhable by the white turban, as a ſymbol of their purity; which they conceive to be ſullied by even touching a profane perſon. If one eat out of their plate, or drink out of their cup, they break them; and hence has originated the cuſtom, ſo general in this country, of uſing vaſes, with a ſort of cock, which may be drank out of without touching them with the lips. All theſe practices are enveloped in myſteries. Their oratories are ſolitary, and ſituated on eminences, and in theſe they hold their ſecret aſſemblies, to which women are admitted. They have one or two books, which they carefully conceal; but chance has diſcovered that one of theſe contains only a myſtic jargon, valuable only to adepts. It repreſents God, meaning Hakem bamr ellah, as incarnated in the perſon of the caliph: it likewiſe treats of another life, of a place of puniſhment, and a place of happineſs, where the Okkals ſhall, of courſe, be moſt diſtinguiſhed. The reſt of the Druzes are wholly indifferent with regard to religion. The Chriſtians, who live in this country, pretend that ſeveral of them believe in the metempſychoſis, or tranſmigration; and that others worſhip the ſun, moon, and ſtars. When among the Turks, they affect the exterior of Mahometans, frequent the moſques, and perform their oblations and prayers. Among the Maronites, they accompany them to church, and, like them, make uſe of holy water. Many of them, importuned by the miſſionaries, ſuffer themſelves to be baptized; and, if ſolicited by the Turks, receive circumciſion, and conclude by dying, neither Chriſtians nor Mahometans; but in matters of civil policy they are not ſo indifferent.

The Druzes, as well as the Maronites, may be divided into two claſſes, the common people, and the people of eminence and property, called ſcheiks, and emirs, or deſcendants of princes. Moſt of them are cultivators, either as farmers or proprietors; every man lives on his own inheritance, improving his mulberry trees and vineyards, and in ſome diſtricts they grow tobacco, cotton, and grain, in inconſiderable quantities. At firſt the lands were in the hands of a ſmall number of families; but in order to render them productive, the great proprietors ſold part, and let leaſes of other parts. The ſcheiks of the principal families, who poſſeſs large property, amounting to one-tenth part of the whole country, have great influence among their inferiors and dependents, and involve all the Druzes in their diſſenſions. However, in conſequence, probably, of the conflict between contending parties, the nation has never been enſlaved by its chief. This chief, called "Hakem," or governor, and alſo "Emir," or prince, is a ſort of king, or general, who unites in his own perſon the civil and military powers. His authority is hereditary; but the ſucceſſion is determined rather by force than by any certain laws. Females are excluded. But whoever be the ſucceſſor, and this is generally determined by the greateſt number of ſuffrages and reſources, when the male line of any family is become extinct, it is neceſſary for him to obtain the approbation of the Turks, of whom he becomes the vaſſal and tributary. The office of the governor is to watch over the good order of the ſtate, and to prevent the emirs, ſcheiks, and villagers, from making war on each other. He is alſo at the head of the civil power, and names the Cadis, always reſerving to himſelf the power of life and death. He collects the tribute, from which he always allows an annual ſum to the pacha. This tribute, which varies from 160 purſes (8330*l.*) to ſixty, is called "Miri," and is impoſed on the mulberry tree, vineyards, cotton, and grain. The ſurplus of this tribute is for the prince, ſo that it is his intereſt to reduce the demands of the Turks, and to augment the impoſt: but this meaſure requires the ſanction of the ſcheiks, and their conſent is neceſſary for peace or war. In theſe caſes the emir muſt convoke general aſſemblies, and lay before them the ſtate of his affairs. There every ſcheik and every peaſant, in reputation for courage or underſtanding attend; ſo that this government may be conſidered as a well-proportioned mixture of monarchy, ariſtocracy, and democracy. Neither the chief, nor the individual emirs, maintain troops; they have only perſons attached to the domeſtic ſervice of their houſes, and a few black ſlaves. When the nation makes war, every man, whether ſcheik or peaſant, able to bear arms, is called upon to march. He takes with him a little bag of flour, a muſquet, ſome bullets, a ſmall quantity of powder, made in his village, and repairs to the rendezvous appointed by the governor. The ceremonies, previous to war, very much reſemble the cuſtoms of ancient times. When the emir and the ſcheiks determined on war, at Dair-el-Kamar, cryers, in the evening, aſcended the ſummits of the mountain, and there began to cry with a loud voice; "To war, to war; take your guns, take your piſtols; noble ſcheiks, mount your horſes; arm yourſelves with the lance and ſabre; rendezvous to-morrow at Dair-el-Kamar. Zeal of God! Zeal of combats!" This ſummons, heard in the neighbouring villages, was repeated there; and, as the whole country is nothing but a chain of lofty mountains and deep vallies, the proclamation paſſed in a few hours to the frontiers. Theſe voices, from the ſtillneſs of the night, the long-reſounding echoes, and the nature of the ſubject, had ſomething

thing awful and terrifying in their effect. Three days after, 15,000 armed men rendezvoued at Dair-el-Kamar, and operations might have been immediately commenced. The troops of the Druzes have neither uniforms, nor diſcipline, nor order; they are mere peaſants with ſhort coats, naked legs, and muſquets in their hands, differing from the Turks and Mamlouks, in being all foot; the ſcheiks and emirs only having horſes, which are of little uſe from the ruggedneſs of the country. The war of the Druzes is merely a war of poſts; for they never riſk themſelves in the plain, as they would not be able to ſtand the ſhock of cavalry, having no bayonets to their muſquets. They are excellent markſmen, and accuſtomed to ſudden ſurpriſes; though they are daring even to temerity, and ſometimes ferocious; they poſſeſs two qualities eſſential to the excellence of any troops; they ſtrictly obey their leaders, and are endowed with a temperance and vigour of health, unknown to moſt civilized nations. They can paſs three months in the open air, without tents, or any other covering than a ſheep-ſkin, and their proviſions conſiſt of ſmall loaves baked on the aſhes or on a brick, raw onions, cheeſe, olives, fruits, and a little wine. They have no knowledge of fortification, the management of artillery, or the mode of encampments; in a word, they are ignorant of war, conſidered as an art.

The Druzes, comparing their own ſituation with that of the ſubjects of the Turkiſh government, acquire an idea of their own ſuperiority, which has an influence on their perſonal character. Hence they are in their diſpoſition elevated, energetic, and active; and they are conſidered, through the Levant, as reſtleſs, enterprizing, hardy, and brave even to temerity. No people have a higher ſenſe of honour than the Druzes, and this has produced a politeneſs which is viſible even among the peaſants. They are alſo diſtinguiſhed for their hoſpitality; for any one who preſents himſelf at their door as a ſuppliant or paſſenger, is ſure of being entertained with lodging and food, in the moſt generous manner. The pooreſt peaſants have given the laſt morſel of bread to the hungry traveller; alleging that "God is liberal and great, and all men are brethren." They have, therefore, no inns in this country; and when they have once contracted with their gueſt the ſacred engagement of bread and ſalt, no ſubſequent event can induce them to violate it. The Druzes, like the Bedoueens, pay great reſpect to the antiquity of families; but nobility exempts no ſcheik or emir from paying tribute, in proportion to their reſpective revenues; and it confers upon them no prerogatives. Every thing among the Druzes is held in freehold; after paying his miri and his rent, every man is maſter of his property. Fathers have here, as in the Roman law, the power of preferring ſuch of their children as they think proper. Such are their prejudices, that they do not chuſe to make alliances out of their own families. They invariably prefer a poor relation to a rich ſtranger; it is uſual with them for a brother to eſpouſe a brother's widow; and, in various reſpects, they retain the cuſtoms of the Hebrews, in common with other inhabitants of Syria, and all the Arab tribes.

The proper and diſtinguiſhing character of the Druzes is a ſort of republican ſpirit, which gives them a greater degree of energy than other ſubjects of the Turkiſh government, and an indifference for religion, which forms a ſtriking contraſt with the zeal of the Mahometans and Chriſtians. In other reſpects their private life, their cuſtoms and prejudices are the ſame with other orientals. They may marry ſeveral wives and repudiate them when they chooſe; but this is ſeldom practiſed, except by the emir, and a few men of eminence. Occupied with their rural labours, they experience neither artificial wants, nor thoſe inordinate paſſions which are produced by the idleneſs of the inhabitants of cities and towns. The veil, worn by their women, is their protection; inſomuch that no one knows the face of any other woman beſides his wife, his mother, his ſiſter, and ſiſter-in-law. The women are perfectly domeſtic; thoſe even of the ſcheiks make the bread, roaſt the coffee, waſh the linen, cook the victuals, and perform all the offices of the family. The men cultivate their lands and vineyards, and dig canals for watering them. In the evening they aſſemble in the area, or court, or houſe of the chief of the village or family; where, ſeated in a circle, with legs croſſed, pipes in their mouths, and poniards at their belts, they diſcourſe of their various labours, the ſcarcity or plenty of their harveſts, peace or war, the conduct of the emir, or the amount of the taxes; they relate paſt tranſactions, diſcuſs preſent intereſts, and form conjectures on the future. Their children liſten, and at 10 or 12 years of age they talk with a ſerious air of war and taxes. This is their only education. They are not taught to read either the Pſalms, as among the Maronites, nor the Koran, like the Mahometans: and even the ſcheiks ſcarcely know how to write a letter. Among the Druzes there is little appearance of the gradation of ranks; all, both ſcheiks and peaſants, treat one another with a familiarity, which is equally remote from rudeneſs and ſervility. In a word their manners are thoſe of ancient times, and that ruſtic life, which marks the origin of every nation; and which proves that the people, among whom they are found, are hitherto only in the infancy of the ſocial ſtate. Volney's Travels in Egypt and Syria. Tott's Memoirs. Pococke's Deſcription of the Eaſt, vol. ii.

DRUSIAS, in *Ancient Geography*, a town of Paleſtine, placed by Ptolemy W. of the Jordan.

DRUSILLIANIA, an epiſcopal town of the proconſular Africa.

DRUSIUS, John, in *Biography*, a very learned theologian of the Proteſtant faith, was born at Oudenard, in Flanders, about the year 1550. The firſt rudiments of his education he had at Ghent, and from thence he was ſent to Louvain to go through a courſe of philoſophy. His father, in 1567, was one of the victims of the ſavage tribunal eſtabliſhed by the duke of Alva in the Netherlands, which ſtripped him of his eſtate, and obliged him to ſeek refuge in England. Young Druſius, notwithſtanding the vigilance of his mother, who, being herſelf a zealous Catholic, took every method of detaining the youth in Flanders, found means to eſcape and join his father in London. He almoſt immediately entered himſelf at Cambridge, and ſtudied with much ardour the claſſics and philoſophy, and was at the ſame time employed as private tutor to ſome young men at the ſame college with himſelf. In 1571 he returned to the metropolis, and was preparing for a journey to France, with a view of farther improvement, when the news arrived of the dreadful maſſacre in Paris on St. Bartholomew's day. In the following year he was admitted a member of Merton college, Oxford, took his degree of B. A., and had an eſtabliſhment appointed him for reading a lecture in the oriental languages. He continued the duties of this office four years, and then feeling a ſtrong deſire to viſit his native country, he quitted Oxford and went to Louvain, where he applied himſelf to the ſtudy of the civil law. Here his continuance was very ſhort, on account of the troubles excited by bigots in religion, and he returned to his father in London. A ſudden turn in the affairs of his country, by the pacification of Ghent, enabled both father and ſon to return home in ſecurity. The latter began now to look for a ſettlement in ſome Proteſtant country on the continent, and was accordingly appointed profeſſor of the oriental languages in the univerſity of Leyden. In the duties of this office he laboured with indefatigable induſtry, and, during the eight years which bore witneſs to his aſſiduity as a lecturer, he publiſhed works that eſtabliſhed his fame for ſolid erudition in various departments of literature. In the year 1580 he married, and openly expreſſed a wiſh for a more lucrative ſettlement, in order that his means might correſpond to the additional expences in which a family might involve him. The prince of Orange knew his value in the univerſity, and, with his own hand, wrote to the magiſtrates of Leyden, exhorting them to furniſh Druſius with ſuch ample proviſion as ſhould prevent him from leaving their city. Inattentive, however, to his great merits, they ſuffered him to accept of the ſituation of Hebrew profeſſor in the univerſity of Franeker. He entered upon the duties of his new office in the year 1585, and retained it with the higheſt reputation to himſelf till his death, in 1616. He left behind him, in his numerous works, monuments to his fame, as one of the ableſt ſcripture critics, having written upwards of thirty ſeparate works on the ſubject. The greateſt part of theſe has been incorporated in the well-known and highly eſteemed "Critici Sacri in Vet. et Nov. Teſt," firſt publiſhed in this country, and of which we have an abridgment in Pool's "Synopſis Criticorum," a work that is become almoſt as ſcarce as it is valuable. Beſides this we have many other writings of Druſius, which indiſputably prove his deep ſkill in the Hebrew language, and his extenſive acquaintance with the Jewiſh antiquities, and with whatever is connected with biblical literature. The private character of this excellent ſcholar was as amiable and unaſſuming as his learning was profound. He had a ſon, of the ſame name with himſelf, who exhibited an aſtoniſhing inſtance of genius at a very early age; he underſtood accurately the Hebrew language when he was only eight or nine years old; and, before he was 17, he was preſented to James I. of England; before whom, in the midſt of his courtiers, he delivered a Latin oration, which obtained the applauſe and admiration of all who heard it. He died of the ſtone, before he was 21 years of age, at the houſe of the dean of Chicheſter, leaving behind him many memorials of his learning and unaffected piety.

DRUSOMAGUS, in *Ancient Geography*, a town of Vindelicia, now *Memmingen*.

DRUSUS, Marcus Livius, in *Biography*, a perſon of conſiderable diſtinction at Rome, was deſcended from an ancient family, and became tribune of the people about the year 91, B. C. At this period there were great diſſenſions in the ſtate; Druſus hoped to reconcile the contending parties, but his plan was oppoſed by all thoſe whom he aimed to benefit by it. Conſcious, perhaps, of his own good intentions, he did not readily abandon the ſcheme, and in ſome inſtances he made uſe of means which were by no means juſtifiable to promote its ſucceſs. Finding himſelf growing unpopular, he propoſed, as a bait to the multitude, a gratuitous diſtribution of corn among them: this meaſure he followed by a ſtill more alarming motion, of giving to the Latins the privileges of Roman citizens. Hence violent conſpiracies were formed, which required all his addreſs to ward off for a time, and which, in the end, proved fatal to him. Returning from the forum, where he had been haranguing in favour of the allies, he was attended to his houſe by a great crowd of people, in the midſt of which an aſſaſſin, ſaid to be C. Varus, plunged a knife into his body, and made his eſcape. Druſus fell, and expired a few hours after, exclaiming, with his laſt breath, "When will the republic again poſſeſs a citizen like myſelf!" By the party whoſe cauſe he eſpouſed his death was ſincerely deplored, while thoſe on the oppoſite ſide regarded it as a timely deliverance of the ſtate from one who was only ambitious of being diſtinguiſhed as a popular leader. Univer. Hiſt.

Drusus, Nero Claudius, ſecond ſon of Tiberius Nero, by Livia, afterwards the wife of Auguſtus, was diſtinguiſhed on many occaſions for his courage and talents in public employments. His conduct againſt the Rhetians, a fierce people, inhabiting the country of the modern Griſons, over whom he obtained a complete victory, is celebrated by Horace in the fourth ode of the fourth book. This was about the year 15, B.C.; and in two years afterwards, Auguſtus, who was his patron, committed to him the charge of ſtopping the incurſions of the Germans into Gaul. In this, and in various other inſtances, he evinced the characteriſtics of courage and of the higheſt military prudence and ſkill; till, at length, his ſucceſſes were ſo brilliant and important, that his army, on the field of battle, ſaluted him Imperator. On his return to Rome he obtained the honour of a triumph, and in the following year, 9, B. C., he was raiſed to the conſulate. Foreign war called him again to Germany: he croſſed the Rhine and the Weſer, and made ſome ineffectual attempts to paſs the Elbe. Here he erected trophies to atteſt his conqueſts, and then began to march homewards: a fall from his horſe, however, impeded his progreſs; and a fever, the conſequence of the accident, put an end to his life, in the 30th year of his age. Though cut off in the prime of life, and even in the ardour of youth, he had lived ſufficiently long to eſtabliſh a high reputation as a ſoldier and magiſtrate. His public and private character exhibited the ſtrongeſt marks of honour and integrity. He was lamented by the army and the people, and all claſſes of the citizens rendered him every token of homage and reſpect. He left three children; *viz.*, the celebrated Germanicus; Claudius, who was afterwards emperor; and Livilla. Rom. and Univer. Hiſt.

Drusus, Cæsar, ſon of the emperor Tiberius, was born B. C. 13. He was introduced by Auguſtus to offices in the ſtate at a very early age, and at the time of the death of that emperor, he was nominated to the conſulſhip. In the firſt year of his father's reign, ; *viz.* A.D. 14, he was ſent out to appeaſe a ſedition, which had broken out in the legions in Pannonia, in which he, happily, ſucceeded. In the year 17, he was ſent to command in Illyricum, in order to keep that province free from the war, which was then raging in Germany. For his prudent and ſucceſsful ſervices he had the honour of an ovation on his return. He was elected conſul, a ſecond time, in the year 21, and during the abſence of the emperor in Campania, he fulfilled, alone, the functions of the office to the entire ſatisfaction of the public. In the following year the tribunitial authority was conferred upon him, for which he returned thanks by letter, inſtead of preſenting himſelf in due form before the ſenate, which was regarded in the light of an inſult. Druſus, however, felt his importance in the ſtate, and could not brook a rival, which led him to dread the growing influence of Sejanus, and to take every opportunity of treating him with indignity. Sejanus was too aſpiring and ambitious to ſubmit even to the prince, and determined to deſtroy him. For this purpoſe, he inſinuated himſelf into the favour of Livilla, the wife of Druſus, and, at length, ſeduced her affections, and contrived, by her means, to adminiſter poiſon to her own huſband, the foe of her infamous gallant. In early life Druſus was ſuppoſed to betray a cruel diſpoſition, by ſome feats at the gladiatorian games: he was alſo, in ſome degree, addicted to wine, and in other inſtances he gave tokens of a haughty and violent character. It muſt, however, be mentioned to his credit, that, while the court was divided between him and his couſin Germanicus, the two princes remained in perfect union, and almoſt indifferent as to the final deciſion. Rom. and Univer. Hiſt.

Drusus, the *tower of Straton*, or *Cæſarea*, in *Ancient Geography*, a port of Judea on the ſea, formerly in the half-tribe of Manaſſeh, on this ſide of Jordan, and called Druſus in honour of the ſon of Cæſar's wife. See Cæsarea.

DRUSWER, in *Geography*, a town of Lithuania, in the palatinate of Wilna; 14 miles W. of Braſlaw.

DRUTHMARUS, Christian, in *Biography*, a learned French monk in the ninth century, was a native of Aquitaine, but he was ordained prieſt in the dioceſe of Amiens. His various works prove that he was an excellent ſcholar; and very converſant in the ſacred writings. He left behind him commentaries on the goſpels of St. Matthew, Luke, and John; of the laſt, two fragments only have reached us. His object, as a critic and illuſtrator of the ſacred writings, was to give the natural and plain ſenſe of the original language, and he is thought by able judges to have obtained his wiſh. His commentary on St. Matthew, and the fragments of the others, were publiſhed at Straſburgh in 1514, which were ſoon after ſuppreſſed on account of their tendency, which was decidedly in favour of proteſtantiſm. The catholics maintained, that theſe paſſages are inſidious interpolations, and of no authority whatever.

DRUTISCHKEN, in *Geography*, a town of Pruſſian Lithuania, on the Rominte; four miles S. S. E. of Gumbinnen.

DRUTZ, a river of Ruſſia, which runs into the Dnieper at Rogatchev, in the government of Mogilev.

DRUYE, a town of France, in the department of the Yonne, and diſtrict of St. Fargeau; 16 miles S. of Auxerre.

DRUYN, or Drevin Petri, or *Grand Drewin*, a town of Africa, on the Ivory coaſt, at the mouth of the river St. Andre. N. lat. 5°. W. long. 4° 5′.

DRUYSKIDWAR, a town of Lithuania, in the palatinate of Wilna; 8 miles N. E of Braſlaw.

DRUZIPARA, in *Ancient Geography*, a town of Thrace, near the river Agrianes, towards the north-weſt, and at ſome diſtance from Perinthus.

DRY. A dry air, *cæteris paribus*, leſſens the weight of the human body, and the contrary quality increaſes it. See Moisture *of the air*.

Dry *Aqueduct*, is an arch made under a canal for a road to paſs through.

Dry *Baths*, *Confects*, *Dock*. See the ſubſtantives.

Dry *Exchange*, *Cambium ſiccum*, a ſoft appellation, anciently uſed to diſguiſe uſury, intimating ſomething to paſs on both ſides; whereas, in truth, nothing paſſed but on one: in which reſpect it might be called dry. See Interest, and Usury,

"Cambium ſiccum," ſays Lud. Lopes, de Contract. & Negot. "eſt cambium non habens exiſtentiam cambii, ſed apparentiam, ad inſtar arboris exſiccatæ, &c."

Dry *Harbour*, in *Geography*, a bay on the N. coaſt of the iſland of Jamaica. N. lat. 18° 30′. W. long. 77° 16′.

Dry *Maſs*, *Meaſures*. See the ſubſtantives.

Dry *Meat*, in the *Manege*, is uſed for corn and hay. After taking the horſe from graſs, or houſing him, he is frequently put to dry meat.

Dry *Moat*, *Rent*, *Storax*, *Suture*, *Spavin*. See the ſubſtantives.

Dry *Needle*, or *Dry point*, a tool uſed in copper-plate engraving, generally for the more delicate parts, ſuch as the lights of clouds, white drapery, the light fur of animals, &c. It is called *dry*, in contradiſtinction to the *etching*-needle, and becauſe its uſe is not followed by the application of aqua fortis.

Dry-needles are formed of ſteel-wire, which ſhould be of excellent temper, that it may cut the copper freely, without breaking. The wire ſhould be from one to two inches in length, and from the $\frac{1}{8}$th to the $\frac{1}{16}$th part of an inch in diameter, according to the required ſtrength of the lines which they may be intended to cut. Being thus formed and tempered, the wire ſhould be carefully inſerted in ſlender handles, which are commonly formed of ebony or box, and whetted to conical points, more or leſs acute or obtuſe, in proportion as the lines or inciſions in the copper are required to be broad or deep.

That the point may cut lines exactly of the ſame breadth and depth on every ſide, it ſhould be whetted as nearly as poſſible to a perfect cone: in order to which, it ſhould be very carefully inſerted in the handle, and ſo that a right line being ſuppoſed to paſs from its extreme point, to the centre of the upper extremity of the handle, might form an ideal axis to the whole, during the proceſs of whetting. In proportion to the truth of this ideal axis, will be the truth of the conical point, and the conſequent truth of the workmanſhip for which it may be employed: and to enſure purpoſes of ſo much importance to the engraver, the beſt tool-makers generally inſert a braſs ſocket in the handle very correctly, by means of a watch maker's lathe and wheel, before the dry-needle itſelf is introduced.

The dry-needle is uſually whetted to a point, with a little oil, on a hone of the fineſt kind: by the French engravers latitudinally on the flat ſurface of the ſtone, and by moſt of the Engliſh engravers, longitudinally, in a groove of an inconſiderable depth, which is formed in the hone for that purpoſe.

When the dry-needle is thus prepared, it is uſed by different artiſts, with various degrees of freedom or exactitude; the degrees of ſtrength of the inciſions in the copper, being effected by mere dint of preſſure as the needle is held between the fingers and thumb.

It ſhould be mentioned, that in uſing this tool, ſtill more than in uſing the graver, the copper is forced up on either ſide the inciſions, as earth land is forced up in ploughing a furrow. The copper thus forced up, is termed by engravers *the burr*, which is removed either by a ſcraper, (ſee Scraper,) or by a piece of ſoft charcoal with a flat ſurface, uſed either with oil or with water.

Aliamet, Le Bas, and ſeveral other of the French engravers, occaſionally uſed *oval* inſtead of *circular* wire for their dry-needles; and Worlidge, who engraved his ſmall portraits and prints from antique gems almoſt entirely with this tool, uſed *triangular* points, clearing off the burr which he raiſed with charcoal; though, as may be ſeen in his prints, not always clearing it off to the ſurface of the copper-plate.

DRYADES, Dryads, in the *Heathen Theology*, the nymphs of the woods; a ſort of imaginary deities, which the ancients believed to inhabit the woods and groves, and to hide themſelves under the bark of the oak, called by the Greeks δρυς.

The dryades differed from the hamadryades, in that theſe latter were attached to ſome particular tree, with which they were born, and with which they died; whereas the dryades were the goddeſſes of the trees and woods in general, and lived at large, in the middle thereof. For, though δρυς properly ſignifies an oak, it was alſo uſed for tree in general.

We likewiſe find mention made, in divers authors, of a kind of propheteſſes, or witches, among the Gauls, called dryades, or rather druides. See Druids.

DRYÆNA, or Chrysopolis, in *Ancient Geography*, a town of Aſia, in Cilicia. Steph. Byz.

DRYANDER, John, in *Biography*, but whoſe real name was Eichmeus, was born at Wetterau in Heſſe, but received his education in France, and took his degree of doctor at Mayence. He went thence to Marpurg, where he was engaged in teaching anatomy for twenty-four years, *viz.* from the year 1536, to 1560, when he died. His works are, "Anatomiæ pars prior, in qua membra ad caput ſpectantia, recenſentur, et delineantur," Marpurg, 4to. 1537. He firſt obſerved ſeveral diſtinctions, before unnoticed, between the medullary and cortical part of the brain, and he ſaw the olfactory nerves, which he miſcalls the optic nerves. In 1541, he gave "Anatomiam Mundini ad vetuſtiſſimorum aliquot manuſcriptorum codicum fidem collatam," 4to. with notes, in which he frequently corrects the errors of his author, and for which he is deſervedly placed by Haller among the reſtorers, and improvers of anatomy. He is alſo mentioned with honour in the Bib. Anat. of Douglas. Haller Bib. Anat.

DRYANDRA, in *Botany*, (ſo named by Thunberg in honour of his much-valued friend, Jonas Dryander, M. A. the pupil and friend of the great Linnæus and of his ſon, long reſident in this country, and now a vice-preſident of the Linnæan Society,) Thunb. Japon. 13. Murray in Linn. Syſt. Veg. ed. 14. 612. Schreb. 708. Juſſ. 389. Mart. Mill. Dict. v. 2. Claſs and order, *Dioecia Monadelphia.* Nat. Ord. *Euphorbiæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of two ovate, acute, equal leaves, ſhorter than the corolla. *Cor.* Petals five, obovate-oblong, reflexed, ſomewhat ſpreading, rather above half an inch long. *Stam.* Filaments nine, united below into one ſet, unequal, half the length of the petals; anthers minute. *Piſt.* none.

Female, *Cal.* and *Piſt.* not obſerved. *Cor.* Petals five. *Peric.* Drupa pear-ſhaped, angular, furrowed. *Nut* of three or four cells. *Seeds* ſolitary, oval.

Eſſ. Ch. Male, Calyx two-leaved. Petals five. Stamens nine. Female, Petals five. Drupa. Nut with three or four cells. Seeds ſolitary.

D. *cordata.* Thunb. Jap. 267. t. 27. (Abraſin; Kæmpf. Amoen. 789. Ic. t. 23.) Dodiekn or Abraſin of the Japaneſe. Native of the iſland of Nipon, the country of Fakonia, and other places in Japan, flowering in May and June. It forms a ſmall tree, luxuriantly branched; its wood is compared by Kæmpfer to that of the willow, and the pith is light and very abundant. *Branches* round, with a rugged, dotted bark. *Leaves* about the ends of the branches, ſpreading, alternate, on footſtalks, heart-ſhaped, acute, entire, ſmooth, paler beneath, five-ribbed, veiny, broad, three or four inches long. In Kæmpfer's figure they are undulated and ſometimes lobed, and bear two ſtalked glands at the baſe, or one between the lobes, which he alſo deſcribes in his *Amoenitates.* Flowers in corymboſe, aggregate, nearly terminal panicles, white according to Kæmpfer, Thunberg ſays yellow. The *ſeeds* are compared to thoſe of the *Ricinus* or *Palma Chriſti*, and afford oil for lamps. It is nearly allied to *Jatropa*, or at leaſt to ſome ſpecies incorrectly ranged by Linnæus under that genus.

DRYAS, elegantly ſo named by Linnæus, from the Dryades, or ſylvan goddeſſes, to whom the oak, Δρυς, which its leaves reſemble, was ſacred. Linn. Gen. 256. Schreb. 343. Willd. Sp. Pl. v. 2. 1118. Sm. Fl. Brit. 555. Mart. Mill. Dict. v. 2. Juſſ. 338. Gærtn. t. 74. Claſs and order, *Icoſandria Polygynia.* Nat. Ord. *Senticoſæ*, Linn. *Roſaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, in eight deep ſegments, which are ſpreading, linear, obtuſe, equal, rather ſhorter than the corolla. *Cor.* Petals eight, oblong, emarginate, ſpreading, inſerted into the calyx. *Stam.* Filaments numerous, capillary, ſhort, inſerted into the calyx; anthers ſmall. *Piſt.* Germens numerous, crowded, ſmall; ſtyles capillary, inſerted into the ſides of the germens; ſtigmas ſimple. *Peric.* none. *Seeds* numerous, roundiſh, compreſſed, each crowned with its long, woolly, permanent ſtyle.

Schreber remarks, that the ſegments of the calyx, and conſequently the number of petals, vary from ſix to ten. This is true, but it happens very ſeldom.

Eſſ. Ch. Calyx inferior, in eight equal ſegments. Petals eight. Seeds with feathery tails. Receptacle depreſſed.

D. *octopetala*, Linn. Sp. Pl. 717. Fl. Lapp. ed. 2. 181. Sm. Engl. Bot. t. 451. (Chamædrys tertia, ſive montana; Cluſ. Hiſt. v. 1. 351.) is the original, and as Willdenow juſtly obſerves, only genuine ſpecies, its generic character depending not only on the number of petals, and correſponding number of the ſegments of the calyx, but on the equality and uniformity of the latter. By this rule the other ſpecies are removed to *Geum.* It is found on moſt of the high Alpine heaths of Europe, forming wide entangled depreſſed tufts or patches, flowering from the middle of June till late in Auguſt. The *ſtems* are woody, branched, leafy, a few inches in height. *Leaves* evergreen, crowded, ſtalked, ovate, blunt, ſtrongly ſerrated; dark ſhining green above, ſnow-white, veiny, downy and concave beneath. *Stipulas* united with the footſtalk, as in roſes. *Flowers* ſolitary, white, large, and handſome, each on a long, erect, ſolitary, terminal, reddiſh, glandular ſtalk. *Calyx* alſo glandular and browniſh. *Anthers* yellow. It is one of the moſt elegant of Alpine plants, and may be cultivated in a gravelly ſoil, mixed with loam and ſome bog-earth, under a north wall in our gardens, but it requires a pure air, and ſome cover during the cold windy weather uſual in our tardy ſpring. S.

Dryas, in *Ancient Geography*, a river of Greece, in Theſſaly, 20 ſtadia S. of the river Sperchius, and about the ſame diſtance N. of Aſopus.

Dryas, in *Zoology*, a ſpecies of *Myoxus*, which ſee.

DRYBACTÆ, or Trybactræ, in *Ancient Geography*, a people of Aſia, in Sogdiana. Ptolemy.

DRYBURG, in *Geography*, a town of Germany, in the circle of Weſtphalia, and biſhopric of Paderburn; ſeven miles E.N.E. of Paderburn.

DRYDEN, John, in *Biography*, one of the moſt celebrated poets of which this country can boaſt, was born about the year 1631, in the pariſh of Aldwinkle-All-Saints, in Northamptonſhire. He was grandſon to ſir Eraſmus Driden, (the name being then ſpelt with an *i*,) of Canons-Aſby, in the ſame county. The father of our poet poſſeſſed a ſmall eſtate, acted as a county magiſtrate during the uſurpation, and was, in religion, probably, a preſbyterian. John laid the foundation of a learned education at Weſtminſter, under the famous Buſby, and was thence elected to a ſcholarſhip in Trinity college, Cambridge, in 1650. It is ſaid that he was not diſtinguiſhed for peculiar talents or genius, either at the ſchool or at the univerſity. In the latter he took his degrees, and though he had, at the time of his admiſſion, written two ſhort copies of verſes, yet his name is not recorded among the academical poets of the period. His father died in 1654, and John ſucceeded to ſo much of the eſtate as could be ſpared from the widow, who had other children to provide for. He removed to the metropolis, and was patronized by a diſtant relation, ſir Gilbert Pickering, one of Cromwell's ſtricteſt adherents. Dryden was his clerk or ſecretary, and probably concurred in the opinions and practices of the family in which he reſided. Hence, ſays his biographer, "in the hiſtory of the changes of the human mind, few facts will appear more extraordinary, than that Milton ſhould have been deſcended from a catholic and loyaliſt family, and Dryden from a ſectarian and republican one." On the death of Cromwell, Dryden celebrated his memory, in heroic ſtanzas, which fact has been perpetually referred to in diſpraiſe of the poet, who, on the reſtoration, ardently embraced the royal cauſe. It muſt, however, be admitted, that Dryden's praiſe of the protector went chiefly to that trait in his character, which enabled him firſt to put an end to domeſtic contentions, and then to inſpire awe and reſpect for his country throughout Europe. On the return of Charles II. he publiſhed his "Aſtrea Redux," which he followed by "A Panegyric on the Coronation." In 1662, he addreſſed ſome lines to lord chancellor Clarendon, in the ſame ſtrains of loyalty; but it was ſuppoſed to be owing to ſome elegant verſes in praiſe of the modern improvements in philoſophy, which he prefixed to Dr. Charleton's treatiſe on Stonehenge, that he was elected a member of the Royal Society. About the ſame time he appeared firſt as a writer for the ſtage, and his comedy, entitled the "Wild Gallant," was acted in February 1663. By the public this firſt effort was ungraciouſly received, but by the intereſt of Barbara Villiers, afterwards ducheſs of Cleveland, it obtained a kind reception at court. His next pieces were, the "Rival Ladies," and the "Indian Emperor," in which he diſplayed a facility of harmonious verſification, and a ſplendour of poetic diction: while his "Eſſay on dramatic Poeſy" exhibited him as an elegant writer in proſe, and an able and ingenious critic. About the year 1665, he married lady Elizabeth Howard, daughter of the earl of Berkeley, a connection which promiſed more advantages than really reſulted from it. In 1667, Dryden added to his fame, by the publication of his "Annus Mirabilis," for which the ſubjects were the fire of London, and the war with the Dutch. He now engaged, under certain conditions, with the managers of the king's theatre, to ſupply them with three plays annually. His profits under this joint concern have been eſtimated at nearly 400*l.* a-year, and were probably the principal part of his income. On the death of ſir William Davenant, in 1668, he obtained the office of poet-laureat, and ſoon after the ſinecure place of hiſtoriographer, the joint ſalaries of which produced him 200*l.* *per ann.* For ſome defects in his ſtyle as a tragedian, he was attacked under the name of Bayes, in the "Rehearſal." This ſatire was written by Villiers, duke of Buckingham, in conjunction with other wits of the time. Dryden felt the laſh which the burleſque drama meant to inflict, and candidly acknowledged that ſeveral of the ſtrokes contained in it were truly appropriate. In 1679 Dryden himſelf became a ſatyriſt, but his "Eſſay" provoked from lord Rocheſter a ſevere retaliation by the hands of ruffians hired by his lordſhip to inflict on the poet a cudgelling, as he was returning from the coffee-houſe. In 1681, by the royal command, Dryden wrote his celebrated poem of "Abſalom and Achitophel," which was an application of the events in the life of David, king of Iſrael, to the reign of his own ſovereign Charles II., relative to the duke of Monmouth and the earl of Shafteſbury. This work was eagerly read, and as it raiſed him very high in the eſtimation of the court, ſo it involved him in irreconcilable enmity with its opponents. The hatred was greatly increaſed by his "Medal, a ſatire on ſedition," written the ſame year, on occaſion of a medal ſtruck by the whig party, when a grand jury returned *ignoramus* to an indictment preferred againſt lord Shafteſbury for high treaſon.

Dryden next tried his powers in literary ſatire, by the publication of a piece entitled "Mac-Flecknoe," which was written in ridicule of an unequal rival, Shadwell. From this, which cannot well be juſtified by the poet's warmeſt admirers, we turn to his more ſerious poem, the "Religio Laici," which appeared in the ſame year. Its purpoſe is to give a compendious view of the arguments for revealed religion, and to aſcertain in what the authority of revelation eſſentially conſiſts. Soon after this, he ceaſed to write for the ſtage, but he was then deeply involved in his pecuniary circumſtances, and ſolicited moſt earneſtly any employment, either in the cuſtoms or exciſe, that might be vacant, on the ſcore of abſolute neceſſity. "I have," ſays he, "three ſons, growing to man's eſtate. I breed them all to learning beyond my fortune, but they are too hopeful to be neglected, though I want.—I am going to write ſomewhat by his majeſty's command, and cannot ſtir into the country for my health and ſtudies, till I ſecure my family from want." The caſe of Dryden, like a thouſand ſimilar caſes, proved that real want was not the beſt recommendation to the affluent: his petition was unheeded, and he obtained from thoſe Mœcenaſes of the age, the bookſellers, that patronage which an ungrateful monarch refuſed to beſtow, upon his needy, but very faithful poet and friend.

Soon after the acceſſion of James II., Dryden conformed to the religion of the king, in the profeſſion of which he continued till his death. Whether this important change be imputable to conviction, or to a deſire of the royal favour, has been a ſubject of much diſpute. It is, however, certain, that he never ſeems to have regarded the buſineſs of religion with that attention which its importance demands, and on this account, probably, thought the difference between the proteſtant and catholic faith of no great moment. He obtained from the new king an additional penſion of 100*l.* as a reward of his ready compliance; to which was annexed, it is ſuppoſed, a condition that he ſhould employ his pen in defence of the religion which he embraced, and he faithfully performed his part of the contract. The revolution, in 1688, deprived the poet of all his poſts and penſions, and the laureateſhip was beſtowed upon his rival Shadwell, to the no ſmall mortification of Dryden, and not a little to the diſgrace of thoſe who could ſnatch it from a poet of extraordinary merit, to give it to a man who poſſeſſed no qualification worthy of the office.

Dryden, now advanced in life, was obliged to depend wholly upon his own exertions for a ſecurity from abſolute indigence. Fortunately for him, his faculties were equal to his wants, and what is very ſurpriſing, the pieces which he wrote during the laſt ten years of his life, for actual ſubſiſtence, were thoſe which have moſt contributed to immortalize his name. Among theſe were his tranſlations of Juvenal and Perſius, and Virgil; by the latter he gained about 1300*l.*, it being publiſhed by ſubſcription. Soon after the publication of his Virgil, he was ſolicited by the ſtewards of the muſical celebration of St.-Cecilia's day, to write a ſecond ode for the purpoſe: he had written the firſt in 1687. This requeſt produced his celebrated "Alexander's Feaſt," the moſt popular of all his compoſitions, and, perhaps, ſays a good writer, it ſtands at the head of all the lyric poems in the Engliſh language. About this period he meditated a tranſlation of Homer, and agreed, as we are told, to furniſh his bookſeller with 10,000 lines for the ſum of 300*l.* His laſt work was a collection of fables, of which the ſubjects are taken from Chaucer, Boccace, Ovid, &c. He died on the firſt of May, 1700, and his body was interred with every mark of reſpect, in Weſtminſter Abbey, where a monument was erected to his memory, by Sheffield, duke of Buckingham: his name alone ſupplied his epitaph.

No modern writer, unleſs Voltaire be an exception, has poſſeſſed equal verſatility of talent with Dryden. For the drama he had no original predilection: the bent of his genius would have impelled him to epic poetry: he wrote plays becauſe he was poor: and that he ever wrote them well muſt be aſcribed to the exuberance of his powers. His theatrical pieces are indeed unequal in the extreme. In ſome he ſinks below criticiſm, in others he ſoars far above it. The plays of Dryden, though never to be entirely approved, are ſtill read and admired, while thoſe of his competitors are mouldering in oblivion. In his heroic plays, Dryden opened a field of compoſition peculiarly his own. In the "Conqueſt of Grenada," he delights by the diverſity of his characters, the vivacity of his deſcription, the eloquence of the language, and occaſionally the ſublimity of the ſentiments. What he has produced is not ſo much a drama as an epic romance, and it has been the ſubject of regret that he had not leiſure to produce a poem on a plan ſo conſonant to his genius. "In his "Don Sebaſtian," ſays an elegant writer, "he has rivalled Corneille: in his "Anthony and Cleopatra," he has caught a portion of Shakſpear's ſpirit, and employed it better than his maſter: in his "Spaniſh Fryar," he has given the happieſt example of a double plot, and in every reſpect, but morals, of a perfect play. In the drama, therefore, if Dryden ſometimes fell ſhort of his own powers, he commonly proves ſuperior to other men; as an original poet he is yet more to be praiſed. Perhaps no individual writer ever contributed ſo largely to poliſh and refine a language: in ſatire he was a maſter: his "Medal;" his "M'Flexnoe," and his "Abſalom," are all original treaſures which have enriched ſucceeding writers: his characteriſtic excellencies are verſatility and ſtrength; his faults are innumerable, but they are redeemed by the originality and energy of his conceptions. As a tranſlator, he deſerves much blame as well as praiſe. His genius aſſimilated better with Juvenal and Perſius than with Virgil. His fables are not the leaſt pleaſing of his performances: his "Alexander's Feaſt," which alone might have immortalized his name, was among the lateſt of his productions. Such an acceſſion of valuable poetry no other writer has ſupplied to our language: but his merits are not limited to poetical compoſitions; in his various prefaces, and in his "Eſſay on Dramatic Poetry," he has eſtabliſhed his reputation as a proſe writer. The inequalities ſo obvious in his verſe are not diſcovered in his proſe; he is uniformly graceful and elegant; always animated and various, and ſometimes eloquent. To compare Dryden with Pope would be invidious: the latter could not have written ſo well, had not the former written before him. Under Dryden's auſpices, Congreve wrote for the ſtage: emulous of his genius, Pope liſped in numbers, for the numbers came; Bolingbroke caught the glow of Dryden's fancy; and Addiſon learnt from him to conſtruct ſentences with that exquiſite felicity which eludes cenſure, and baffles imitation."

In private life Dryden was cold and reſerved; yet he was friendly and humane. Though his pen was extremely licentious, his manners were decently regular. He was domeſtic in his habits, and affectionate towards his family. With a due ſenſe of his own ſuperior merit, he was ſenſible of his defects and patient under criticiſm. Biog. Brit. Johnſon. Hiſt. of Knowledge, in New Ann. Regiſter.

Our great bard, beſides his dramatic works for declamation, ſingle poems of length, occaſional verſes, epiſtles, fables, elegies, prologues, epilogues, epitaphs, and tranſlations, is well entitled to eulogy as a lyric poet; having not only written innumerable ſongs; "Alexander's Feaſt," and another "Ode for St. Cecilia's Day," but ſeveral dramas expreſsly for muſic: as, "The State of Innocence, or, Fall of Man," an opera; "Albion and Albanius," ditto; "King Arthur, or the Britiſh Worthies," a dramatic opera; and the "Drama of Diocleſian," written originally by Beaumont and Fletcher, which he formed into an opera for Purcell.

Though the State of Innocence is formed into an opera, it can hardly be called a lyric poem: it is written in regular heroic verſe, and in rhyme. There is, indeed, much machinery and pictureſque and inſtrumental muſic planned; but in the two firſt acts not a ſingle ſtanza calculated to form an air or duet. There is, indeed, a dance of devils, among other amuſements, between the firſt and ſecond acts; and it is ſaid in the inſtructions, that they may ſing a ſong expreſſive of the change of their condition, from what they once enjoyed, and how they fell bravely in battle, having deſerved victory by their valour, and what they would have done had they conquered. In the third act only devils ſing, diſguiſed like angels. There is no ſong or vocal muſic in the fourth act. In the laſt ſcene of the fifth act, ſoft muſic and a ſong are mentioned; but for which no words are provided. Eve's laſt ſpeech, however, might be ſet and ſung, as an adieu to the joys of paradiſe.

This drama, framed from Milton's Paradiſe Loſt, was never brought on the ſtage, or even ſet to muſic, as we have been able to diſcover. Nor do we know whether the dialogue was intended for recitative or declamation. The author, while he has endeavoured to preſerve the beautiful, bold, and daring ſentiments of Milton, quitting blank verſe, and Milton's epic ſtyle, has dreſſed his thoughts in his own melodious, powerful, and happy verſification.

Throughout the preface to his next opera, as it is called, "Albion and Albanius," Dryden, in his uſual manner, diffuſes entertainment and inſtruction; and though he probably had never ſeen or heard a ſingle ſcene of an Italian opera performed, his definition of that ſpecies of drama, and precepts for its conſtruction and perfection, are admirable, and in many reſpects ſtill applicable to ſimilar exhibitions.

"An opera," ſays he, "is a poetical tale, or fiction, repreſented by vocal and inſtrumental muſic, adorned with ſcenes, machines, and dancing. The ſuppoſed perſons of this muſical drama are generally ſupernatural, as gods and goddeſſes, and heroes, which at leaſt are deſcended from them, and in due time are to be adopted into their number. The ſubject, therefore, being extended beyond the limits of human nature, admits of that ſort of marvellous and ſurprizing conduct, which is rejected in other plays. Human impoſſibilities are to be received, as they are in faith; becauſe, where gods are introduced, a ſupreme power is to be underſtood, and ſecond cauſes are out of doors: yet propriety is to be obſerved even here. The gods are all to manage their peculiar provinces; and what was attributed by the Heathens to one power, ought not to be performed by any other. If the perſons repreſented were to ſpeak on the ſtage, it would follow of neceſſity, that the expreſſions ſhould be lofty, figurative, and majeſtical; but the nature of an opera denies the frequent uſe of theſe poetical ornaments; for vocal muſic, though it often admits a loftineſs of ſound, yet always exacts a melodious ſweetneſs; or to diſtinguiſh yet more juſtly, the recitative part of an opera requires a more maſculine beauty of expreſſion and ſound: the airs muſt abound in the ſoftneſs and variety of numbers; their principal intention being to pleaſe the hearing, rather than to gratify the underſtanding. As the firſt inventors of any art or ſcience, provided they have brought it to perfection, are, in reaſon, to give laws to it; ſo whoſoever undertakes the writing an opera, is obliged to imitate the Italians, who have not only invented, but perfected this ſort of dramatic muſical entertainment. We know that for ſome centuries, the knowledge of muſic has flouriſhed principally in Italy, the mother of learning and of arts; that poetry and painting have been there reſtored, and ſo cultivated by Italian maſters, that all Europe has been enriched out of their treaſury.

"It is almoſt needleſs to ſpeak any thing of that noble language, in which this muſical drama was firſt invented and performed. All who are converſant in the Italian, cannot but obſerve, that it is the ſofteſt, the ſweeteſt, the moſt harmonious, not only of any modern tongue, but even beyond any of the learned. It ſeems, indeed, to have been invented for the ſake of poetry and muſic; the vowels are ſo abounding in all words, and the pronunciation ſo manly and ſo ſonorous, that their very ſpeaking has more of muſic in it than Dutch poetry or ſong. This language has in a manner been refined and purified from the Gothic, ever ſince the time of Dante, which is above four hundred years ago; and the French, who now caſt a longing eye to their country, are not leſs ambitious to poſſeſs their elegance in poetry and muſic; in both which they labour at impoſſibilities: for nothing can be improved beyond its own ſpecies, or further than its own original nature will allow: as one with an ill-toned voice, though ever ſo well inſtructed in the rules of muſic, can never make a great ſinger. The Engliſh have yet more natural diſadvantages than the French; our original Teutonic conſiſting moſt in monoſyllables, and thoſe incumbered with conſonants, cannot poſſibly be freed from thoſe inconveniences."

He tells us, that "this opera was only intended as a prologue to a play of the nature of the "Tempeſt;" which is a tragedy mixed with opera, or a drama written in blank verſe, adorned with ſcenes, machines, ſongs, and dances; ſo that the fable of it is all ſpoken and acted by the beſt of the comedians; the other part of the entertainment to be performed by the ſame ſingers and dancers who are introduced in this preſent opera." The tragedy here alluded to was "King Arthur," which was not performed till about the year 1690.

By dramatic opera, Dryden, and writers of his time, mean a drama that is declaimed or ſpoken, and in which ſongs and ſymphonies are introduced; differing from real operas, where there is no ſpeaking, and where the narrative part and dialogue is ſet to recitative. And this is the plan that has of late years been ſo ſucceſsfully followed by Bickerſtaff and others, in the comic-operas that have appeared on the Engliſh ſtage. To ſay the truth, though recitative was tolerated in Dr. Arne's Artaxerxes in favour of the airs, ſung by favourite ſingers, we have properly no *national recitative*, which, in action, is not languid, or ridiculous.

In the epiſtle dedicatory to his third opera, "King Arthur," to the marquis of Hallifax, the poet makes a very candid, liberal, and unuſual conceſſion to the muſician, Purcell, who compoſed the opera, by ſaying that "theſe ſorts of entertainment are principally deſigned for the ear and eye; and therefore in reaſon my art on this occaſion ought to be ſubſervient to his."

Dryden, no muſician himſelf, ſeems to have been more ſenſible to the charms of muſic, than any of our poets of the higher claſs, except Milton and Maſon, who knew what they were talking about. Burney.

DRYERS, in *Painting*, are ſubſtances, ſo called from their uſe in remedying the fault of oils, which dry too ſlowly. See *Drying* Oil.

DRYINAS, *Oak-ſnake*, in *Zoology*, a ſpecies of *Crotalus;* which ſee.

DRYITÆ, in *Ancient Geography*, a people of Africa, in Mauritania Cæſarienſis, placed by Ptolemy on mount *Durdus*. —Alſo, a people of the iſle of Crete.

DRYITES Lapis, in *Natural Hiſtory*, a name given by authors to a ſubſtance but ill deſerving the name of a ſtone; it being only foſſile wood found in detached maſſes. There is much of this foſſile wood found in Italy, on the banks, and on the ſhores of rivers. We know alſo by what we ſee of the foſſile wood of England, that it may be found in all degrees of petrifaction, from that of almoſt unaltered wood, to abſolute ſtone, or mineral matter, with only the ſuperficial grain of wood. See *Foſſile* Wood.

DRYMA, or Dryme, in *Ancient Geography*, a town of Africa, in Libya, the *Adryma* of Strabo, ſuppoſed to be the ſame with *Adrumetum*.

DRYMÆA, Drymos, or *Drymus*, a town of Greece, in the Phocide, on the banks of the Cephiſſus, N.E. of mount Parnaſſus, and 20 ſtadia from mount *Tithronium*. In this place was an ancient temple, dedicated to Ceres Theſmophora, or Legiſlatrix, in which was celebrated an annual feaſt. The ſtatue of the goddeſs was of marble. Pauſanias ſays that the inhabitants of this town were anciently called *Nauboliani*. It is called *Drymia* by Steph. Byz., and Pliny denominates its territory *Drymia* and *Daulis*.

DRYNESS *of a Place*, means the ſtate of that place with reſpect to the want of moiſture; and, ſince dry and moiſt, dry and damp, dry and wet, are relative terms, a place A may be ſaid to be dryer than another place B; or the place B may be ſaid to be moiſter than the place A, and the meaning of both expreſſions is exactly the ſame. There is no place upon the ſurface of the earth which is perfectly dry, and there is none that may be called perfectly damp, unleſs it were entirely covered by water. The philoſophical inſtrument, which meaſures and indicates the actual degree of dryneſs, or of moiſture, is called an hygrometer, and a vaſt variety of hygrometers have been contrived and uſed; but they are moſtly imperfect. The beſt hygrometers at preſent known, are thoſe of Mr. De Luc, and Mr. Sauſſure. (See the article Hygrometer.) The general principle upon which hygrometers act is as follows:

A ſlender piece of animal, or vegetable ſubſtance, capable of abſorbing and of yielding moiſture with readineſs, and likewiſe capable of expanding itſelf, more or leſs, in proportion to the quantity of moiſture, (of which there is a great number,) is fixed in a proper frame of metal, or wood, or glaſs, &c. and by means of a graduated ſcale, its expanſion is ſhewn to the obſerver; and ſince this expanſion is nearly proportional to the degree of moiſture in the hygrometrical ſubſtance, which is not materially different from the moiſture of the ſurrounding air; therefore, the degree of expanſion of the hygrometrical ſubſtance, indicates the contemporary moiſture of the ſurrounding air. But the more general defects of hygrometers are, 1ſt, that the points of extreme moiſture and extreme dryneſs, or the utmoſt expanſion and contraction of the hygrometrical ſubſtance, cannot be fixed on many of them; and, 2dly, that even in the beſt hygrometers, the animal, or vegetable hygrometrical ſubſtance, is apt to alter its degree of expanſion and contraction in the courſe of no great length of time; hence, two or more hygrometers, made upon the very ſame principle, even by the ſame workmen, but at different times, will hardly ever be found to agree, when placed in the ſame ſituation, and exactly in the ſame circumſtances. The hygrometers of De Luc and Sauſſure, though ſuperior to all the others, are not quite free from this imperfection. In conſequence of theſe defects, and of the recent invention of the two laſt mentioned hygrometers, we have not a great number of periodical hygrometrical obſervations made in different countries; whence, the comparative dryneſs of different places might be determined. It is not from the obſervations of one or two years, that a tolerably good eſtimate of the dryneſs of a particular place may be derived. A mean of ſeveral years conſtant obſervation, is the only approximation that can be depended upon. Notwithſtanding theſe defects and theſe difficulties, the dryneſs of places frequently forms the ſubject of common converſation, and common inquiry ; for, in truth, the real ſtate of it is a matter of no ſmall conſequence to the welfare of the human ſpecies.

The dryneſs, or moiſture, of a particular ſpot, ariſes from a variety of circumſtances, which muſt be all taken into conſideration, in order to form a proper eſtimate ; and, after all, at leaſt in the preſent ſtate of knowledge, the real ſtate of any particular ſpot, with reſpect to dryneſs, or moiſture, may, with more confidence, be derived from viſible effect in common occurrences, than from the meteorological journal. The common occurrences we allude to, are the uſual colour of vegetables ; their growing more or leſs readily upon walls, houſes, trees, &c. ; the frequent moiſture of common ſalt, and ſo forth.

The average quantity of rain which falls upon a country throughout the year, is by no means a ſure indication of the nature of that country with reſpect to dryneſs ; for, if the rains fall ſeldom, though in abundance, the place may be much dryer than if the rain fell frequently and ſlightly. In the former caſe, the great quantity of rain-water is abſorbed, or drained, or evaporated ; and not long after the place may be remarkably dry. In the latter caſe, the ſmall quantity of rain which falls at one time is hardly evaporated, or abſorbed, before more rain comes down, and thus a ſucceſſion of moiſture is kept up. Dr. Huxham obſerves, that ſmall rains keep the air moiſt, while heavy ones render it drier, by beating down vapours. The perpendicular height of water which falls at Barbadoes in one year, meaſures 67 inches (a remarkably great quantity) ; yet the air of that iſland is by no means reckoned damp. In India, the air generally is ſo remarkably dry, as to abſorb moiſture, with ſurpriſing quickneſs, from whatever is expoſed to it ; yet, during the rains, *viz.* the period during which the rain falls almoſt inceſſantly, the water that falls, and the copious evaporation of that which has fallen, render the air ſo very damp, as to looſen all ſorts of furniture that are faſtened by means of glue, and the hygrometer nearly points to extreme moiſture. See the article Rain.

The dews, which fall much more abundantly upon certain places than upon others, contribute, at leaſt for a particular time, to moiſten the air of the place. See the article Dew.

Numerous plants, cloſely growing, contribute to the dampneſs of the place ; 1ſt, becauſe they themſelves evaporate abundance of water ; 2dly, becauſe they prevent the rays of the ſun, and the action of the winds, having any effect upon the ground below them.

In general, warm countries, *viz.* thoſe which are ſituated near the torrid zone, when they are not ſurrounded by marſhes, are drier than thoſe which lie nearer to the poles of the earth ; excepting, however, in a hard froſt.

Iſlands, and eſpecially ſmall ones, moſtly are leſs dry than continental tracts. And valleys, together with other places that lie cloſe to hills, mountains, &c. generally are leſs dry than thoſe which ſtand in open countries. About the latitude of Great Britain, thoſe places which lie cloſe to the weſtern ſhores, are leſs dry than thoſe which are otherwiſe ſituated.

The winds which are predominant in any particular country, influence, in a conſiderable degree, the dryneſs of the place ; for, according as they moſtly come from the ſea, or from the land, from the north, or from the ſouth, or elſewhere, ſo they bring dry, or moiſt air with them.

In no place does the hygrometer ever reach the points of extreme dryneſs, or of extreme moiſture ; excepting, indeed, when it is improperly ſituated. In London, the mean annual altitude of the hygrometer ſeems to be about 82° ; the whole ſcale between the points of extreme dryneſs and extreme moiſture being divided into 100 degrees.

The movements of the hygrometer indicate the changes of dryneſs to moiſture, and *vice verſâ*, in the ſurrounding air, with ſufficient quickneſs. And from the joint movements of the hygrometer and the barometer, the approaching change of weather may frequently be foreſeen. When the barometer falls, and the hygrometer riſes, rain is at hand. When the barometer riſes, and the hygrometer falls, we may expect fair weather.

Dryneſs, *Extreme Point of*, means a total privation of moiſture. But upon the ſurface of the earth a place ſo circumſtanced does not occur ; for the air, in its natural ſtate, is always more or leſs combined with aqueous vapour ; and hot air holds in ſolution a greater quantity of water, than an equal bulk of colder air can do ; ſo that heated air has a greater drying power, becauſe the additional heat has rendered it capable of diſſolving more water ; whence, it evidently appears, that heating is not one of the means by which air may be deprived of its moiſture ; yet, (in conſequence of the above-mentioned circumſtance,) it is the moſt effectual method of drying other things.

The only method of depriving air of its moiſture, to a very conſiderable degree, if not entirely, is to expoſe a given quantity of it to ſuch ſubſtances as abſorb water with great avidity. Strong ſulphuric acid, hot cauſtic alkalies, and quick-lime recently calcined, have each of them the property of abſorbing the humidity of the air. There are other ſubſtances which likewiſe poſſeſs the ſame power, though not in an equal degree, or which may not be uſed with equal conveniency. For this purpoſe, the air muſt be confined into a veſſel, ſo as to have no communication with the external air, and the ſubſtance which is to abſorb its moiſture, muſt then be introduced to it.

This operation is not frequently required in philoſophical experiments ; and the principal uſe to which it is at preſent applied, is to ſettle the point of extreme dryneſs in the conſtruction of hygrometers ; and this is accompliſhed in the following manner: About 10, 15, or 20 pounds weight of quick-lime juſt burned, are placed in an oblong tin veſſel, the capacity of which exceeds the bulk of the lime. On one ſide of this veſſel, and againſt its empty ſpace, there is a pane of glaſs, through which one may ſee what paſſes within the veſſel. Now, when the veſſel has been charged with the lime, the hygrometers which are finiſhed, ſo far as to want only the graduation of the ſcale, are placed within the tin veſſel, and exactly behind the pane of glaſs. The lid of the veſſel is then put on, and is waxed, or cemented down, in order to prevent any paſſage of air either in or out of the veſſel. In this ſituation, the whole is left undiſturbed for ſeveral days, during which the movements of the indexes of the hygrometers are obſerved daily through the pane of glaſs. In proportion as the lime abſorbs the moiſture of the air, the index of each hygrometer is ſeen to deſcend ; but, after a certain period, they become ſtationary ; and that point at which the index of each hygrometer ſtops, gives the point of extreme dryneſs which is there marked, (for which purpoſe a few arbitrary marks are made upon the undivided ſcales of the inſtruments before they are confined within the tin veſſel.) The point of extreme moiſture is afterwards determined, by placing the hygrometer under water. And the diſtance between thoſe two extreme points is divided into a hundred equal parts, called *degrees*.

In the above-deſcribed operation, quick-lime has been preferred, principally on account of its continuing to abſorb moiſture gradually, but for a very long time. For farther particulars relative to the conſtruction and the uſe of this veſſel with quick-lime, ſee the article Hygrometer.

DRYOPA, in *Ancient Geography*, a town of the Peloponneſus, in the Argolide, near Hermione. Steph. Byz.

DRYOPEIA, Δρυοπεια, in *Antiquity*, an anniverſary day, obſerved in memory of Dryops, one of Apollo's ſons.

DRYOPIS, in *Ancient Geography*, a country of Greece, ſituate in the vicinity of Mounts Oeta and Parnaſſus, and ſo called, as it is ſaid, from Dryope, the daughter of Eurypylus, or, as the poets feign, a nymph raviſhed by Apollo; but more probably from δρυς, an oak, and οψ, voice, on account of the number of oaks that grew about the mountains and the ruſtling of their leaves. The Dryopes, however, valued themſelves much upon their fabulous origin, and called themſelves the ſons of Apollo; and therefore, Hercules, having overcome this people, carried them priſoners to Delphos, where he preſented them to their divine progenitor, who commanded that hero to take them with him into Peloponneſus. Hercules obeyed, and gave them a ſettlement there, near the Aſinean and Hermionian territories; hence the Aſinæans came to be blended with and to call themſelves Dryopes. Pauſanias, in Meſſen.

DRYOPTERIS, in *Botany*, from Δρυς, the *oak*, and πτερις, a *fern*, ſee Polypodium. Tragus ſeems the firſt modern writer who gave this name to what is now *Polypodium Dryopteris*; but the celebrated Polypody of the Oak is, with Engliſh pharmacologiſts, merely *P. vulgare* happening to grow in that ſituation, which has been ſuppoſed to encreaſe its reputed medical virtues. The Δρυοπτερις of Dioſcorides is deſcribed by him as a fern with very finely cut leaves, growing on old moſſy oaks, and may as probably be the plant of Tragus as any other.

DRYPIS, (Δρυπις of Theophraſtus, ſo called from δρυπτω, *to tear*, appears to have been a thorny leafleſs ſhrub, not now to be aſcertained. Anguillara firſt applied this ancient name to the plant before us, and was followed by Lobel, Gerarde, and Linnæus. It is perhaps the only plant for which the latter quotes Gerarde's herbal.) Linn. Gen. 150. Schreb. 202. Willd. Sp. Pl. v. 1. 1513. Mart. Mill. Dict. v. 2. Juſſ. 303. Gærtn. t. 128. Claſs and order, *Pentandria Trigynia*. Nat. Ord. *Caryophylleæ*.

Gen. Ch. *Cal.* Perianth of one leaf, tubular, divided half way down into five ſegments, permanent. *Cor.* Petals five; their claws narrow, the length of the calyx; borders flat, deeply divided into two linear blunt ſegments, and crowned at the baſe with a pair of ſmall teeth to each petal. *Stam.* Filaments five, as long as the corolla; anthers ſimple, oblong, incumbent. *Piſt.* Germen ſuperior, obovate, compreſſed; ſtyles three, ſimple, ſpreading; ſtigmas ſimple. *Peric.* Capſule roundiſh, clothed with the calyx, ſmall, of one cell, cut all round. *Seed* ſolitary, kidney-ſhaped, poliſhed with ſpiral cotyledons and embryo.

Eſſ. Ch. Calyx with five teeth. Petals five, cloven, crowned. Capſule burſting all round, of one cell. Seed ſolitary.

D. *ſpinoſa*. Linn. Sp. Pl. 390. Jacq. Hort. Vind. v. 1. 19. t. 49. (Drypis; Ger. em. 1112. D. italica aculeata, floribus albis umbellatim compactis; Mich. Gen. 24. t. 23, badly copied in Lamarck t. 214.) This is the only known ſpecies, nor can any plant conſtitute a more natural genus, though it belongs to ſo very natural an order. It grows in Barbary, Italy, and ſeveral parts of the Levant. Dr. Sibthorp gathered the *Drypis* on mount Parnaſſus; ſee Prod. Fl. Græc. v. 1. 209. Jacquin communicated it to the Kew garden in 1775. The *root* is biennial. *Stems* decumbent at the baſe, then aſcending, ſquare; branched in an oppoſite manner. *Leaves* oppoſite, ſeſſile, awl-ſhaped, pungent; thoſe on the main ſtem having often two or three ſpinous ſegments or teeth on each ſide, while thoſe on the branches are all undivided and entire. The ſtem terminates in a forked leafy *panicle*. *Flowers* ſeſſile, white or purpliſh, reſembling thoſe of a *Stellaria*. The whole herb is ſmooth, and of a pale rather glaucous green. Aſſes are ſaid by Micheli to be fond of it.

DRYS, in *Ancient Geography*, a town of Thrace.—Alſo, a town of Italy, in Oenotria.—Alſo, a town of Greece, in Epirus.—Alſo, a trading ſea-port town of Aſia Minor, in Bithynia, over-againſt Nicomedia; it was one of the fauxbourgs of the town of Chalcedon; and was alſo called *Rufiniana*.

DRYSDALE, John, D. D. in *Biography*, a diſtinguiſhed clergyman of the eſtabliſhed church of Scotland, was the third ſon of the Rev. John Dryſdale, miniſter of Kirkaldy; at which place Dr. Dryſdale was born, on the 29th of April, in the year 1718. The elementary parts of claſſical learning he received under Mr. Miller, who kept a ſchool in that town; and had among his contemporaries the learned Dr. George Kay, and the celebrated Dr. Adam Smith. In 1732, he was ſent to finiſh his ſtudies at the univerſity of Edinburgh; and in the year 1740, was licenſed to preach by the preſbytery of Kirkaldy. Taking holy orders, he was ſeveral years aſſiſtant miniſter of the collegiate church in Edinburgh, and in 1748 was preſented to the church of Kirkliſton. After reſiding there for fifteen years, he was preſented to lady Yeſter's church, by the town council of Edinburgh. This being the firſt inſtance in which the magiſtrates of that city had exerciſed their right of preſentation, and Mr. Dryſdale being ſuſpected of favouring in his diſcourſes the *Arminian* tenets; a formidable oppoſition was made to his inſtitution; but the magiſterial party proving victorious, he obtained a ſettlement in lady Yeſter's church. And the ſermons he delivered there, ſays profeſſor Dalzel, always attracted a great concourſe of hearers, whom he never failed to delight and inſtruct, by an eloquence of the moſt nervous, and intereſting kind. His natural diffidence for ſome time prevented his appearing as a ſpeaker in the eccleſiaſtical judicatories; but he was at length induced to co-operate with Dr. Robertſon, in defence of what is termed the *Moderate Party*, in the church of Scotland. In 1765, the univerſity of Aberdeen, unſolicited, conferred upon him the honorary degree of doctor in divinity; and on the death of Dr. Jardine, he was preferred to the church of Tron, and appointed a king's chaplain, with the allowance of one-third the emoluments ariſing from the deanery of the chapel royal. In 1773, having obtained the character of an able and impartial divine, he was unanimouſly elected moderator of the general aſſembly of the Scottiſh kirk; "the greateſt mark of reſpect," obſerves his biographer, "which an eccleſiaſtical commonwealth can beſtow." In 1784, he was re-elected by a great majority, and again raiſed to the ſame dignity. In May, 1788, he appeared at the general aſſembly, and, the firſt day, acted as principal clerk, but was taken ill, and died on the 16th of June following, aged 70 years. His general character was that of benevolence and inflexible integrity. His candour obtained him many friends; and even ſuch as were of different ſentiments in church affairs, and held different religious tenets, eſteemed the man, and with theſe he kept up a friendly intercourſe. "Indeed," adds the profeſſor, "never any man more ſucceſsfully illuſtrated what he taught by his own conduct and manners." His reputation as a preacher was very great; and, on an occaſional viſit he made to London, Mr. Strahan endeavoured to perſuade him to publiſh a volume of ſermons. On his return to Scotland he began a ſelection for the purpoſe, but his modeſty hindered his proceeding, and induced him, finally, to relinquiſh the plan. After his death, his friend, profeſſor Dalzel, who had the inſpection of his manuſcripts, made a ſelection of his ſermons, and publiſhed them in two octavo volumes, with biographical anecdotes of his life, from whence this account has been extracted.

DRYSWIATY, in *Geography*, a town of Lithuania, in the palatinate of Wilna; 16 miles S. W. of Braſlaw.

DRZEWICZE, a town of Poland, in the palatinate of Sandomir; 24 miles W. N. W. of Sandomir.

DSAPRONG, or Tchaprong, a town of Aſia, in the country of Thibet, on the Lantchau; 345 leagues W. of Laſſa.

DSARIN, a lake of Thibet, about 12 leagues in circumference. N. lat. 32° 10′. E long. 77° 24′.

DSATCHOU, or Tsatchou, or *Saichou*, a river of Aſia, which riſes in Thibet, and paſſes into the Chineſe province of Yun-nan, where it aſſumes the name of *Lan-tſan*; and after croſſing the province of Yun-nan, it is called *Kiou-long*.

DSEPTONG, or Septong, a town of Aſia, in Thibet; 8 leagues W. N. W. of Rimbou.

DSJABBE-Tar, a ſmall iſland of Arabia, in the Red ſea, about 40 miles W. S. W. of Loheia. N. lat. 15° 32′. E. long. 41° 35′.

DSJABBEL, a ſmall iſland in the Red ſea, about 8 leagues from the coaſt of Arabia. N. lat. 14° 4′. E. long. 43° 34′.

DSJALIE, a town of Arabia; 24 miles S. E. of Loheia.

DSJAR, a town of Arabia; 80 miles S.W. of Medina.

DSJEBI, a town of Arabia, in the country of Yemen, 56 miles E. of Hodeida. N. lat. 14° 54′. E. long. 43° 40′. To this town belongs a diſtrict of conſiderable extent, in which are a number of independent ſcheiks. This diſtrict forms with that of Kuſma the country of Rema, which is a fertile tract, abounding chiefly in grapes and coffee, and with reſpect to external appearance, ſoil, and production, poſſeſſing the ſame character with Kuſma.

DSJELLEDI, a town of Arabia, in the country of Yemen; 24 miles E. S. E. of Chamir.

DS JERENANG, in *Botany*, a name by which ſome authors have called a ſpecies of palm-tree, from the fruit of which is procured dragon's blood. Kæmpfer, Amœn. Exot. p. 552.

DSJOBLA, in *Geography*, a town of Arabia, in the country of Yemen; 60 miles N.E. of *Mocha*. This town is the capital of a diſtrict, and the ſeat of a dola. It ſtands upon the brink of a ſteep precipice, and contains about 600 houſes, of a conſiderable height and good appearance. Its ſtreets are paved, which is not common in Arabia. The Jews, in this place, and through the whole country of Yemen, inhabit a ſeparate quarter, without the city. This is a place of ancient note, and exhibits the ruins of ſome moſques. It has neither a caſtle nor walls. At ſome diſtance is a place incloſed with walls, where a Turkiſh pacha has been interred: whence we may infer, that the conqueſts of the Ottoman Porte have been extended even over theſe mountainous regions.

DSJOF, an extenſive diſtrict of the province of Yemen, in Arabia, reaching ſouthward from Nedsjeran to Hadramaut, and eaſtward from Haſchid-u-Bekil to the Deſart, by which Yemen is ſeparated from Oman. It abounds with deſart and ſandy plains; nevertheleſs, in ſeveral places, the inhabitants want neither cheeſe, nor durra, nor any other neceſſaries of life. The horſes and camels of Dsjof are much valued in the Imam's dominions. This country is divided into Bellad-el-Bedoui, a diſtrict occupied by wandering Arabs; Bellad-es-Saladin, the highland diſtrict, governed by independent chiefs, who aſſume the title of ſultan; and Bellad-es-Scheraf, the diſtrict in which the ſupreme power is poſſeſſed by ſheriffs.

The wandering Arabs of this country are of a martial character; and in their military expeditions they ride upon horſes or camels. Their arms are a lance, a ſabre, and ſometimes a match fire-lock. Sometimes they put on coats of mail, a piece of defenſive armour, which the other Arabs have ceaſed to wear. They are troubleſome to their neighbours, who are ſettled in villages, plundering them, and often carrying away their young women. But though they are robbers, they are not ferociouſly cruel. Theſe Bedouins of Dsjof are ſaid to have uncommon talents for poetry, and to excel all the other Arabs in this elegant art. In the diſtrict of Bellad-es-Saladin are many petty ſovereigns. The title of ſultan is no where uſed in Arabia, except in Dsjof and Jafa; and it ſeems to diſtinguiſh the ſcheiks of the Highlanders from thoſe of the Bedouins. The moſt conſiderable princes in the diſtrict of Bellad-es-Scheraf are the three ſheriffs of Mareb, Harib, and Rachvan. But the firſt, although chief of the deſcendants of Mahomet in this country, poſſeſſes only the town of Mareb, with ſome adjacent villages. (See Mareb.) The only other place in the country of Dsjof, that is at all remarkable, is Kaſſer-el-Nat, a citadel which ſtands upon a lofty hill, and was built by the Hamjare princes.

DSOUKIOAG, a lake of Thibet, 15 leagues in circumference. N. lat. 30° 30′. E. long. 74° 24′.

DSJULFAR, a name given by the Perſians to the principality of Seer in Arabia. See Seer.

DUABOS, Le, a town of the iſland of Cuba; 36 miles E. of Villa-del-Principe.

DUALISM, or Ditheism, an opinion which ſuppoſes two principles, two gods, or two independent uncreated beings, of which one is the firſt cauſe of good, the other of evil. See Manichees.

DUANESBURG, in *Geography*, a poſt-town of America, in the ſtate of New York, and county of Albany; containing 2787 inhabitants.

DUARE, a town of Venetian Dalmatia; 20 miles E.N.E. of Spalatro.

DUARZE, a river of Spain, in the province of Guipuſcoa, which runs into the Orio at Toloſa.

DUATUS Sinus, in *Ancient Geography*, a bay of Arabia Felix. Pliny.

DUAULT-Quelin, in *Geography*, a town of France, in the department of the North Coaſts; 3 leagues N.W. of Roſtrenen.

DUBBA Fettee, a river of Hindooſtan, one of the branches of the Sinde.

DUBBING *a Cock*, cutting off his comb and wattles.

DUBCHESKIAIA, in *Geography*, a town of Ruſſian Siberia, in the government of Tobolſk, on the Eniſei; 164 miles N.N.E. of Eniſeiſk.

DUBDU, or Dubudu, a walled town of Africa, on the farther ſide of the kingdom of Fez, in the province of Shaus or Chaus, near the river Mullavia, ſeated on an eminence, and ſurrounded by fertile vallies. This town, ſuppoſed to have been built by the ancient Africans, was a conſiderable place in the 16th century, when the race of

Merini reigned at Fez. At preſent it contains few inhabitants, though it has a garriſon, and a confidential alcayde to guard the frontier; 80 miles E. of Fez.

DUBEN, anciently *Döbin*, a ſmall town of the kingdom of Saxony, in the circle of Leipſick, ſituated on the river Mulde, 20 miles of Leipſick, on the high road to Wittenberg and Berlin, with a population of about 1300 individuals. It has a flouriſhing woollen cloth manufacture; and a conſiderable quantity of pitch is made in the adjacent extenſive foreſt.

The diſtrict of Düben compriſes, beſides the town, 6 villages and 7 hamlets, containing all together above 3000 inhabitants, and is remarkable for its alum works.

DUBENDORF, a ſmall town of Switzerland, in the canton of Zurich, in the neighbourhood of which, at a place called Oerliken, is a ſpring of mineral water.

DUBENINKEN, a town of Pruſſian Lithuania; 4 miles E. of Goldapp.

DUBENOW, a town of the duchy of Courland; 20 miles S.E. of Seelburg.

DUBICE, a town of Lithuania, in the palatinate of Wilna; 20 miles W.N.W. of Lida.

DUBIECZ, a town of Poland, in the palatinate of Lemberg; 52 miles W. of Lemberg.

DUBINKY, a town of Lithuania, in the palatinate of Wilna; 24 miles N. of Wilna.

DUBITATIVE CONJUNCTIONS. See CONJUNCTION.

DUBITZA, in *Geography*, a ſmall town of Boſnia, in Turkiſh Illyricum, in the diſtrict of Banialuck, on the river Unna.

DUBITZA, a town and fortreſs of Croatia, on the Unna; 11 miles N.E. of Kaſtanovitz.

DUBKI, a town of Ruſſia, in the government of Peterſburg, on the gulf of Finland; 16 miles N.N.W. of Peterſburg.

DUBLIN, a county of Ireland, in the province of Leinſter, and nearly in the centre of the eaſtern coaſt. It has Meath on the north; the ſame county and Kildare on the weſt; and Wicklow on the ſouth. It is from north to ſouth 24 Iriſh miles (30½ Engliſh), and from eaſt to weſt 15 (19 Engliſh) miles. It contains in Iriſh meaſure 147,840 acres, or about 231 ſquare miles; and in Engliſh meaſure 237,513 acres, or about 371 ſquare miles. Of this, about an eighth part is waſte and mountain. The number of houſes, as returned in 1792, was 25,510, including the city, which exceeded 14,000; but theſe muſt have increaſed, notwithſtanding the circumſtances which have ſince that period contributed to check population. Reckoning the city at 10 to each houſe, and the reſt of the county at 6, this would give a population of about 210,000, which is leſs than what the city alone has been often eſtimated. There are 108 pariſhes, of which 21 are within the city; ſeveral of the country ones are without churches. This county is not to be claſſed among the moſt fruitful, or the beſt cultivated; and towards the borders of Wicklow, aſſumes the mountainous and rocky character of that county. The remainder is flat and unintereſting, except in the neighbourhood of the ſea-coaſt, which, being broken into bays and creeks, affords many pictureſque and pleaſing proſpects. The ſoil is in general a cold wet clay: but it is not like thoſe deep and tenacious clays ſo common in England; there being ſcarcely any part of it without a mixture of gravel; and in moſt parts there may be found, at no very great depth, lime-ſtone, or other beneficial gravels, with this uncommon advantage, that the operation of draining the ground generally raiſes a ſufficiency of gravel to manure the whole ſurface. Great improvements have been made in many parts of this county, by this practice; and where caution is obſerved in the mode of filling in the drains over the ſods or other materials, with which the drains are conſtructed, the practice, aided by the great facility of procuring manures from Dublin and elſewhere, muſt tend to counteract the bad effects attendant on retentive ſoils. In the northern part of this county, called *Fingal*, the ſyſtem of huſbandry has been ſtigmatiſed as very bad; but, from the efforts of the Dublin Society, and the Farming Society of Ireland, it may be hoped that it will not long deſerve the character given it. The old ſyſtem of *fallowing* ſeems to have been more pertinaciouſly adhered to in this than almoſt any other diſtrict, from its farmers having been formerly in high eſtimation, and having acquired an opinion of their own ſuperiority, which prevents their attending to the ſuggeſtions of others.

The minerals of the county of Dublin are various, but not likely to contribute much to the wealth of the country. The mountains in the ſouthern part conſiſt of granite, which is very uſeful for building, and for paving the ſtreets of the capital. There is alſo abundance of lime-ſtone, lime-ſtone gravel, and marle. Amongſt thoſe which have been reckoned as lime-ſtone is *calp*, or the black quarry ſtone of Dublin, firſt made a diſtinct ſpecies by Mr. Kirwan, and particularly deſcribed by Mr. Knox in the Tranſactions of the Royal Iriſh Academy. (See CALP.) Siderocelcite is often found interſecting and inveſting calp. Copper and lead have been found in this county, and mines of them have been formerly worked; and a lead mine lately diſcovered at the Scalp, near the county of Wicklow, which is likely to prove productive. The principal river of this county is the Liffey, or, as it is ſometimes called, *Anna*, or *Awin*, *i. e.* river *Liffey*, which runs nearly through the middle of it, diſcharging itſelf into the bay of Dublin. A few other ſtreams of no conſiderable note empty themſelves into this river, and have a number of mills for various manufactures. The navigation of the Liffey will be noticed in another place. (See DUBLIN *City*, and LIFFEY.) The Dodder, though next in importance, is a ſmall ſtream, which takes its riſe in the mountains bordering on Wicklow, and running by the villages of Rathfarnham, Milltown, and Donnybrook, diſcharges itſelf into the bay of Dublin at Rings-end. There are other ſmall ſtreams, which run through different parts of the county, and fall into the Iriſh ſea; but they are too inſignificant to be particularly mentioned. But if the county of Dublin cannot boaſt much of its rivers, it may of its canals; for there are two paſſing through it, which contribute greatly to its proſperity, and which for extent, if not for uſefulneſs, may vie with almoſt any in Great Britain. Theſe are the Grand and Royal Canals, of the firſt of which there is a ſhort account in our article CANAL, to which we are now able to add ſome particulars. The Grand Canal was commenced in 1753, by the commiſſioners of inland navigation; and in 1772, a company was incorporated for carrying on and completing it, from Dublin to the river Shannon, with a power of levying a toll of 3*d. per* ton *per* mile. The difficulties to be overcome were, however, ſuch, from the nature of the ground through which the line lay, that, together with ſome miſmanagement, *upwards of one million ſterling* has been expended, of which 116,000 *l.* has been from time to time given by parliament. The length of the canal is 62 Iriſh, or 78½ Engliſh miles, from Dublin to Shannon harbour, on the Shannon near Banagher. There is alſo a branch, of 21 Iriſh miles, to the river Barrow, at Athy, and two or three ſhorter branches, making in all 96 Iriſh, or 122 Engliſh miles, on the different parts of which boats are now conſtantly employed. At Dublin there is a complete floating dock, capable of containing upwards of 400 ſhips, with three large graving docks for repairs. The principal commodities carried on it are flour, malt, wheat, oats, and barley, turf, Kilkenny coal, timber, bricks, furniture, and camp equipage. The number of boats plying on it exceeds 400. The amount of freight in the year 1801 was 120,000 tons, ſince which time it has been completed to the Shannon. When the French landed at Killala, the late marquis Cornwallis found the canal very uſeful for tranſporting his troops without the fatigue of marching, and thus had them freſh for ſervice at a conſiderable diſtance from the capital. There are 56 locks and eight aqueducts on this canal and its branches. The locks are 70 feet long, and 14 feet ſix inches wide. Their average fall is nine feet. The ſummit level is well ſupplied with water; its height is 240 feet above the ſea. The depth of the canal is five feet over the cills of the locks and aqueducts, and five feet ſix inches in the body of the canal; it is 25 feet wide at bottom and 40 feet wide at water ſurface. For ſeveral miles from Dublin the banks are planted with trees, which have a very pleaſing effect. The revenues of the Grand Canal company have been gradually riſing. In 1787 the amount was only 6984*l*., but in 1802 47,100*l*.; and it is expected that it will exceed 100,000 *l*. *per annum*. The Royal Canal commenced, under an act of parliament and a charter from his majeſty, in the year 1789, and it alſo has received large grants from the national purſe. Theſe grants amounted to 91,000*l*. previous to 1801, at which time the directors general of inland navigation, in conſequence of a reduction of the tolls, agreed to give a further ſum of 95,866*l*. The object of this canal is to carry a line of navigation from Dublin to the Shannon, at Tarmonbury, in a north-weſt direction; and it has been already carried nearly to Mullingar, in the county of Weſtmeath, which is about fifty Engliſh miles from the capital. The ground through which the canal runs is ſo favourable, that one level is ſix miles in length, another ſixteen, and the ſummit level will be 17 miles in extent without a lock; into this laſt the grand ſupply of water comes from Lough Owel, near Mullingar. The conſtruction of this canal is much approved; the locks are 80 feet clear in length and 14 in breadth, the banks ſloping 20 inches for each foot they riſe. At preſent great quantities of goods are carried by this canal; but the national benefit muſt riſe ſtill higher when it reaches the Shannon, as coals, manufactured iron, clays and ores of various kinds, will then be brought from the counties of Roſcommon and Leitrim.

To return from a digreſſion, which the importance of the ſubject, and the want of a better opportunity of introducing it, will, it is hoped, excuſe: the coaſt of the county of Dublin extends for about 30 miles along the Iriſh ſea; on the northern part are ſeveral ſmall fiſhing towns, which were formerly noted for ſmuggling. The iſlands of Lambay and Ireland's Eye form intereſting objects from the coaſt, and are frequented by ſhooting parties. The Hill of Howth is a peninſula projecting conſiderably into the ſea, and forming the northern boundary of Dublin bay. New works have lately been erected on the northern ſide of it, for maintaining a better communication with England, for an account of which, ſee Howth.

To the ſouth of the bay the land alſo projects as far as Howth, and then the coaſt takes a ſouthern direction. There are no towns of any conſequence in this county, except the capital, and, like Middleſex, it has a ſeſſions for adminiſtration of juſtice entirely diſtinct from the circuits. It is repreſented in parliament by four members, two for the county and two for the city of Dublin, beſides a member for the univerſity. This county of courſe formed a part of the *Engliſh pale*, and contains the ruins of a great number of caſtles and religious foundations. Archer's Statiſtical Account of Dublin. Dutton's Remarks on it. Beaufort's Memoir.

Dublin, the capital of Ireland, the ſecond city in the Britiſh dominions, and ſometimes reckoned the fifth for extent in Europe, is on the eaſtern coaſt of Ireland, in the province of Leinſter, and in the county deſcribed in the preceding article. Dublin is ſeated in view of the ſea on the eaſt, and in a fine country, which ſwells into gently riſing eminences on the north and weſt, whilſt lofty mountains bound the horizon on the ſouth. The city itſelf cannot be ſeen to full advantage on entering the harbour, but the approach to it from thence exhibits a fine proſpect of the country for improvement and cultivation, interſperſed with numerous villas, which have a moſt agreeable effect to enliven this delightful ſcene. The Wicklow mountains, on the ſouth, with the pointed cone of the ſugar-loaf, contribute not a little to embelliſh a landſcape ſo extenſive and pictureſque as not to be equalled by any one view in Europe, excepting, perhaps, the bay of Naples, to which it has been thought to bear a very ſtriking reſemblance. The early hiſtory of Dublin, previous to the landing of the Engliſh, is not well aſcertained; and though its name has employed the talents of many antiquarians, it has not been ſatisfactorily accounted for. A town, ſuppoſed to be on the ſite of the preſent Dublin, is mentioned by Ptolemy under the name of *Eblana*, about A. D. 140; and the Danes are ſuppoſed to have entered the Liffey, and encircled Dublin with walls in 498. In a charter of king Edgar's, called *Oſwald's-law*, dated at Glouceſter in 964, Dublin is mentioned as a place of conſequence, but this charter is by many ſuſpected to be a forgery. The Danes appear to have been in poſſeſſion of Dublin in the 11th century, and were perhaps the founders of it, as they were of other maritime towns. It was then beſieged and ſtormed by the Iriſh, under Brien Boromhe, who was killed at the battle of Clontarf; and after this event the Danes, or *Oſtmen*, as they were called, ſeem to have admitted the ſovereignty of the king of Leinſter, though they were often in rebellion. The conteſts, indeed, among the Iriſh chieftains, afforded them a favourable opportunity of re-eſtabliſhing their independence; and when the league was formed againſt Dermod M'Morrough, king of Leinſter, his Oſtmen ſubjects of Dublin, under their governor M'Torkill, or as Cambrenſis calls him, Haſculphus, took an active part againſt him. A ſtrong force, under Raymond le Gros, having reduced Dublin in 1171, M'Torkill eſcaped by ſea, and returned ſoon after with a ſtrong fleet to recover it; he was however taken priſoner and put to death. Strongbow, who laid claim to the kingdom of Leinſter in right of his wife Eva, daughter of Dermod, was ſoon after beſieged in Dublin by the confederate Iriſh, and reduced to great difficulty, from which he was delivered by the deſperate valour of his followers. In the year 1172, Dublin was given up by Strongbow to king Henry, that he might appeaſe his reſentment, and we find that this monarch paſſed the enſuing Chriſtmas in his new acquiſition. The Iriſh chieftains who had ſubmitted flocked to Dublin from all quarters; and we are told, that, as the city afforded no building capable of receiving the royal train, Henry cauſed a temporary ſtructure to be raiſed after the Iriſh faſhion, where his new vaſſals were admitted freely and feaſted ſumptuouſly. Soon after he had taken poſſeſſion of Dublin, Henry granted it, by charter, to a colony of Briſtolians, with the ſame privileges which they had enjoyed at Briſtol; and he, afterwards, confirmed to his burgeſſes of Dublin, or *Divelin*, as it is called in ancient records, all manner of rights and immunities throughout his whole land of England, Normandy, Wales, and Ireland. On his departure he alſo appointed it to be the reſidence of his governor, and ordered a caſtle to be built there. In 1210, upwards of 20 Iriſh princes ſwore allegiance to king John at Dublin, engaging to eſtabliſh the Engliſh laws and cuſtoms, and in the ſame year courts of judicature were inſtituted. In 1217, the city was granted to the citizens in fee farm, at 200 marks *per annum.* In 1308, the civil government of Dublin was eſtabliſhed under a provoſt and two bailiffs; but in 1409, the title of the chief magiſtrate was changed to that of mayor, by charter of Henry IV.; and in 1547, the office of bailiffs was changed to ſheriffs. Stanihurſt, who compiled the deſcription of Ireland for Holinſhed, which was re-publiſhed by Hooker in 1586, gives a particular account of the hoſpitality of theſe magiſtrates: "They that ſpend leaſt in their mayoralty," ſays he, (as thoſe of credit and ſuch as bear the office have informed me) "make an ordinary account of 500*l.* for their viands and diet that year." This was no ſmall ſum, when the cheapneſs of proviſions is taken into account. In 1609, the charter of the city of Dublin was renewed by James I. After the reſtoration, Charles II. gave to the mayor a collar of S.S., and a company of foot-guards; and in 1665, he conferred the title of lord mayor on the chief magiſtrate, and granted him 500*l.* *per annum* in lieu of the foot company. The government of the city was further regulated by the earl of Eſſex in 1672. It is executed by a lord mayor, a recorder, two ſheriffs, 24 aldermen, and a common-council, formed of repreſentatives from the 25 corporations. The aldermen are elected from amongſt thoſe who have ſerved or fined for the office of ſheriff, and the lord mayor is elected from amongſt the aldermen by the common council. The next in rotation is generally choſen; but there have been inſtances of departure from this rule, when ſuch perſon has been obnoxious to the commons. The lord mayor tries all offences, even capital ones, except murder and treaſon, and matters of property for any ſum under 20*l.* Though Dublin became early the ſeat of the Engliſh governor, it continued a very ſmall town. In 1610, when a map of it was drawn by W. Speed, the Liffey was not embanked by quays on the north ſide, and only a part of it on the ſouth. There were only three or four ſtreets on the north ſide, which went by the name of *Oxmantown*, or *Oſtmentown*, and ſome villages at a ſhort diſtance, which are now part of the city. On the ſouth of the river it was alſo very much confined. The college was at ſome diſtance from the walls, and, comparatively, a very ſmall part of what is called the Liberty was built. The great increaſe of population will, however, mark the change which has taken place more ſtrikingly. In 1644, it appears that the inhabitants were numbered by order of government, when there were only 8159 perſons. Perhaps at this time the population was leſs than it had been from the diſtreſſed ſituation of the country. In 1681, the number was 40,000. Between the years 1711 and 1755, above 4000 houſes were built, and, in the laſt of theſe years, the inhabitants were eſtimated at 128,570, by the late Dr. Rutty. By the apparently accurate enumeration of the Rev. James Whitelaw, in 1798, of which he has publiſhed an account, and which agrees very nearly with the return made by the diſtrict committees in 1804, the number of inhabitants appears to be 182,370, including the garriſon, houſe of induſtry, college, &c. The number of houſes, according to the ſame enumeration, was 16,401, allowing a population of above 10 to each houſe. It appears evident, therefore, that the population of Dublin is below 200,000, though it is frequently reckoned at 300,000.

Dublin would be a commodious ſtation for ſhipping, were it not for two ſand banks, called the *North* and *South Bulls*, which prevent large veſſels from croſſing the bar, and ſad experience has proved that the bay is not a ſafe place for anchorage. In conſequence of this a new harbour is forming at Howth, of which an account will be given hereafter. (See Howth.) The river, however, has been greatly improved for ſuch veſſels as do not draw too much water to croſs the bar, by a prodigious work on the ſouth ſide of it, called the *South wall*, which was begun in 1748, and which extends from the point of Ringſend to the light-houſe about three miles. It is formed of large blocks of granite ſtrongly cemented, and ſtrengthened with iron cramps. The breadth of the road is near forty feet, riſing five feet above high water. About midway, between Ringſend and the light-houſe, at a place called the *Blockhouſe*, a new baſon has been formed of an oblong ſhape which is 900 feet long and 450 broad, where the packets of all deſcriptions uſually lie. The light-houſe was begun in 1762 under conſiderable difficulties from the depth of the water, from the power of the winds in ſuch an expoſed ſituation, and from the raging of the ſeas. Theſe, however, were overcome by the architect, Mr. Smyth, who collected vaſt rocks, and depoſited them in a caiſſoon or cheſt, which was ſunk to the bed of the ſea, and afterwards guarded with a buttreſs of ſolid maſonry, 25 feet broad at the baſe. On this he raiſed a beautiful circular ſtructure, three ſtories high, ſurrounded by an octagonal lantern of eight windows. It is compoſed of white hewn granite, firmly cemented, gradually tapering to the ſummit, and each ſtory ſtrengthened with ſtone archwork. A ſtone ſtaircaſe, with an iron baluſtrade, winds round the building to the ſecond ſtory, where an iron gallery ſurrounds the whole. The lantern is ſupplied with large oil lamps, the light of which is powerfully increaſed by reflecting lenſes. From Ringſend, up through the whole city, the river is commodiouſly embanked with quays; and excellent docks are laid out on each ſide ſufficiently large to contain ſeveral hundred veſſels. There are ſeven bridges, of which that formerly called *Iſland bridge*, but which having been rebuilt is now called *Sarah bridge*, has been conſidered as the *Iriſh Rialto*. It forms one grand arch that ſweeps in a beautiful and well proportioned direction from north to ſouth, extending three hundred and fifty-ſix feet: the arch is an ellipſis, the ſpan of which meaſures one hundred and four feet, being twelve feet wider than the celebrated Rialto at Venice. Eſſex bridge was built in imitation of Weſtminſter bridge. Carliſle bridge is remarkably wide, being ſixty feet between the baluſtrades, which leaves ample room both for carriages and foot paſſengers. The old bridge, which was lately carried away by a flood, will be replaced by a handſome one oppoſite to the courts of juſtice, which is to be named Richmond bridge. It was not until the year 1768 that even in London the projecting ſigns and penthouſes were removed, the ſtreets flagged, and the houſes numbered. The ſame regulations were effected in Dublin by an act of parliament in 1774, and another act was paſſed in 1785 for better paving, lighting, and cleanſing the city, by which an additional number of globes with double burners were erected. In conſequence of the exertions of the paving board, the ſtreets are, in general, ſufficiently wide, and well flagged; there are, however, ſome exceptions, and in the old part of the city, the buildings are very irregular. The numerous ſtreets and ſquares which have been added of late years, are magnificent and ſpacious, and the buildings regular and commodious. Among thoſe on the ſouth ſide of the river, thoſe wherein perſons of diſtinction reſide, lie chiefly to the eaſtward of the college and Stephen's green. This laſt, though it does not rank with the new buildings, poſſeſſes much grandeur and elegance, being one of the largeſt ſquares in Europe: it is an Engliſh mile in circumference, ſurrounded by a gravel walk planted on each ſide with trees; within this walk is a ſmooth level meadow, having in the centre an equeſtrian ſtatue of George II. There are ſeveral handſome houſes, but they are by no means uniform, and have others amongſt them of a very mean appearance. Merrion ſquare, to the eaſt of it, is nearly as extenſive, and the buildings are elegant and uniform; the centre is incloſed with iron paliſades, and formed into a beautiful garden, adorned with ſhrubberies, gravel walks, and handſome entrance lodges. On the north ſide, Rutland and Montjoy ſquares are deſerving of attention. The garden of the lying-in-hoſpital, which is ſurrounded by iron paliſades, is in the centre of the former, and that of the latter is laid out like Merrion ſquare. Sackville ſtreet, which, though built upwards of ſixty years ago, is often reckoned amongſt the new ſtreets, has been lately extended, and conſiderably improved. It is 120 feet wide from Carliſle bridge to the rotunda and public aſſembly rooms, and having on the other ſide of that bridge Weſtmoreland ſtreet, extending to the college and national bank. Towards the middle of Sackville ſtreet a noble column, with ſuitable decorations, has been erected to the memory of that illuſtrious naval officer lord Nelſon. The circumference of Dublin, as it now ſtands, is above ten miles varying to an irregular oval form. A road, called the *Circular*, is carried round the greater part of the city, but whilſt in ſome parts it includes gardens and orchards, ſome new ſtreets are ſituated without it in other parts. There is, perhaps, no city of its ſize, which can boaſt of ſuch a number of magnificent and uſeful buildings. Of theſe, as well as of ſome valuable eſtabliſhments, it will be neceſſary to give ſome account. The caſtle of Dublin was built, or at leaſt completed and flanked with towers by Henry de Londres, archbiſhop of Dublin and lord deputy, about 1213. Of theſe towers the ſtrongeſt and moſt famed was that called Birmingham tower, from ſir William Birmingham, who was impriſoned there and afterwards executed about 1331. It was long uſed as a ſtate priſon, but the old tower having been taken down and a new one erected on the ſite, this has been uſed for preſerving the archives of the kingdom. The caſtle was diſmantled of its warlike garb in the reign of queen Elizabeth, being intended for the reſidence of the governor. It has continued ſince that period to be the ſeat of government, and, at preſent, like St. James's in London, is the place where the viceroy gives audience, and which is uſed on other ſtate occaſions. There are two courts; the upper court is that in which are the ſtate apartments, and the chief ſecretary's apartments; in the lower court are the treaſury, regiſter office, and an armoury. The whole is encloſed, and ſince the rebellion, has been fortified, ſo as to be able to reſiſt a ſudden attack. The royal exchange, which adjoins the caſtle, was finiſhed in the year 1779, at an expence of forty thouſand pounds. As this building, however, does not poſſeſs all the advantages which the merchants expected from it, a new ſtructure has therefore been erected in Dame ſtreet, called the "Commercial buildings," which is more immediately intended for a ſtock exchange, brokers' ſales, ſhip inſurance, &c. The National bank is a moſt ſuperb ſtructure, and is fronted with a grand arcade of Ionic columns, all of Portland ſtone. This is the building in which the ſenators of Ireland were accuſtomed to aſſemble; and ſince the union it has been converted to its preſent purpoſe. Oppoſite to this is the college, of which a ſeparate account will be given, (ſee Dublin, *Univerſity of*). The ſtamp office, in William ſtreet, formerly Powerſcourt houſe, is another fine building, the architecture of which is chiefly Doric. The barracks on the north ſide of the river were founded in 1704, and are reckoned the largeſt and moſt commodious in Europe. They conſiſt of five large ſquares, capable of containing 4000 cavalry and infantry. On the oppoſite ſide of the river ſtands Kilmainham hoſpital, founded by Charles II. for invalids of the Iriſh army, on the plan ſimilar to Chelſea in England. The building was finiſhed in 1683, and coſt 24,000*l.*; it is of a quadrangular form, with a ſpacious area in the centre laid out in gravelled walks. The commander in chief, the maſter and officers, have excellent apartments and gardens. The ground anciently belonged to the knights templars. The new courts of juſtice on the north ſide of the river are extremely handſome and convenient: the building is of a circular form; and within, the upper part of the dome is ornamented with the buſts of the moſt celebrated legiſlators, ancient and modern, adorned at the ſame time with ſculptured devices, executed in a maſterly ſtyle. A range of law-offices, finiſhed in a ſtriking manner, completes this beautiful edifice. The Linen hall is a neat building, erected in the year 1728, for the purpoſe of detecting frauds in this the grand manufacture of Ireland. The merchants have rooms where the cloth is ſold, and the trade is under the controul of a board conſiſting of the principal men in the country. The Cuſtom houſe, if we conſider the beauty of its architecture, or the judicious choice of ſite and accommodations, muſt be acknowledged to ſtand at the head of all thoſe eſtabliſhments erected for commercial purpoſes among European nations. It is ſituated on the northern diviſion of the city cloſe by the ſide of the river. The expence of this magnificent ſtructure, which is larger than the trade of Dublin ſeemed to require, was no leſs then 255,000 pounds. The buildings of the Dublin ſociety in Hawkins's ſtreet are alſo extenſive. (See Dublin *Society*.) The private houſes which chiefly deſerve attention are, Leinſter houſe, Waterford houſe, and Charlemont houſe. The latter contains a valuable library, and ſome excellent works of Titian and Rembrandt, chiefly collected by the late earl of Charlemont, whoſe patronage of ſcience, as well as his other public virtues, will long be remembered. Dublin contains 20 pariſhes, that have nineteen churches and two chapels of eaſe, fifteen Roman catholic chapels, and about ſixteen places of worſhip belonging to different claſſes of proteſtant diſſenters. Dublin is the ſee of an archbiſhop, and contains two cathedrals, both within the city. Chriſt church, or the church of the Bleſſed Trinity, was firſt built by the Oſtmen of Dublin about the year 1038. Its ſituation is nearly in the middle of the city, and the whole building ſpacious and ornamental, containing a vaſt number of ſuperb and curious monuments, particularly that of Strongbow, which ſtill continues in good preſervation. This church was founded for regular canons and converted into a collegiate for a dean and chapter by Henry VIII. in 1514. The biſhop of Kildare unites this deanery to his biſhopric. The other cathedral, that of St. Patrick, was founded for thirteen prebends, which number has ſince been increaſed to 22. This cathedral, ſituated on the ſouth ſide of the city, was erected about the year 1190 by John Comyn, then archbiſhop of Dublin. In its firſt conſtitution it was collegiate, but De Londres, Comyn's ſucceſſor, made it his cathedral. In the year 1370 archbiſhop Minot added to it a high ſteeple of ſquared ſtone; and in 1750 Dr. Sterne, biſhop of Clogher, on this ſteeple erected a lofty and beautiful ſpire, little inferior to that of Saliſbury, and which is ſeen at a conſiderable diſtance. This cathedral contains ſeveral excellent monuments, among which that of Dr. Swift, who was dean of St. Patrick's, and whoſe name is ſo juſtly dear to the Iriſh nation, claims pre-eminent regard. Of the other churches, many are neat ſtructures, and

and capable of containing large audiences, but that which moſt deſerves attention is St. Andrew's, in the neighbourhood of the college. If none of the diſſenting meeting houſes is remarkable for its appearance, yet two of them can boaſt of having had as miniſters two of the ableſt defenders of religion in the Engliſh language, Abernethy and Leland. The charitable inſtitutions in Dublin are very numerous, and the buildings in ſome inſtances very ornamental. To enter into a detailed account of theſe would ſwell this article beyond reaſonable bounds, yet there are ſome which ought not to paſs unnoticed. The houſe of induſtry was partly founded for receiving ſuch as were by age, ſickneſs, or misfortune, rendered incapable of earning their bread, and for relieving the city from the clamours and impoſitions of ſturdy beggars. Poor perſons of every deſcription are always admitted into this houſe, whether young or old, that are in apparent diſtreſs; here they are lodged and fed, but not clothed, it being found to be productive of bad effects, many going into the houſe merely to be clothed, and afterwards diſpoſing of their apparel for ſpirituous liquors; they are now, therefore, obliged to ſupply themſelves with this comfort from their own exertions, from ſhops kept for that purpoſe within the walls of the inſtitution, and by this means are better clad than formerly. The average number annually maintained is 1718, yet the ſtreets of Dublin are ſtill crowded with beggars. The lying-in hoſpital is an elegant piece of architecture. It was founded by Dr. Moſſe, a phyſician of Dublin, who obtained a charter for it, and in addition to private ſubſcriptions, it has an annual grant from parliament. There are about 700 females delivered here every year. The Fever hoſpital is an extenſive building, capable of containing above a hundred patients, and is admirably well conducted. The Foundling hoſpital receives all expoſed and deſerted children of either ſex, and is ſupported partly by a tax of three-pence in the pound on all houſes in Dublin, and partly by a parliamentary grant. There are ſeveral infirmaries and medical charities of various kinds, and beſides ſeveral ſchools on public foundations, almoſt every place of worſhip in Dublin has a ſchool connected with it, which is ſupported by an annual charity ſermon. Beſides the Univerſity and Dublin Society, which require particular notice, the literary inſtitutions in Dublin are, the Royal Iriſh Academy, which has publiſhed ſeveral volumes, the Dublin Library Society, the colleges of Phyſicians and Surgeons, and the King's Inns, where Iriſh barriſters muſt now paſs a certain number of terms before they can be called, and which has a good library. There are ſeveral good private libraries, and ſome valuable private collections of minerals, and other natural productions. The Farming Society of Ireland, which moſtly holds its meetings in the capital, is likely to render moſt eſſential ſervice to the country.

Dublin is remarkably well ſupplied with fleſh, fowl, and fiſh, the latter in much greater perfection than any other capital in Europe. It is ſupplied with coals chiefly from Cumberland and Scotland, and with turf by the canals. Water is conveyed to the city on the north ſide from the Lower Liffey, by machines conſtructed for the purpoſe at an outlet called Iſland bridge. The ſouth ſide is ſupplied from a reſervoir or baſin, which joins the grand canal, with the directors of which, the corporation contract for a ſupply. As a tax is laid on every houſe, ſo the ſupply is general, and there are beſides fountains erected in various parts of the city, for the convenience of the poorer inhabitants. The Phœnix park is a fine extenſive encloſure at the weſt end of the town, which is diverſified with woodland, champaign, and riſing ground, and is a moſt intereſting ride. It is ſeven miles in circuit, and contains the Vice Regal Lodge, where the lord-lieutenants now conſtantly reſide, the ſeat of the principal ſecretary, and ſome other handſome lodges. In this park are alſo a magazine for powder, and a battery that commands the city. In 1747, a fluted pillar, thirty feet high, with a phœnix on the top, was erected in the centre of a ring in this park, by the celebrated earl of Cheſterfield, when lord-lieutenant of Ireland. Such is Dublin, a city which rapidly increaſed for many years, and was beautified at the national expence. It was aſſerted, previous to the act of union, that the effect of that meaſure would be to ruin Dublin, and *that graſs would ſoon grow in the ſtreets*. It muſt be admitted that no place was likely to receive ſo much injury as Dublin from that important change, but the parliament would not have been juſtified in rejecting an arrangement beneficial to Ireland in general, becauſe it might interfere with the intereſt of thoſe who inhabited the capital. The injury ſuſtained, however, does not appear ſo great as was apprehended. The nobility have indeed in great meaſure forſaken Dublin, and their manſions have become the habitations of bankers or wealthy merchants; and in ſome inſtances have been converted into ſplendid hotels. Some particular claſſes of tradeſmen alſo appear to have ſuffered, and the often beneficial buſtle occaſioned by the meeting of parliament is no longer felt. There are, however, many cauſes which draw numbers to the capital, and the high rent of houſes, with the exception of very ſplendid ones, is a proof that they do not yet exceed the demand for them, though ſome new ſtreets have been laid out ſince the union. Dublin is repreſented by two members in the imperial parliament, who are choſen by the freemen at large. It is ſixty miles W. from Holyhead in Wales, and 330 miles N.W. from London, in long. 6° 30′ W. from Greenwich, and in 53° 14′ N. lat. Archer's Survey of Dublin. Dodd's and Wilſon's Directories, &c. &c.

Dublin, *Archbiſhopric of*, one of the four provinces into which Ireland is divided, which contains five ſees under four prelates, *viz.* the archbiſhop of Dublin, and the biſhops of Kildare, Leighlin and Ferns, and Oſſory. The firſt mention of the ſee of Dublin is in the 7th century. In the year 1152, it was erected into an archbiſhopric. At the time of the landing of the Engliſh, it was filled by a prelate named Laurence, who appears to have had great influence in the country, and who was afterwards canonized. In the year 1214, the biſhopric of Glandelough, which had been founded in the 6th century, was incorporated with it. This ſee is 50 miles in length from north to ſouth, and 36 in the greateſt breadth, containing the whole county of Dublin, the moſt of Wicklow, and part of the counties of Wicklow and Wexford. It contains 209 pariſhes, which form 86 benefices. In theſe are 82 churches, twenty of which are in the city of Dublin. Amongſt thoſe who have filled this ſee was Dr. King, author of an eſteemed work on the "Origin of Evil." The archbiſhop of Dublin is primate of Ireland, and is the ſecond in point of dignity. It was long the policy of the Engliſh government, as appears from the letters of archbiſhop Boulter, to confine the chief offices to men of Engliſh birth, regarding thoſe who had been born and ſettled in Ireland, although of Engliſh extraction, as not ſufficiently attached to the intereſt of England. At that time the archbiſhopric of Dublin was the higheſt dignity an Iriſhman could obtain. Dr. Beaufort's Memoir. Abp. Boulter's State Letters.

Dublin *Society*. This ſociety, which, as Mr. A. Young obſerves, has the undiſputed merit of being the father of all the ſimilar ſocieties now exiſting in Europe, was eſtabliſhed in the year 1731, and owed its origin to one of the moſt patriotic individuals which any country has produced, Dr. Samuel Madan. For ſome years it was ſupported only by the voluntary ſubſcriptions of the members, forming a fund under a thouſand pounds a-year, but for a long time paſt parliament has regularly granted ten thouſand pounds each ſeſſion in aid of the ſubſcriptions. To enter upon the hiſtory of this ſociety, and detail the various objects which formerly engaged its attention, would be tedious; but ſome account of its preſent objects, and the progreſs made in accompliſhing them, will be intereſting to many readers. The ſociety was incorporated in 1749, by the title of the Dublin Society, for promoting huſbandry and other uſeful arts in Ireland. The members of it have accordingly adopted many meaſures for the improvement of agriculture, plants, &c. They have contributed in particular to the increaſe of plants, and to the formation of large and extenſive nurſeries. They alſo, like the London Society, give premiums for all uſeful inventions, and for proficiency in the fine arts. They purchaſed the celebrated Leſkean collection of minerals, and have adopted different meaſures to encourage the ſtudy of mineralogy. They have eſtabliſhed annual lectures on chemiſtry, with a particular view to its application to manufactures. They have appropriated above 27 Engliſh acres to a botanic garden, at Glaſnevin, in the neighbourhood of Dublin, in which particular attention is paid to promote a practical knowledge of botany, ſo far as it is uſeful to the farmer, the grazier, the planter, and the artificer, and they have alſo eſtabliſhed lectures on this ſcience. They have further eſtabliſhed lectures on natural philoſophy, and on the veterinary art. They have procured ſurveys to be made of the counties of Ireland, which have been publiſhed at their expence. They have formed a valuable library, which is open to the members, and have various collections of objects of natural hiſtory, and of models for the imitation of young artiſts. The buildings of the ſociety in Hawkin's-ſtreet are very extenſive and convenient, and if uſeful knowledge be not advanced in Ireland, it cannot be attributed to any want of exertion in this ſociety, or of liberality in parliament. A. Young's Tour—Appendix. Charter and Petition of the Society.

Dublin, *Univerſity of*. This noble inſtitution was founded by queen Elizabeth in 1591; Loftus, archbiſhop of Dublin, having prevailed on the corporation of that city to give up for this purpoſe the monaſtery of All-hallows, at that time in the neighbourhood of Dublin, on the ſouth-eaſtern ſhore; it having been veſted in the mayor and citizens, on the diſſolution of religious houſes. By the charter, the college was erected as "mother of a univerſity," by the ſtyle of "the College of the holy and undivided Trinity, of queen Elizabeth, near Dublin." It deſerves notice, that the juſtly celebrated Uſher, afterwards promoted to the primacy, was the firſt ſtudent admitted. Several grants of land in different parts of Ireland were made for its ſupport; and the patronage of ſeveral livings in the counties planted by James I. was aſſigned to it. In 1637, the original conſtitution being found imperfect, a new charter was given to it, and a ſet of ſtatutes compiled by archbiſhop Laud, which are ſtill in force. This prelate made ſeveral eſſential alterations in the conſtitution of the college; the moſt material of which was the depriving the fellows of the election of their provoſt, the appointment to that important office being from thenceforth reſerved to the crown. To make the fellows ſome amends for the loſs of their firſt privilege, it was appointed by the new charter that they ſhould be tenants for life in their fellowſhips, if they remained unmarried, or unprovided with a benefice of more than 10*l.* in the king's books; whereas, by the firſt charter, they were to quit their office in ſeven years after they became of maſter's ſtanding. At the ſame time, the number of fellowſhips was enlarged; and the government of the college was placed in the provoſt and major part of the ſenior fellows, from whoſe deciſion an appeal was given to the viſitors, who are the chancellor of the univerſity, or his vice-chancellor, and the archbiſhop of Dublin. The office of provoſt, being of conſiderable dignity and emolument, has in ſome inſtances been given to laymen, and perſons previouſly unconnected with the univerſity; but ſuch appointments are always diſagreeable, and, in general, ſo much reſpect is paid to the feelings of the members of this learned body, as to place over them one who had for ſome time filled the office of fellow, and is capable of filling the ſtation with propriety. During the provoſt's abſence, his place is filled by the ſenior of the fellows, who is always called vice-provoſt. The provoſt and ſeven ſenior fellows form a council called *the board*, which meets every Saturday, and by which all matters relating to the internal government of the college are decided. The income of a ſenior fellow, ariſing from various ſources, is generally eſtimated at about a thouſand pounds *per annum*; but it neceſſarily fluctuates according to the offices held, and, on an average, is probably not ſo great. The number of junior fellows is at preſent (1808) ſixteen; but it is intended to augment it. Theſe are the tutors of the college; and their income depends, in a great meaſure, on the number of their pupils. Some who, from merit or intereſt, have a large number, have 700l. or 800l. *per annum*. Attempts were made by former provoſts, to aſſign tutors to every young perſon entering the college, which would give very great influence; but, at preſent, the parents, or guardians of the pupils chuſe the tutor under whom he is placed. The number of livings in the gift of the univerſity is 19, the value of which was, ſome years ago, from 500l. to 1000l. *per annum*, and muſt have conſiderably advanced from the increaſe of tillage. On one of theſe becoming vacant, it is offered to the clerical fellows in rotation, beginning with the ſenior, until one chuſes to accept of it, who then vacates his fellowſhip. The profeſſors, alſo, of divinity and common law muſt vacate their fellowſhips to hold theſe two offices. The ſupplying the benefices and profeſſorſhips as they become vacant, keeps up a conſtant circulation among the leading members of the univerſity. By this means, there is a conſtant encouragement to exertion among the ſtudents, and the church of Ireland is ſupplied with ſome of its moſt uſeful and reſpectable members. There is, perhaps, no patronage ſo beneficial to the country as this. The mode of filling a ſenior fellowſhip, on its becoming vacant is, for the board to elect the ſenior of the junior fellows, if no objection lie againſt him, within three days after a vacancy is known. But, to a junior fellowſhip, admiſſion is obtained only by ſuſtaining publicly one of the ſevereſt trials of the human faculties of which there is any account. The candidates for this office, who muſt have taken a bachelor's degree in arts, are examined in the public hall, three days ſucceſſively, for two hours in the morning, and as many in the afternoon of each day; the firſt morning in logic and metaphyſics; firſt afternoon in all the branches of the mathematics; ſecond morning in natural philoſophy; ſecond evening in ethics; third morning in hiſtory and chronology; third evening in the Greek, Latin, and Hebrew languages. The fourth day is private, and is devoted to compoſition. The examination is in Latin; and the days appointed for it are the four days immediately preceding Trinity Sunday. The examiners, who are the provoſt and ſeven ſenior fellows, (or, in the abſence of any of theſe, the next in ſeniority among the juniors,) after a ſcrutiny among themſelves in the board-room, on the ſucceeding Monday, proceed to give their votes, in the moſt ſolemn manner, for the candidate, or candidates, they think fitteſt to ſupply the vacancies, when, if the provoſt do not chuſe to interpoſe, the vote of the majority is deciſive, and the ſucceſsful candidate is preſently after ſworn into office in the college chapel. As the ſtruggle is often cloſe, and the deciſion, conſequently, difficult, the reſult is naturally expected with much anxiety; for the ſucceſsful candidate is conſidered as honourably and happily provided for. It will often happen, that men of great merit will fail from various cauſes; but, when unſucceſsful candidates have anſwered reſpectably, they have a ſum of money allotted to them at the time; and, if they chuſe to decline further attempts, generally ſucceed in procuring pupils, or entering ſome of the learned profeſſions, derive benefit from their paſt exertions. The difficulty, indeed, is ſo great, that it is conſidered honourable to have made the attempt, even without ſucceſs. There are only three of the fellows allowed to be members of the lay profeſſions, one of medicine, and two of law, without an expreſs diſpenſation from the crown. All the reſt muſt become clergymen of the eſtabliſhed church, and take their ſhare of the clerical duties of the univerſity. By the ſtatutes of the college, every fellow, on marrying, may be obliged to vacate his fellowſhip; but ſeveral diſpenſations have been given by the crown; and, of late years, moſt of the fellows have married, without any attempt to enforce the penalty. Beſides the fellows, there are 70 ſcholars, who have a right of voting at the election of the member returned by the college to parliament, and who have ſome other privileges and emoluments. Twenty of theſe have what are called native places, attended by an additional income; and theſe are filled up, as vacancies occur, from the moſt diligent of the ſcholars. The candidates for a ſcholarſhip muſt have arrived at the rank of ſophiſters; and are examined, for two days in the week, before Whitſuntide, in the Greek and Latin claſſics, by the provoſt and ſenior fellows. As a ſcholarſhip cannot be held by one arrived at the ſtanding of maſter in arts, it terminates in four, or, at moſt, five years, from the time of obtaining it; but it is often vacated before that time, as the emolument is trifling, and the neceſſary attendance on college duties often interferes with profeſſional purſuits, after the completion of the undergraduate courſe. The ſtudents are claſſed under three ranks, diſtinguiſhed by the names of *fellow commoners*, *penſioners*, and *ſizars*. The number of the two former is unlimited, and generally exceeds 500. They are publicly examined before admiſſion, by the ſenior lecturer, and ſuch fellows as he chuſes to aſſociate with him, in ſeveral Greek and Latin books appointed to be read at ſchools for this purpoſe, and in Latin compoſition, either proſe or verſe. The candidates admitted, are entered according to their merit; and to obtain the firſt place on this occaſion is eſteemed very honourable. Extraordinary rewards are alſo adjudged, on ſome occaſions, to thoſe who diſtinguiſh themſelves; whilſt thoſe who are ſhamefully deficient are refuſed admiſſion, and are obliged to return to ſchool, or to ſeek refuge in ſome other college, where the proficiency of the ſtudents is leſs attended to. The fellow-commoners are diſtinguiſhed by a peculiar gown and cap, and have the privilege of dining at the ſame table with the fellows, for which they pay a much higher ſtipend; whilſt penſioners, at a leſs expence, poſſeſs all the real advantages which the college affords; and, if they conduct themſelves with propriety, receive every attention from their ſuperiors. The ſizars are limited in number to about 30, and receive their commons and inſtruction *gratis*. As vacancies occur, they are ſelected, after examination, from a number of competitors. Though their ſituation may appear degrading, yet, by good conduct, they may remove any thing that would be painful, and, in a very ſhort time, by continued diligence, they may raiſe themſelves to a higher rank. Some of this claſs have, indeed, riſen to the higheſt honours of the univerſity; but this does not generally happen. The undergraduate courſe continues for four years, during the two firſt of which, the ſtudents are called *freſhmen*, and the two laſt ſophiſters; and there are four examinations in each year in the public hall, in a courſe of reading appointed by the board. Judgments are given for each branch of the examination, which are publicly read, and thoſe who get a very bad judgment loſe the examination for that time. To encourage application, premiums and certificates are liberally, but not negligently, beſtowed; and the youth who omits no examination, and obtains good judgments at every one, during his undegraduate courſe, is honoured with a gold medal, which, being only obtained by the union of reſpectable talents, with unremitting application, is juſtly and highly valued. The premiums are books, ſtamped with the college arms; and the certificates, which are on vellum, are given only to thoſe who, being the beſt in the diviſion, are precluded from a premium, in order to ſpread the flame of emulation more widely. Beſides theſe regular rewards, there are occaſional ones for compoſition; and the provoſt is empowered to give annual ſums, called *exhibitions*, to thoſe he eſteems deſerving. There are alſo premiums for Hebrew, mathematics, divinity, &c.; for thoſe who, having taken their bachelor's degree, continue in the college, either with a view to a fellowſhip, or in purſuance of their profeſſional ſtudies. Beſides the advantages derived from the regular examinations, &c. there is a ſociety compoſed of a number of thoſe who have arrived at the ſtanding of ſophiſters, called the Hiſtorical Society, under the patronage of the fellows, in which queſtions are debated, portions of hiſtory examined into, and compoſitions in proſe and verſe occaſionally read. Theſe exerciſes ſerve to call forth the exertions of the ſtudents, and have particularly contributed to form ſome of the moſt diſtinguiſhed members of the Iriſh bar, who here cultivated thoſe powers of oratory, by which they have ſince riſen to the moſt eminent ſtations. Having given this general account of the ſyſtem of education purſued in Dublin college, it may be expected that ſome notice ſhould be taken of the illuſtrious characters it has produced. Here, however, if we conſider the length of time ſince its eſtabliſhment, it muſt be acknowledged, that the number is very few; and ſome of thoſe who are moſt celebrated, appear to have derived little advantage from their *alma mater*. Amongſt theſe laſt, we muſt, perhaps, conſider Swift, Congreve, and Goldſmith. But though the liſt will not be great, it will include Uſher, Berkeley, Molineaux, and Edmund Burke. To theſe we may add the leſs eminent, but truly reſpectable names of archb. King, biſhops Bedell, P. Browne, Chandler, H. Hamilton, and Young, Drs. T. Leland, Helſham, Delaney, Lawſon, Murray, Parnell; Meſſrs. Farquhar and Dodwell, with a long liſt of diſtinguiſhed lawyers and ſtateſmen, ſuch as lord chancellor Clare, Yelverton, lord Avonmore, Huſſey Burgh, Henry Flood, &c. Perſons yet living have been purpoſely excluded from this liſt, or it might have been increaſed by names well known, and highly reſpected throughout the Britiſh empire. It may, however, be aſked, why the number of eminent writers is not greater? And it may be anſwered, that the courſe of ſtudy neceſſary to obtain a fellowſhip is very fatiguing; that when this honour is obtained, the time of a fellow is uſefully employed in teaching his pupils, and that when after ſeveral years of labour, he arrives at a ſtate in which he can enjoy "otium cum dignitate," it can hardly be expected that he ſhould devote himſelf to new labours, without that inducement which moſt authors have of thus providing for the maintenance of a family. It requires uncommon exertion in men ſo ſituated, to become authors, and it is perhaps rather to be wondered at, that ſo many have added this to their other labours. Is it then to be inferred, that the univerſity of Dublin is leſs uſeful, or its fellows leſs reſpectable? Is authorſhip more honourable than forming the youth of their country for active life? And is it to be deſired, that the fellows ſhould ceaſe to labour as tutors, or that they ſhould be compelled by reduced incomes to add to this labour; that Dublin college may be able to rival her ſiſter univerſities in the production of authors? Is it not rather their firſt duty and their higheſt honour to watch over the morals of the youth entruſted to their care, to maintain ſtrict diſcipline, to encourage and aſſiſt riſing merit, and to form their pupils for future uſefulneſs? After all, though Dublin cannot boaſt any name equal to Bacon, Newton, or Locke. yet conſidering the much greater number of ſtudents in Oxford and Cambridge than in it, there will not be as much reaſon to ſhrink from the compariſon as might at firſt be imagined. The ſyſtem of education in Dublin has alſo been objected to, eſpecially by thoſe who admire that of the Scotch univerſities. It is ſaid, that learning would be more conſiderably advanced, by each fellow devoting himſelf to ſome one ſcience, and lecturing on it, than by his being obliged to inſtruct in all. There is ſome force in this objection; but if the ſyſtem in Dublin college be not as favourable to the advancement of ſcience, it will be found much more ſo to the diffuſion of it, for every tutor is more intereſted in the general improvement of his pupils, feeling himſelf in ſome degree anſwerable for it, than if they were merely to attend to a diſcourſe delivered by him. In fact, in education, it is of much more conſequence to have good elementary works carefully explained to a ſtudent, than that a lecturer ſhould aim at eſtabliſhing his own character by new diſcoveries, when more than three-fourths of his hearers probably want to be inſtructed in the firſt principles. The conſequence is, that at other univerſities, the youth who has been well trained at ſchool, and who burns with the deſire of knowledge, may learn more in a ſhorter time, than he can do in Dublin, but on the other hand, the many, thoſe who require the ſtimulus of reward, or the dread of puniſhment to induce them to ſtudy, and who are unable to proceed, without the aſſiſtance of a tutor, will perhaps derive much greater advantage in Dublin, than at any other. Beſides, though the junior fellows inſtruct the undergraduates in every part of their courſe of inſtruction, the lectures to the more advanced ſtudents, are given by profeſſors who have only one purſuit, and the lectures on natural philoſophy and mathematics, will not be found inferior to thoſe given at other univerſities. It may be added, that the attention paid throughout the courſe to logic and mathematics, lays a very uſeful foundation for future labours. It may be perceived, from what has been already noticed, that a conſiderable ſum out of the college revenues is devoted to giving rewards to the ſtudents, a ſyſtem purſued here more regularly and extenſively than in any other univerſity, and which has been of late years adopted at two or three colleges in Oxford and Cambridge. The advantage of a large revenue is alſo apparent in other inſtances. The library, eſpecially ſince the addition of the Fagel collection, is of the firſt rank, and is highly creditable to the college. This library is open for four hours each day, from eight to ten in the morning, and from twelve to two in the afternoon, and ſtudents may remain in it for the intermediate hours, if they chuſe to be locked in, during the abſence of the librarian. Every perſon who has taken the degree of bachelor of arts in the univerſity is entitled to go there, if he once enter into an engagement to obſerve the rules of the library, and this privilege is liberally extended, by the ſpecial favour of the board, to gentlemen, who, having no claim, may derive benefit from the uſe of it. If undergraduates cannot obtain this privilege, it is becauſe they are thought to be moſt uſefully employed in preparing for their reſpective examinations, and the frequenting the library would interfere with their peculiar ſtudies. The manuſcript room contains many curious Iriſh manuſcripts, and Dr. Barrett, the preſent vice-provoſt, diſcovered there an old manuſcript of the goſpel of Matthew, of which he has publiſhed a *fac-ſimile*. The collection of apparatus for lectures on natural philoſophy is very valuable, and was in great part a donation from that active promoter of ſcience, the late primate Robinſon. The muſeum is a fine room, and contains many curious articles; the collection of minerals, in particular, has been conſiderably increaſed, and would be eſteemed valuable, if it were not naturally compared with the neighbouring one belonging to the Dublin Society, which is excelled by very few in the world. The anatomy-houſe contains the celebrated wax models of the human figure, executed by monſieur de Roue at Paris, and purchaſed by the earl of Shelburne, who preſented them to the college in 1752. On the ſummit of Dunſink-hill, about four miles north-weſt from the caſtle of Dublin, an obſervatory was founded at the inſtigation of the late Dr. Henry Uſher, profeſſor of aſtronomy, and one of the ornaments of the univerſity, of which a particular account is given in the Tranſactions of the Royal Iriſh Academy. No expence has been ſpared to provide the building with the beſt inſtruments. Amongſt others, a circular inſtrument, begun by Ramſden and completed by his ſucceſſor, has been lately brought over at an expence of more than 1000*l*. The board alſo, with a liberality not often met with, in electing a profeſſor of aſtronomy to ſucceed Dr. Uſher, paſſed over a reſpectable candidate of their own college, in favour of a gentleman from another univerſity, who appeared more fit for the ſituation. A lot of ground, of about four acres, has been lately taken at about a mile diſtance from the college, for a botanical garden, which is laying out in the beſt manner, at a conſiderable expence. Such are the advantages which the univerſity of Dublin poſſeſſes, and theſe advantages are not, as at Oxford and Cambridge, confined to thoſe who can ſubſcribe the articles, or attend on the worſhip of the eſtabliſhed church. The Roman catholic and the Proteſtant diſſenter, may paſs through every ſtage of education, without being required to do any thing inconſiſtent with their opinions as ſuch, and ſubſcription which is at Oxford required on matriculation, and at Cambridge on taking the loweſt degree, is here never aſked except on attaining a fellowſhip, or on admiſſion to a degree in divinity. Such liberal conduct muſt add conſiderably to the number of ſtudents, though it will be in ſome meaſure counteracted by the influence of faſhion, and by the unwillingneſs of many young men to ſubmit to thoſe ſalutary reſtrictions which have been introduced, and which, in ſo large a city, are peculiarly neceſſary. It may be proper to add a ſhort account of the buildings, which, though formerly only in the neighbourhood, are now within the city, and contribute greatly to its ornament. Theſe buildings conſiſt of two ſpacious ſquares. The area of the firſt, called Parliament ſquare, is 212 feet by 316, and was built chiefly by grants from parliament. It is formed entirely of hewn ſtone, ornamented with Corinthian pillars, and contains the refectory, chapel, and theatre for lectures and examinations. The front of the theatre is well decorated with four Corinthian columns, ſupporting a pediment. The interior, excluſive of a ſemicircular receſs, 36 feet in diameter, is 80 feet long, 40 broad, and 44 high, excellently ornamented with ſtucco work. A ruſtic baſement ſupports a range of pilaſters of the Compoſite order, highly decorated, from which the rich moſaicked cieling riſes in groined arches: and in the pannels, between theſe pilaſters, are hung the portraits of queen Elizabeth the foundreſs, and of ſeven eminent perſons educated in the ſociety. The only portrait of a living perſon, was that of the Right Hon. Henry Grattan. This portrait of one, who muſt be ever conſidered an honour to the univerſity, was removed on ſome diſapprobation of his political ſentiments, and that of the Right Hon. John Foſter ſubſtituted in its place. If the removal be regretted, it muſt however be acknowledged, that the latter gentleman has deſerved well of the college and of his country. Directly oppoſite to the theatre, on the north ſide of the ſquare, is the chapel with a front exactly ſimilar. In this is placed a noble monument of Dr. Baldwin, a former provoſt, who left a fortune of 80,000 pounds to the univerſity. This monument was executed by an Iriſh artiſt at Rome, and does the higheſt honour to his abilities. The theatre and chapel were both built from the deſigns of ſir Wm. Chambers. The library extends the entire length of the inner ſquare; it is a double building compoſed of brick and faced with ſtone, with a magnificent Corinthian entablature crowned with a baluſtrade. It is the moſt ſuperb room in Europe for ſuch a purpoſe, being 210 feet long, 41 broad, and 40 high. Beyond this is a well planted and extenſive park, containing ſeven acres, on the northern ſide of which is the printing office, ornamented with a good portico of the Doric order. Oppoſite to this is a building containing the laboratory, and anatomical lecture room. The grand front of the college is 350 feet in extent, ornamented with Corinthian pillars and other decorations. Over the veſtibule, which is an octagon, terminated with groined arches, in the centre of this front, is the muſeum, a fine room 60 feet by 40. At a ſmall diſtance to the ſouth ſide of this front, is an elegant edifice, in which the provoſt reſides. Such is the univerſity of Dublin, yielding to no other in proportion to its extent. It has its defects, but there is a diſpoſition to correct them, and a diſcuſſion of them here would ſwell an article already too long. The writer cannot conclude, what he truſts will be found a fair and impartial account of his *alma mater*, without adding his ſincere prayer *eſto perpetua*.

Dublin, a townſhip of America, in the ſtate of New Hampſhire and Cheſhire county, ſeated on a branch of Aſhuelot river, and north of the great Monadnock, containing 1188 inhabitants; 28 miles S.E. of Charleſtown, and 63 W. of Portſmouth; incorporated in the year 1771.

Dublin, *Lower*, a pleaſant town in Philadelphia county and ſtate of Pennſylvania, 10 miles N.E. of Philadelphia, and as far S.W. of Briſtol, containing 1495 inhabitants.—Alſo, a townſhip of Huntingdon county in Pennſylvania, including 978 inhabitants.

DUBNO, a town of Poland, in the palatinate of Volhynia; 24 miles S.S.E. of Lucko.—Alſo, a town of Poland, in the palatinate of Belcz; 40 miles N. of Belcz.

DUBOJA, a town of Lithuania, in the palatinate of Brzeſc; 10 miles W.S.W. of Brzeſc.

DUBOIS, **William**, in *Biography*, was born in 1656, at Brive-la-Gaillarde in Limoſin, where he received the early parts of his education, and exhibited thoſe naſcent talents which evince to the poſſeſſor the power of becoming great. When he was very young, he manifeſted a propenſity to falſehood that ſeems never to have left him. To complete his ſtudies, he entered himſelf at the college of St. Michael at Paris: ſuch, however, was his indigence, that he was obliged to ſerve the principal in the ſubordinate office of valet. Having acquired a good portion of learning, as well in philoſophy as in the languages, he became a preceptor in different families, and at length was ſub-governor to the duke de Chartres, afterwards the regent duke of Orleans. Here he acted his part ſo well, that he was ſhortly made preceptor, with a conſiderable ſalary. The principles of Dubois at this period were pliant and corrupt, ſo that nothing ſtood in his way of preferment. He was employed to perſuade his pupil to marry the king's natural daughter, madame de Blois; and his ſucceſs in this was rewarded with the abbacy of St. Juſt. He was ſent to England in a political character; and on this and other occaſions performed the duties required of him with ſo much diligence, that he obtained very conſiderable preferment in the church: this being regarded as the only proper method of rewarding the agents of the court. In the year 1715 his pupil became regent; and ſuch was the character of Dubois at this time, that almoſt the only condition impoſed on the prince by his mother was, "that he ſhould not employ the knave Dubois." To this, however, he paid but little attention; and after a ſhort time appointed him counſellor of ſtate; and in 1717, he was ſent ambaſſador into England, where he ſigned the triple alliance. On his return he was made miniſter and ſecretary of ſtate; and ſhortly after, he obtained the richeſt archbiſhopric in the kingdom, *viz.* that of Cambray, though no man ſeems to have been leſs fitted for the office than Dubois. Againſt this elevation cardinal Noailles entered his proteſt, regarding it as calculated to deſtroy all veneration for the church in the minds of the laity. In the next year, 1721, he was made cardinal, but not without meeting with a decided oppoſition from the pope, Innocent III., who was well acquainted with the infamy of his moral character. In this rank of life he commanded the higheſt offices of ſtate, and was admitted into the council of regency in 1722, and firſt miniſter of ſtate. He alſo claimed the right of being a member of the French academy, under the title of "Monſeigneur;" and, in the following year, the French clergy choſe this man to be their firſt preſident. Thus, arrived at the ſummit of power and place, rolling in opulence, and beholding almoſt every thing crouch in obeiſance before him, there ſeemed nothing wanting to render him great and happy, if happineſs could be the reſult of power; but, in the midſt of his honours, he was attacked with a fatal diſeaſe, the conſequence of early debaucheries, which, after a painful chirurgical operation, put a ſpeedy end to his life. He died Auguſt, 1723, at the age of 67, leaving behind him a character more infamous than can well be conceived. Moreri.

Dubois, John, born at Liſle in Flanders, after finiſhing his courſe of claſſics, applied to the ſtudy of medicine; and in 1557, he was admitted a doctor in that faculty, at the univerſity of Louvain. On taking his degree, he pronounced a declamation, in Latin, "De Lue Venerea," which procured him ſome credit. He then went and ſettled at Valencien, where he diſtinguiſhed himſelf ſo well, as to be appointed principal of the college of St. John. In 1562, he was made profeſſor of medicine, in the univerſity which Philip II. had recently founded, at Douay. In this poſt, which he filled with credit, he continued 13 years. He died April 5th, 1576. His works are, "De Curatione Morbi Articularis, Tractatus quatuor," 8vo. 1557; "Morbi populariter graſſantis Præſervatio et Curatio," Lovanii, 1572; "De Studioſorum et eorum qui Corporis Exercitationibus addicti non ſunt, tuenda Valetudine," Duaci, 1574, 8vo. Haller Bib. Med. Eloy Dict. Hiſt.

Dubois, Francis, or Francis Sylvius De le Boe, born at Hanau, in the circle of the Upper Rhine, in 1614, received the rudiments of his education at Sedan, whence he went to Bale, where he was admitted doctor in medicine in 1637. Not ſatisfied with his acquirements, he viſited ſeveral of the univerſities in France and Germany. At length he went to Leyden; and in 1658 he was appointed to the chair of profeſſor in medicine in that univerſity, which had become vacant by the death of Albert Kyper. His character here, both as a teacher and practitioner, ſoon became ſo extended, that as there were few caſes in medicine that were difficult in which he was not conſulted, ſo there were none of the claſſes ſo numerouſly attended as that over which he preſided. In 1670 he was made rector of the univerſity, and two years after he died, in the 58th year of his age. He attended with his pupils the ſick wards of the hoſpital, explained to them the nature of the diſeaſes with which the patients were afflicted; and he opened before them ſuch of the patients as died, and ſhewed them the changes which had taken place in the organs that were the ſeat of the diſeaſes. He had the merit of being one of the moſt ſtrenuous defenders of the doctrine of the circulation of the blood, as deſcribed by Dr. Harvey, and which, we know, at firſt met with much oppoſition. He alſo made conſiderable advances in the ſtudy of chemiſtry, to which he was much attached. He was, however, too much attached to the humoral pathology, attributing all diſeaſes to ſome fault in the blood or juices, which he ſuppoſed, in moſt caſes, were vitiated by a redundancy of acid. His remedies, therefore, were principally taken from the alkalies, a doctrine which by degrees became general over Europe. Notwithſtanding his numerous avocations, he found time to write a conſiderable number of treatiſes on various parts of medicine, though few of them were publiſhed in his life-time. They have been ſince collected, and form a large volume in folio. "Opera medica, tam hactenus inedita, quam variis Formis et Locis edita, nunc vero certo Ordine diſpoſita, et in unum Volumen reducta," Amſtel. 1679. It has been ſeveral times reprinted. For the titles of the ſeveral treatiſes, ſee Haller's Bib. Med. Eloy Dict. Hiſt.

Dubois, or, as he is more commonly called, James Sylvius, a learned and voluminous writer of the 16th century, was ſo attached to the ancients, particularly to Hippocrates and Galen, the greater part of whoſe works he tranſlated and edited, that he conſtantly oppoſed every thing that was novel in doctrine or practice. Hence he kept up a conſtant warfare with Veſalius, his cotemporary, whoſe diſcoveries and improvements in anatomy, although obvious to the ſenſes, he refuſed to admit. Sylvius was born in the dioceſe of Amiens, in 1478, and was educated under his brother Francis, who had ſo far diſtinguiſhed himſelf by his knowledge of the Greek and Latin languages, that he was promoted to the office of principal of the college of Tourney. After remaining ſeveral years with his brother, and having been initiated in the knowledge of medicine, which he alſo taught to younger ſtudents, to obtain what was neceſſary for his maintenance, he went to Montpellier in 1529, where, by the favour of the univerſity, and in conſideration of his great learning and his age, he was immediately received bachelor, and the year following doctor in medicine. He then returned to Paris, and was appointed profeſſor in medicine; a poſt which he filled with honour to himſelf and advantage to his pupils, to the time of his death, which happened on the 13th of January, 1555, in the 76th year of his age.

His works, which were numerous and much eſteemed in his time, were collected by Rene Moreau, and publiſhed in one volume folio, at Geneva, in 1635, under the title of "Opera medica, jam demum in ſex Partes digeſta, caſtigata, et cum Indicibus neceſſariis inſtructa." For the titles of the particular treatiſes, with the times and order of their publication, the reader is referred to Haller's Bib. Med. As Dubois had ſuffered much, for want of being able to procure proper aids for his ſtudies in the younger part of his life, and he was old before he attained to affluence, it is probable he could not then give up the habits of parſimony which his indigence had obliged him to adopt. Some wit has laſhed that vice with the following:

> "Sylvius hic ſitus eſt, gratis qui nil dedit unquam,
> Mortuus, et gratis quod legis iſta, dolet."

Haller Bib. Med. Eloy Dict. Hiſt.

Dubois, Simon, a painter of portraits, battles, and cattle, was born at Antwerp; and having become rich by his profeſſion, died in 1708.

Dubois *Lake*, in *Geography*. See *Lake Du* Bois.

DUBOS, Charles Francis, in *Biography*, was born in the year 1661, in the dioceſe of St. Flour in Auvergne. He was ſent to Paris for education, where, after having gone through a courſe of claſſical learning and philoſophy, he devoted himſelf to the ſtudy of theology, and took his degrees in the college of the Sorbonne. Many offers of preferment were propoſed to him, at length he cloſed with one from the biſhop of Luçon, who appointed him principal archdeacon of his church, and confidential grand vicar. In this ſituation, he obtained the friendſhip of the prelate, became an inmate in his houſe, and entruſted by him with the moſt important of his concerns. After the death of his worthy patron, he was elected to a deanery under very honourable circumſtances. This office he held till the 64th year of his age, when he died. He lived honoured and eſteemed by all ranks, and his death was lamented by his friends, to whom he was endeared by the tendereſt tie, and by the poor, who had experienced in him a kind and active benefactor. Dubos reſumed the celebrated "Luçon conferences," which, after the publication of five volumes had been ſuſpended about ten years. To theſe he added 17 others in 12mo., and left materials for 15 more. He was alſo the author of "A ſketch of the life of M. Barillon, biſhop of Luçon," publiſhed in 1700. Moreri.

Dubos, John Baptist, abbot of Reſons, was born in 1670 at Beauvois, where he was educated for the church, but ſome diſappointmeuts cauſed him to turn his attention to the civil law, hiſtory, and politics. In 1695, he publiſhed his "Hiſtory of the Four Gordians proved and illuſtrated by Medals," in which he attempted to prove the exiſtence of a fourth of this imperial family, in addition to the three uſually reckoned. After this, he was employed in many foreign negociations. He came to England to perſuade the people to conſent to a peace with France; for this purpoſe he publiſhed a work, entitled "The intereſts of England ill underſtood in the preſent War," 1704, which obtained a very limited circulation, and made ſcarcely any impreſſion on thoſe for whom it was intended. The only thing remarkable in it, is a prediction of the future ſeparation of the North American colonies. In 1709, he publiſhed a "Hiſtory of the League of Cambray againſt the Venetian republic," which was intended to ſerve the cauſe of peace, by affording a ſtriking example of the ill ſucceſs of a league of many powers againſt an individual ſtate. Dubos was employed in the negociations at Utrecht, Baden, and Radſtadt, and his labours were rewarded by church preferment. He was an agent in the hands of the duke of Orleans, and cardinal Dubois, but never acted even for theſe a diſhonourable part, though he uſually gave them ſatisfaction. Wearied, perhaps, of a political life, he became diſtinguiſhed for his zeal in polite literature and the fine arts, and in 1719, publiſhed a work, entitled "Critical Reflections on Poetry and Painting," in two vols. 12mo. which has gone through ſeveral editions. This work obtained for the author the office of perpetual ſecretary to the French Academy, in the place of Andrew Dacier. He next employed himſelf in elaborate enquiries relative to the early French hiſtory, which led him to publiſh "A critical Hiſtory of the Eſtabliſhment of the French Monarchy in Gaul," in 3 vols. 4to. which was highly eſteemed by many of the moſt eminent authors of the day. He wrote ſeveral other pieces, and died in March 1742. Moreri.

The abbé Dubos, an eminent writer on many ſubjects, was neither ſo faithful as an antiquary, nor ſo ingenious in his conjectures as he was long imagined. His agreeable ſtyle, and inſinuating manner, were ſuch as to make his readers forget to doubt. In his "Reflexions critiques ſur la Poeſie et ſur la Peinture," tom. iii. there are ſome bold and unqualified aſſertions concerning ancient muſic, that ſeem to require particular notice among muſical articles. The abbé does not write ex profeſſo on muſic; it is chiefly in his diſſertation on the theatrical repreſentations of the ancients that he ſpeaks with ſo much firmneſs of Greek muſic, as a good judge might be allowed to do of muſic which he heard but yeſterday.

Voltaire, in characterizing this ingenious writer in his "Siecle de Louis XIV." ſays: "he did not underſtand muſic, had never written a line of poetry, and was not in poſſeſſion of a ſingle picture; but he had read much, and ſeen and reflected much on the arts. He was as well acquainted with ancient literature as the modern, and with ancient and foreign languages as with his own." But it does not follow, that becauſe Voltaire was a man of wit, and a good poet, that he was a good judge of painting and muſic, for neither of which does he manifeſt partiality, or diſcover the leaſt knowledge in its principles.

Dubos's eloge on Lulli, whom he ſtyles the greateſt poet in muſic, with whoſe works he was acquainted; on the ſublimity of his airs for dancing, &c. ceaſes to command attention. The ſame raptures, and ſtill greater, were afterwards expreſſed in France for the works of Rameau, than for thoſe of Gluck and Piccini; and now for thoſe of Haydn, Mozart, and Paeſiello. At preſent, however, there does not remain in France a ſingle idea of that muſic, which Dubos ſo excluſively extolled; and his notions of ancient muſic are ſtill leſs to be confided in, than the modern: among other abſurdities he aſſerts, boldly, that the performer in the ancient dramas was accompanied by a *baſſo continuo,* not like that of the French opera, but like the baſe accompaniment to Italian recitative; and determines, from a paſſage and plate in Bartholinus, that the inſtrument upon which this *continued baſe* was played, was a flute! With the ſame courage, and the ſame truth, this lively author aſſerts, that the *ſemeia,* or muſical characters of the Greeks, were nothing more than the initial letters of the names of the ſixteen notes in the great ſyſtem, or diagram! Opinions which merely to mention, is to confute.

Dilettanti, muſical critics, without poſſeſſing the neceſſary præcognita, know not what is practicable, what impoſſible, what is already known, or what is ſtill to be diſcovered. We have known many gentlemen and ladies who have been admirable performers of the muſic of others; but when they erect themſelves into compoſers and critics, they diſcover more ignorance than the loweſt and moſt clumſy profeſſor that was ever admitted into an orcheſtra or organ-loft.

What Dubos ſays in defence of the *maſks* through which theatrical performers ſpoke or ſung, is more reaſonable. "The Spectator, ſays he, loſt but little on the ſide of *face-playing,* by the introduction of *maſks;* for not one-third of the audience was near enough to the actor to diſcern the play of muſcles, or working of the paſſions in the features of his face; at leaſt to have received pleaſure from them; for an expreſſion muſt have been accompanied with a frightful grimace and diſtortion of viſage, to be perceptible at ſo great a diſtance from the ſtage." But when he ſays, "foreigners find that the French underſtand *time* and *rhythm* better than the Italians,"—all muſt know, except his countrymen of the old ſchool, that the direct contrary is true, and indeed almoſt all the opinions of this writer, concerning both ancient and modern muſic, which were reſpected four ſcore years ago, would be defended now by few, even among the natives of France.

DUBOVKA, in *Geography,* a town of Ruſſia, in the government of Saratof, on the weſt ſide of the Volga; 60 miles S. of Kamiſchin.—Alſo, a fort of Ruſſian Tartary, in the government of Caucaſus, on the Malwa; 12 miles W. of Kizliar.

DUBOURG, Matthew, in *Biography,* a very eminent performer on the violin, whoſe conduct as well as performance, acquired him patrons and friends, which rendered his long life happy, and honourable to himſelf and profeſſion.

This excellent performer, born in 1703, was the natural ſon of the celebrated dancing-maſter, Iſaac, and had inſtructions on his inſtrument by Geminiani, ſoon after his arrival in England, 1714. In 1715, the young Dubourg, at twelve years old, had a benefit concert at the great room, afterwards the Tennis-court, in James's-ſtreet; and is ſaid to have played, ſtanding on a joint ſtool, a ſolo, at Briton, the ſmall coal-man's concert, much earlier. From this time till the year 1720, when the Royal Academy was formed at the opera-houſe, Dubourg played ſolos and concertos at almoſt every benefit concert beſides his own. From that period he was ſufficiently ſteady and powerful to lead the band at the concerts, where he performed ſolos, till the year 1728, when he had arrived at ſuch fame and patronage as procured him the appointment of compoſer and maſter of his majeſty's band in Ireland. He reſided ſeveral years in that kingdom afterwards. But from the the year 1735, when he was taken into the ſervice of the late prince of Wales, he frequently viſited England. We ſaw and heard him while at his beſt in the ſummer of 1744, at Cheſter, and had the pleaſure of accompanying him in Corelli's 5th ſolo, which he performed in a manner ſo ſuperior to any one we had ever heard, that we were equally aſtoniſhed and delighted, particularly with the fulneſs of his tone, and ſpirit of his execution.

It has been erroneouſly ſaid, that Dubourg was no compoſer; he was indeed no publiſher, but the odes which he ſet for Ireland, and innumerable ſolos and concertos which he compoſed for his own public performance, are now in the poſſeſſion of one of his diſciples, and of ſome of them the compoſition is excellent.

On the demiſe of Feſting, in 1752, he was appointed leader of the king's band, and upon that and the produce of his place in Ireland, he ſeems to have enjoyed eaſe and tranquillity to the end of his life, which was terminated in 1767, at the age of 64. He was buried in Paddington church-yard, and on his monumental ſtone are engraved the following lines:

> "Though ſweet as Orpheus, thou couldſt bring
> Soft pleadings from the trembling ſtring,
> Uncharm'd the king of terror ſtands,
> Nor owns the magic of thy hands."

DUBRAVITZ, in *Geography,* a town of European Turkey, in the province of Moldavia; 36 miles N.W. of Galatz.

DUBRAW, John, in *Biography,* a German prelate, ſtateſman, and hiſtorian in the 16th century, was born at

Pilſen, in Bohemia. He was educated in Italy, and obtained the degree of doctor of laws. He was afterwards employed in a political capacity by Stanilaus, biſhop of Olmutz, in Moravia. By this prelate he was engaged in various negociations of conſiderable importance, and was entruſted by him with the direction of his troops which he ſent to the relief of Vienna. He was afterwards raiſed to the ſee of Olmutz himſelf, which he enjoyed about ſix years. His character as a divine did not prevent him from continuing his ſervices as a ſtateſman, which in ſeveral inſtances were of the higheſt intereſt to his country. He publiſhed, in the year 1552, a hiſtory of Bohemia in thirty-three books, which is highly commended for fidelity and accuracy, and in the following year he died. A new edition of his work, with additions, was publiſhed in 1574, by Thomas Jourdaine; and another at Frankfort in 1688, to which is added a hiſtory of Bohemia, by Æneas Sylvius. Moreri.

DUBROWA, in *Geography*, a town of Lithuania, in the palatinate of Wilna; 74 miles E.S.E. of Wilna.

DUBROWICA, a town of Lithuania, in the palatinate of Brzeſc; 46 miles S.E. of Brzeſc.

DUBUDY. See DUBDY.

DUC, FRONTON DU, in *Biography*, a learned French jeſuit, was born at Bourdeaux about the year 1558. He entered into the order when he was nineteen years of age, and was almoſt immediately appointed to the tuition of the junior members in the principles of rhetoric. As a teacher he was employed, in different places, about twenty years, when he began to be known as an author. His firſt production of importance was a Latin tranſlation of the works of St. Chryſtoſtom, in ſix volumes folio, with notes. He was afterwards engaged in a theological controverſy with the celebrated Mornay du Pleſſis-Marli, on the ſubject of the practice and doctrine of the ancient churches, relative to the euchariſt. This diſpute laſted ſeveral years, after which Du Fronton was appointed librarian to the jeſuits at Paris, and about the ſame time Henry IV. had determined upon printing the ſelect MSS. from the collection of the royal library, and had engaged ſeveral learned men to employ themſelves on editions of the profane writers. The clergy of France, in one of their aſſemblies, aſſigned to the jeſuits the care of preparing for publication the writings of the Greek fathers, and father Du Fronton was, on account of his great learning, appointed to that buſineſs, in which he ſpent the remainder of his days. The laſt years of his life were ſpent in almoſt inceſſant pain from repeated attacks of the ſtone, to which he fell a victim in the year 1624. His various works as an original author, tranſlator, and editor, are enumerated by Moreri. He was eſteemed one of the moſt learned men and ableſt critics of his day, and was at the ſame time unaſſuming, and pious. He enjoyed the correſpondence and friendſhip of the moſt diſtinguiſhed literary characters of the age, as well of the proteſtant, as of his own communion. Moreri.

DUC, JOHN LE, a painter of animals, was born at the Hague in 1636, where he was appointed director of the academy of painting, and died in 1671.

DUCA, in *Geography*, a town of Italy, in the kingdom of Naples, and province of Bari; 6 miles N.W. of Bari.

DUCÆ, in *Ancient Geography*, a people of Africa, in Mauritania Ceſarienſis, according to Ptolemy; but as he places them in the vicinity of Sitifi, they ſeem to belong to Mauritania Sitifenſis.

DUCAL. The letters patent granted by the ſenate of Venice, are called ducals: ſo alſo are the letters wrote in the name of the ſenate, to foreign princes. The denomination of ducal is derived hence: that, at the beginning of ſuch patents, the name of the duke, or doge, is wrote in capitals, thus, "N ——— Dei Gratia Dux Venetiarum, &c." The date of ducals is uſually in Latin, but the body is in Italian. A courier was diſpatched with a ducal to the emperor, returning him thanks for renewing the treaty of alliance (in 1716) againſt the Turks, with the republic of Venice.

DUCAREL, ANDREW COLTER, in *Biography*, was born in Normandy, in 1713, but was brought to England by his father during infancy. He received his grammar learning at Eton ſchool, and from that ſeminary he went to St. John's college, Oxford, where he took his degree of LL. B. In 1742, he became a member of the college of civilians in Doctor's Commons; and, in 1752, he made a tour in his native country, of which he publiſhed an account ſoon after his return, which he reprinted in 1767, under the title of "Anglo-Norman Antiquities." He had, however, ſome years previouſly to this, been elected to an office in the chapel of St. Catharine near the tower, which was peculiarly grateful to him on account of its affording him a good opportunity of purſuing his antiquarian ſtudies. In 1757, he was appointed librarian of the palace of Lambeth, and in the following year was made commiſſary and official of the city and dioceſe of Canterbury. About this period he addreſſed to the antiquarian ſociety, of which he had been ſome years an active and indefatigable member, a ſeries of above two hundred Anglo-Gallic, or Norman and Aquitaine coins of the ancient kings of England, exhibited in copper-plate engravings, and illuſtrated with letter-preſs. In 1762, he was elected a member of the Royal Society, and was ſoon after a contributor to its Tranſactions, in an account of the early cultivation of botany in this country. Dr. Ducarel's ſituation in the library at Lambeth led him to the ſtudy of eccleſiaſtical antiquities, and he made large collections on the ſubject. In the year 1763, he was appointed, with ſir Joſeph Ayloffe and Mr. Aſtle, to methodiſe the records in the ſtate paper office in Whitehall, and in the augmentation office. In 1782, he publiſhed "The Hiſtory of the Royal Hoſpital and Collegiate Church of St. Catharine," and in the following year, an account of the town and palace of Croydon. In the Bibliotheca Topographica he gave "The Hiſtory and Antiquities of the Archiepiſcopal palace of Lambeth from its foundation to the preſent time." He continued an unwearied application to buſineſs, and his favourite ſtudies till his death which happened in the ſpring 1785. Independently of the works of which this learned man was the ſole author, he contributed to ſeveral others connected with antiquarian ſubjects, and had a conſiderable ſhare in the "Account of Alien Priories." It was his cuſtom for many years, previouſly to his death, to take a ſummer journey, with a ſingle friend, and as privately as poſſible, for the purpoſe of purſuing his favourite reſearches. Biog. Brit.

DUCART, ISAAC, a painter of flowers, generally on ſatin, was born at Amſterdam in 1630, and died in 1697.

DUCAT, a foreign coin, either of gold or ſilver, ſtruck in the dominions of a duke; being about the ſame value with the Spaniſh piece of eight, or a French crown, of four ſhillings and ſix-pence ſterling, when of ſilver; and twice as much, when of gold. See COIN.

The origin of ducats is referred to one Longinus, governor of Italy; who, revolting againſt the emperor Juſtin the Younger, made himſelf duke of Ravenna, and called himſelf *Exarcha*, *i. e.* without lord or ruler; and, to ſhew his independence, ſtruck pieces of money of very pure gold, in his own name, and with his own ſtamp, which were called *ducati*, ducats; as Procopius relates the ſtory.

After him, the firſt who ſtruck ducats were the Venetians, who called them alſo Zecchini, or ſequins, from Zecca, the place where they firſt were ſtruck. This was about the year 1280, in the time of John Danduli: but we have pretty good evidence, that Roger, king of Sicily, had coined ducats as early as 1240. And Du-Cange ſcruples not to affirm, that the firſt ducats were ſtruck in the duchy of Apulia, in Calabria. The chief gold ducats now current, are, the ſingle and double ducats of Venice, Florence, Genoa, Germany, Hungary, Poland, Sweden, Denmark, Flanders, Holland, and Zurich. The heavieſt of them weighs five penny-weights ſeventeen grains, and the lighteſt five penny-weights ten grains; which is to be underſtood of the double ducats, and of the ſingle in proportion.

The Spaniards have no ducats of gold; but, in lieu thereof, they make uſe of the ſilver one; which, with them, is no real ſpecies, but only a money of account, like our pound. It is equivalent to eleven rials. (See Rial.) The ſilver ducats of Florence ſerve there for crowns.

DUCATOON, a ſilver coin, ſtruck chiefly in Italy; particularly at Milan, Venice, Florence, Genoa, Lucca, Mantua, and Parma: though there are alſo Dutch and Flemiſh ducatoons.

They are all nearly on the ſame footing; and, being a little both finer and heavier than the piece of eight, are valued at two-pence or three-pence more, *viz.* at about four ſhillings and eight-pence ſterling.

There is alſo a gold ducatoon, ſtruck and current chiefly in Holland: it is equivalent to twenty florins, on the footing of one ſhilling and eleven-pence halfpenny the florin.

DUCE, in *Geography*, a ſmall town of France, in the department of La Manche, chief place of a canton in the diſtrict of Avranches; 6 miles S. E. of that place, with a population of 1611 individuals. The canton has an extent of 120 kiliometres, and comprizes 12 communes, with 8754 inhabitants.

DUCENARIUS, in *Antiquity*, an officer in the Roman army, who had the command of two thouſand men.

The emperors had alſo ducenarii among their procurators, or intendants, called *procuratores ducenarii.* Some ſay, that theſe were ſuch whoſe ſalary was two hundred ſeſterces; as in the games of the circus, horſes hired for two hundred ſeſterces, were called ducenarii. Others hold that ducenarii were thoſe who levied the two hundredth penny, the officers appointed to inſpect the raiſing of that tribute. In the inſcription at Palmyra, the word ducenarius, in Greek δȣκεναριος, occurs very often.

DUCENTESIMA, a tax of the two hundredth penny, exacted, by the Roman emperors.

DUCES Tecum, in *Law*, a writ commanding one to appear at a certain day in the court of chancery, and to bring with him ſome evidences, or other things, which the court would view.

Duces *tecum licet languidus*, a writ directed to a ſheriff, who, having in his cuſtody a priſoner, in a perſonal action, returns, upon a *habeas corpus*, that he is *adeo languidus*, that, without danger of death, he cannot have his body before the juſtices. This is now out of uſe. Where a perſon's life would be in danger by removal, the law will not permit it to be done.

DUCHAL, James, in *Biography*, was born at or near Antrim in the year 1697. For the principal part of his early education he was indebted to the celebrated Mr. Abernethy. His college ſtudies he purſued at Glaſgow, from whence he removed to, and ſettled among, a ſmall congregation of diſſenters at Cambridge, where he remained ſeveral years, improving the advantages which the ſituation afforded in the beſt manner poſſible. About the year 1730, he accepted an invitation to Antrim, to ſucceed his friend and preceptor Mr. Abernethy, whom he again ſucceeded at Dublin in the year 1740. In the year 1752, Mr. Duchal publiſhed his work, entitled "Preſumptive Arguments for the Truth and divine Authority of the Chriſtian Religion, in ten ſermons: to which is added, a ſermon upon God's Moral Government." Almoſt immediately upon the appearance of this volume, the author had the degree of doctor in divinity conferred upon him by the univerſity in which he had been educated. He died in the year 1761, deeply regretted by his friends. He ever maintained a high character for piety, and every Chriſtian virtue. In his religious ſentiments he was liberal, and candid, and as a preacher he maintained a high rank among his contemporaries. After his death three volumes of his ſermons were publiſhed, which have been highly eſteemed on account of their excellent tendency. Beſides theſe, Dr. Duchal publiſhed three diſcourſes while he was at Cambridge, entitled, "The Practice of Religion recommended;" and he is ſuppoſed to have been the author of various occaſional publications, both in England and Ireland, which related to the theological controverſies of the period in which he flouriſhed. Biog. Brit.

DUCHESS, in *Geography.* See Dutchess.

Duchess, *La*, a town of Naples, in the province of Abruzzo Ultra; 11 miles S.S.W. of Aquila.

DUCHOUTSCHINA, a town of Ruſſia, in the government of Smolenſk; 24 miles N. of Smolenſk, and 300 S.S E. of Peterſburg.

DUCHY Court *of Lancaſter.* See Court.

DUCK, Stephen, in *Biography*, was an Engliſh poet, more diſtinguiſhed by his fortune and his fate than by the brilliancy of his genius, or the excellency of his poetry; and whoſe labours excited more attention, and received more patronage, than any cotemporary writings, though far ſuperior in meritorious claims. For a ruſtic genius was then a novel thing, and a poet from the barn appeared as great a prodigy as a dictator from the plough. He was born at an obſcure village in Wiltſhire, A.D. 1700. His early education was ſuch as was afforded by a common country ſchool; where he learned to read and write, to which was added a little knowledge of arithmetic. At the age of 14, he was taken from ſchool, and employed afterwards in all the menial offices of a country life. His inclination for learning, however, muſt have been prodigiouſly great; for he was married in ſervice; was poſſeſſed of no books, nor money to purchaſe them. He contrived, by working over-hours, to obtain ſufficient money to buy a few, and others he borrowed of his friends. Theſe he peruſed, by frequently ſtealing a few hours from ſleep. Though limited in time, he could read but little; yet he thought more. His ſcanty library conſiſted chiefly of works in verſe, which probably turned the bias of his mind in favour of poetry. And the ſcattered pieces in the Spectators induced him to try, if he could not ſucceed in making verſes himſelf. A very early poem, though not the firſt written, was that on his own occupation, entitled, "The Threſher's Labour," addreſſed to the Rev. Mr. Stanley; and which, excepting the one on "Friendſhip," is perhaps the beſt in the whole collection. Duck now became noticed as a ſurpriſing genius, and obtained ſome little notice from the neighbouring gentry. But had it not been for his friend and admirer Mr. Spence, he might have written verſes, and ſtill been doomed to plod on in the ſame dull round of abject ſervitude, till the cloſe of life; and continued to complain:

> "Thus as the year's revolving courſe goes round,
> No reſpite from our labours can be found:
> Like Siſyphus, our work is never done;
> Continually rolls back the reſtleſs ſtone:
> New-growing labours ſtill ſucceed the paſt;
> And growing always new, muſt always laſt."
> The Threſher's Labour.

Through the means of Mr. Spence, he was introduced to queen Caroline, who took him under her patronage, and allowed him a penſion of 30*l. per annum;* which he gratefully acknowledged in the dedication of his poems. After he had taken holy orders, he was preſented to the valuable living of Byffat in Surrey. But it does not appear that this preferment, though great, contributed at all to his happineſs: for he was obſerved ever afterwards to be melancholy. Whether his ambition had been diſappointed, in not being exalted ſtill higher; or his vanity hurt at the diminution of his early popularity; or that conſcience accuſed him for having aſſumed an office, for the duties of which his previous learning by no means had qualified him, and which he had accepted as a kind of ſinecure, or at leaſt with a view to the emoluments attached,—is not known. Perhaps ceſſation from his uſual labours might have been the cauſe. In a fit of inſanity, he threw himſelf into the Thames, and was drowned, in the month of June, in the year 1756. His works were publiſhed in 8vo. London. 1730; and in 4to. with an account of the author, by Mr. Spence, prefixed, London, 1736.

Duck, in *Geography*, a river of America, in Teneſſee, which riſes on the N.W. ſide of the Cumberland mountains, runs a N.W. courſe, and diſcharges itſelf into the Teneſſee, in N. lat. 36°. At 5 miles from its mouth, 57 miles weſterly of Naſhville, it is 200 yards wide; and it is paſſable by boats for 90 miles.

Duck, a lake of North America. N. lat. 54° 50′. W. long. 108° 30′.

Duck *Creek Croſs Roads*, or *Saliſbury*, a conſiderable and thriving poſt-town of America, in the ſtate of Delaware, ſituated on Duck creek, which in part divides Kent and Newcaſtle counties. It contains about 100 houſes in one ſtreet, and carries on a conſiderable trade with Philadelphia; and is one of the largeſt wheat markets in the ſtate. It has an epiſcopal church, and a poſt-office; 11 miles N.W. of Dover, and 36 from Wilmington.

Duck *Iſland*, a ſmall iſland in the Atlantic, near the coaſt of Main in America. N. lat. 44° 45′. W. long. 67° 43.

Duck *Iſlands*, called the *real ducks*, lie in lake Ontario, Upper Canada, between Wolfe iſland and Point Traverſe.

Duck, in *Ornithology*, the name of a large tribe of birds, ſynonymous with the Linnæan term Anas, and comprehending the whole of thoſe families of the aquatic kind, which are known by the denomination of ſwans, geeſe, ducks, and teal. The word duck may be underſtood to imply only that family which is commonly ſo named, but, in a general ſenſe, muſt be conſidered as the Engliſh generic appellation of anas. The character of the genus conſiſts in having the bill convex and obtuſe, with the edges divided into lamellate teeth; tongue fringed, obtuſe; three fore-teeth connected, the hind-one ſolitary. The following ſpecies are deſcribed by Linnæus, Gmelin, Latham, and others.

* *Anas, with the bill gibbous at the baſe.*

Cygnus. Bill ſemi-cylindrical, blackiſh and yellow; cere yellow; body white. *Cygnus ferus*, Linn. *Cygne ſauvage*, Buff. *Wild ſwan*, Br. Zool. *Whiſtling ſwan*, Lath.

This is rather ſmaller than the tame ſwan, and inhabits Europe, Aſia, and America. The wild ſwan is gregarious, and is ſometimes ſeen in ſevere winters in Britain, aſſembled together in flocks of five, ſix, or more. It has a remarkable whiſtling note, whence it derives the name of whiſtling ſwan. This note, which it utters chiefly in flight, is ſo loud as to be often heard when the bird itſelf is ſo high in the air as to be imperceptible to the naked eye. It appears that this ability ariſes from the peculiar conſtruction of the wind-pipe, which is extremely different from that in the common ſwan: in the firſt of theſe, the wind-pipe, after entering the cheſt a little way, is reflected from thence in the form of a trumpet, and again returning into it, divides into two branches, and joins the lungs; in the other, on the contrary, the wind-pipe enters at once into the lungs, and, in conſequence of this, it is enabled only to make a hiſſing noiſe. The wild ſwan runs ſwiftly, and ſwims with its neck erect. The female lays four eggs. The fleſh of this bird is not only eatable, but held in much conſideration in the north of Europe, and in America. The various uſeful purpoſes to which the feathers of the ſwan are applied are well known. Their ſkins are worn by the Indians, in many parts of America; and having the downy ſurface turned inwards, afford an article of warm and comfortable clothing. The legs of this bird are ſometimes reddiſh.

Olor. Bill ſemi-cylindric and black; cere black; body white. *Anas olor*, Gmel. *Anas cygnus* (*manſuetus*), Linn. *Le cygne*, Buff. *Tame ſwan*, Albin., &c.

Found in a wild ſtate in Ruſſia and Siberia, from whence they have been conveyed to various parts of Europe and Aſia; and being eaſily tamed and domeſticated, form an elegant and appropriate ornament to parks and other grounds, poſſeſſing the advantages of an ample ſheet of water. Nothing can indeed exceed the grace and dignity with which the ſwan glides or ſwims through the watery element, aſſuming the proudeſt attitudes, and ſeeming conſcious of deſerving admiration. In England, they are protected by law: thoſe kept on the Thames are eſteemed royal property, and ſtealing their eggs is deemed felony. The tame ſwan is a ſtrong, robuſt creature, and is ſaid to live to the age of an hundred years. They feed on fiſh and aquatic plants, and build in high graſs near the water. Their eggs, from ſix to eight in number, are laid one every other day. The young ſwans are called cygnets, and were formerly conſidered as a delicacy for the table; the fleſh of the adult birds is hard and ill-flavoured.

Nigricollis. Bill ſemi-cylindric and red; head and neck black; body white; legs fleſh-coloured. Gmel. *Melancorypha*, Molin. *Black-necked ſwan*, Bougan. *Black-necked ſwan*, Lath.

Except in having the neck of a velvet black, the plumage agrees with the tame ſwan, and is about the ſame ſize. The ſpecies inhabits the Falkland iſlands, Rio del Plata, and the ſtraits of Magellan: it is likewiſe met with in Chili.

Atrata. Black; wings edged with white; bill red. *Black ſwan*, Phillip's Voy.

The black ſwan is rather ſmaller than the common kind; the upper mandible is blackiſh at the tip, and marked with a yellow ſpot; the legs black, with the feet paler. This kind inhabits Botany Bay, and has been introduced into England within the laſt few years.

BRACHYPTERA. Bill fulvous; body cinereous; wings ſhort; vent and band on the wing white. Lath. *Anas cinerea*, Gmel. *Oiſeau gris*, Pernet. *Race-horſe duck*, ibid. *Logger head duck*, Phil. Tranſ.

Length thirty-two inches; the bill orange, with black tip; ſecondary quill-feathers white on the outer edge; poſterior part of the belly blueiſh-black; on the bend of the wing a yellow knob half an inch long; legs browniſh-orange, with duſky webs and black claws. Theſe inhabit the Falkland iſlands, Staaten Land, &c. and were obſerved by our navigators with captain Cook to appear generally in pairs. From the ſhortneſs of their wings they were unable, it is ſaid, to fly; but their wings are ſerviceable to them on the water, being uſed as oars, with the aid of which they ſwim along with aſtoniſhing velocity. In order to catch them, our ſailors uſed to ſurround a flock with boats, and drive them aſhore, where, being unable to raiſe themſelves, they ran very faſt, but ſoon becoming tired, ſquatted down, and being eaſily overtaken, were knocked down and killed without difficulty. The fleſh is rank and has a fiſhy flavour.

HYBRIDA. Bill ſemi-cylindrical; cere red; tail ſomewhat pointed. *Molin.* Hybrid ſwan.

A native of Chili. Its ſize is that of a gooſe, but the neck is ſhorter, and the legs and wings longer; the male is white, with the legs and bill yellow; the female black, with a few feathers edged with white; bill and legs red. Theſe birds are found on the ſea-coaſts, lay from ſix to eight eggs on the ſands, and are obſerved to fly in pairs.

CYGNOIDES. Bill black and ſemi-cylindrical; cere gibbous; eye-lids tumid. Linn. *Anſer guineenſis*, Briſ. *Oie de Guinée*, Buff. *Spaniſh gooſe*, or *ſwan gooſe*, Albin. *Chineſe gooſe*, Arct. Zool.

An inhabitant of Europe, Aſia, and Africa. The length is about three feet; the bill wrinkled near the front, gibbous, aſcending, and ſurrounded at the baſe with a whitiſh line; the crown and longitudinal band down the neck and nape teſtaceous; back and flanks grey-brown, the plumage edged with whitiſh; beneath white; legs tawny, with black claws; protuberance on the chin blackiſh.

The variety of cygnoides, called by Linnæus *Orientalis*, and by Albin the Muſcovy gander, is ſmaller than the other; the bill is orange, the irides yellow; on the forehead is a large knob as in the laſt, and which is the ſame colour as the bill; beneath the throat is a wattle; the head and neck are brown, deepeſt on the hind part; back, wings, and tail the ſame, but deeper, and edged with paler; the quills, breaſt, and belly white; the female is ſmaller than the male. There appear to be ſome other varieties of this ſpecies. Theſe birds breed freely with the common tame geeſe, and are rather abundant in England at this time.

GAMBENSIS. Bill ſemi-cylindrical; cere gibbous; body black, beneath white; back purpliſh; bill, forehead, and legs red. *Gambenſis*, Linn. *Anas chilenſis*, Klein. *Spur-winged gooſe*, Lath.

Size of the common gooſe, but taller; the bill more than two inches long, of a red colour, with a protuberance of the ſame colour at the baſe; the cheeks and chin white, and the bend of the wing armed with a ſtrong ſpur of a horn colour, and about an inch and a half in length. The ſpecies inhabits Gambia and other parts of Africa.

INDICA. Grey, beneath pale aſh; head and neck white; lunule on the hind-head and ſpot beneath black; rump and vent white. *Barred-headed gooſe*, Lath.

A native of India, where it occurs in flocks of an hundred together, in the winter months, and is very deſtructive to the corn. It is ſuppoſed to come from Thibet, and other parts toward the north, diſappearing again as the ſummer approaches. The fleſh is good. This bird is about the ſize of the tame gooſe; the bill two inches long and bright yellow, with the nail black; the head, throat, and hind part of the neck are white; at the back part of the head below the eye is a creſcent of black, having the horns curved upwards towards the eye, below this a ſecond, and the back of the neck for the moſt part under this black; the back part of the belly is brown, edged with white; tail grey, with white tip; and the legs tawny.

GOSCOROBA. Bill dilated and rounded at the point; body white. Molin. Chili.

This ſpecies inhabits Chili. It is of a large ſize, the bill and legs are red, and the eyes black.

MELANOTOS. White; bill and caruncle at the baſe black; head and neck ſpotted with black; back, cuneated tail, and wings black. Gmel. Zool. Ind. &c. *L'Oie bronzée de Coromandel*, Buff. *Black-backed gooſe*, Lath.

A ſpecies common in the iſland of Ceylon, and along the coaſt of Coromandel. Its ſize is that of a gooſe, but of a more ſlender form; the bill pale, large, and curved downwards at the point; and in the middle a large rounded fleſhy knob, the ſame colour as the bill; the head, and half the neck is white, dotted with black, and the feathers are ruffled, or reflected; the reſt of the neck and under parts are white tinged on the ſides with grey; the back, wings, and tail, black, gloſſed with greeniſh, and inclining to blue towards the tail; the legs duſky. The female differs from the male in having the caruncle ſmaller, and the plumage leſs vividly gloſſed with green and blue. Both ſexes have the ſhoulder of the wing armed with a long and dangerous ſpur. In India it is known by the name of Nuckdah.

GRANDIS. Body blackiſh, beneath white; bill black; legs ſcarlet. Gmel. *Great gooſe*, Lath.

A large ſpecies, found in the eaſt of Siberia, from the Lena river, as far as Kamtſchatka, and is taken in great numbers, according to Pallas, in decoys contrived for this particular purpoſe; the bill is black, with the baſe tawny.

HYPERBOREA. Body ſnowy; front yellowiſh; firſt ten quill-feathers black; bill and legs red. Gmel. *Anſer niveus*, Briſſ. *White brant*, Lawſ. Car. *Snow gooſe*, Arct. Zool.

Size of the common gooſe; the bill ſomewhat ſerrated at the edges with the upper mandible ſcarlet, the lower whitiſh. The plumage, in young birds, is of a blue colour, until after the firſt year. At Hudſon's bay they are found in vaſt numbers, and are called by the natives *way-way*, and *wapa*, *whe whe*. In the month of October they are taken in abundance by the inhabitants, who pluck them, and after taking out their entrails, put their bodies into holes dug in the ground, which they cover with earth; the ſurface of the ground freezing, preſerves the birds, in a perfectly ſweet ſtate, throughout the winter, and thus theſe ſubterraneous receptacles furniſh an occaſional ſupply of freſh food to the inhabitants, with little coſt or labour, during the ſeverer months of winter. They are repreſented as very ſtupid birds, common in the arctic regions during the ſummer, but paſs the winter in more temperate climates.

PICTA. Blackiſh-aſh, with tranſverſe black lines; head, neck, middle of the belly, bar on the wings, and coverts white. Gmel. *Painted gooſe*, Lath.

The length of this bird is twenty eight inches; the bill is ſmall, about an inch and a half long, and of a black colour. The legs, primary quill-feathers, and tail, black; wings with an obtuſe ſpur on the bend. The ſpecies was firſt deſcribed by Dr. Latham, from the drawings of ſir Joſeph Banks, the bird delineated was met with at Staaten-Land in January.

MAGELLANICA. Ruſty-brown; body, on the fore part and beneath, tranſverſely varied; bar, acroſs the wings and coverts, white. Gmel. *L'Oie des terres Magellaniques*, Buff. *Magellanic gooſe*, Lath.

Obſerved in the ſtraits of Magellan. The length of this bird is twenty-four inches; the bill ſhort and black; wings and tail black, vent grey; legs yellow; and claws black.

ANTARCTICA. Snowy; bill black; legs yellow (*maſ.*) Variegated; belly, vent, rump, and thighs white; legs with a green ſpot (*fem.*) Muſ. Carlſ. *Anas antarctica*, Gmel. *Antarctic gooſe*, Lath.

Theſe birds inhabit the Falkland iſlands, and are from twenty-four to twenty-ſix inches long. The male entirely white; the female, with the bill, fleſh-colour; body brown, with tranſverſe white lines.

VARIEGATA. Body above brown, ſpotted with white; beneath cheſnut, ſpotted with white and black; bill, tail, and primary quill-feathers black; ſecondary green; wing-coverts white; rump and vent ferruginous. Gmel. *Variegated gooſe*, Lath.

Size of a large duck; the bill an inch and a half long, and black at the tip and baſe; tail and legs black. This bird inhabits New Zealand, and was found by captain Cook in Duſky bay, in April, where it is called *Pooa dugghee dugghee*. Dr. Latham conſiders the antarctic gooſe as the female of this ſpecies, in his Synopſis; but in the Ind. Orn. ſince publiſhed, it appears as a diſtinct bird.

LEUCOPTERA. White; bill, two middle tail-feathers, primary quill-feathers, and greater wing-coverts black; nape, and upper part of the body, with numerous black lines. Gmel. *L'Oie des Malouines*, Buff. *White-winged antarctic gooſe*, Brown. *Sea gooſe*, Phil. Tranſ. *Buſtard gooſe*, Lath.

Inhabits the Falkland iſlands, and is known by the name of the *buſtard gooſe*. It is a tall bird, and meaſures nearly forty inches in length; it walks and flies with great eaſe, and lays ſix eggs; the fleſh is deemed wholeſome and palatable. The wings have a blunt ſpine at the bend, and a duſky green ſpot; the greater wing-coverts are white at the tip; ſecondary quill-feathers half black and half white; and the legs black.

TADORNA. Bill knobbed at the baſe, with the front compreſſed; head greeniſh-black; body variegated with white. Linn. *Vulpanſer*, Klein. *Shieldrake*, Brit. Zool. Donov. Brit. Birds.

A native of Europe and Aſia, about two feet long, and ſubſiſts chiefly on fiſh, and aquatic plants. The female is ſmaller than the male, but is not materially different in plumage; it breeds moſt commonly in deſerted rabbit burrows, and has hence acquired the name of *burrow-duck*. The female lays fifteen or ſixteen roundiſh white eggs, and ſits about thirty days; the young take to the water as ſoon as hatched, and ſwim extremely well. The ſhieldrake is a bird of elegant plumage, and is common on many of the Britiſh ſea coaſts.

SPECTABILIS. Bill compreſſed at the baſe, with a black feathery keel; head hoary. Linn. *Anas freti Hudſonis*, Briſſ. *Le canard à tete griſe*, Buff. *Grey-headed duck*, Arct. Zool.

Inhabits North America, Europe, and Aſia. Length about two feet. This bird builds on the ſides of rivers, and lays four or five eggs, which are white, and as large as thoſe of a gooſe. The female is chiefly black and brown; the belly duſky.

FUSCA. Blackiſh; lower eye-lid, and ſpot on the wings, white. Linn. *Anas nigra major*, Briſſ. *Grande, ou double macreuſe*, Buff. *Velvet duck*, Brit. Zool.

Native of Europe and South America. The length is about twenty-two inches; the bill black in the middle, at the baſe gibbous; and the legs red. The female has no gibboſity on the bill; and the body is brown.

NIGRA. Entirely black; bill gibbous at the baſe. Gmel. *La macreuſe*, Buff. *Scoter*, or *Black diver*, Brit. Zool.

Inhabits North America and Europe, and feeds on graſs and ſhell-fiſh. The length is twenty-two inches, the bill yellow in the middle; head and neck ſprinkled with purple; tail ſub-cuneated. The female has no gibboſity at the baſe of the bill, and is browner than the male. The fleſh of this ſpecies is rancid.

REGIA. Caruncle compreſſed; body blue, beneath brown; collar white. Molin. Chili.

This is much larger than the common duck, *Anas boſchas*.

NILOTICA. Whitiſh, with hoary ſpots; ſides of the breaſt and belly with hoary lines; marginal calloſity on the bill and caruncle purple-red. Haſſelq. *Nilotic gooſe*, Lath.

Inhabits the Nile, in Upper Egypt, and is ſaid not to be found in any other parts except on the borders of the Red ſea. The ſpecies is cultivated, with other domeſticated poultry, in Egypt. Its ſize is leſs than the common gooſe; its tail rather long and rounded; legs red, and claws black.

BERINGII. White; wings black; neck blueiſh; caruncle, at the baſe of the bill, yellow, radiate in the middle, with blueiſh feathers. Gmel. *Bering gooſe*, Arct. Zool.

This is the ſize of the common wild gooſe, and was ſeen by Steller in the month of July, in great abundance on Bering iſland. The natives purſue them in boats, and kill them in the moulting ſeaſon, or, at other times, hunt them on land with dogs.

ALBIFRONS. Cinereous; forehead white. Gmel. *Anas erythropus*, (*fem.*) Linn. Faun. Suec. *Anſer ſeptentrionalis ſylveſtris*, Briſſ. *L'Oie rieuſe*, Buff. *Laughing gooſe*, Phil. Tranſ. *White-fronted gooſe*, Arct. Zool.

Inhabits the north of Europe and Aſia, and is likewiſe met with in America. Length two feet four inches.

ERYTHROPUS. Cinereous, above waved black and white; neck black; face and abdomen white. *Anas erythropus*, Linn. Fu. Suec. (*male*). *Bernicla*, Briſſ. *Anas helſingen*, Olaſſ. *Anſer brenta*, Klein. *La bernache*, Buff. *Bernacle*, or *Clakis*, Arct. Zool. Donov. Brit. Birds, &c.

Common in the north of Britain, and other parts of Europe, and is occaſionally ſeen in America. This is a large ſpecies, meaſuring about two feet in length, and is the tree gooſe of Gerrard and other naturaliſts about his own time; a bird which they gravely aſſerted to be generated and hatched in the ſhell of the bernacle, *Lepas anatifera* of modern authors. This ſilly conjecture has been long ſince exploded, but the ſpecies ſtill retains the name given to it under this erroneous idea.

** *Bill equal at the Baſe.*

MARILA. Black; ſhoulders waved cinereous; belly, and ſpot on the wings white. (*male.*) Linn. *Anas ſubterranea*, Scop. *Fuligula Geſneri*, Raii. *Scaup duck*, Arct. Zool. Donov. Brit. Birds, &c. *Anas frænata*, Linn. Muſ. Carlſ.

Length about 18 inches; the bill broad, blueiſh-aſh; head and neck gloſſed with green; the legs and primary quill-feathers duſky; ſecondaries white with black tips; tail, coverts, and vent black. The female is brown, with black bill ſurrounded with a circle of white feathers; neck ruſty; belly and bar on the wings white; legs black. Its ſize rather larger than the male. This ſpecies inhabits the north of Europe, Aſia, and America, and is found during winter in ſmall flocks on the coaſts of England. A ſuppoſed variety of this ſpecies has the head and neck purple green; back and ſhoulders waved with cinereous, and the belly and wing-ſpot white.

Lobata. Blackiſh with tranſverſe greyiſh lines, beneath paler, under mandible lobate beneath. Nat. Miſc.

Inhabits New Holland. Its ſize is that of the common duck; the bill broad at the baſe and black, the lower mandible with a large, black, flat round wattle, placed longitudinally; the body dark cinereous, paler beneath and on the neck, and waved with numerous tranſverſe whitiſh lines, legs black.

Montana. Head, neck, and quill-feathers red-green. Gmel. *Hill or mountain gooſe,* Kolben.

Larger than the tame gooſe, and inhabits the hilly parts of the Cape of Good Hope, and feeds on graſs and herbs.

Cana. Reddiſh-ferruginous; head and neck grey; wing ſpot green; ſhoulders white. Gmel. *L'Oie ſauvage à tête de Coromandel,* Sonn. *Grey headed gooſe,* Brown.

Leſs than the brent gooſe, and inhabits the mountains of the Cape, where it is called *Bergenten* by the Dutch. The female differs from the male in having no white on the cheeks, and, in general, the colours of the plumage more obſcure. There is a ſmall knob a little below the bend of the wing in this ſpecies.

Ruficollis. Black, beneath white; bill ſmall, conic; neck rufous; ſpot between the bill and eyes white. Pallas. *Red breaſted gooſe,* Arct. Zool.

Native of the north of Ruſſia, and has been twice ſhot in Britain: it is a very rare and beautiful ſpecies.

Casarca. Rufous; wings and tail black; wing ſpot white. Linn. *Anas rutila,* Lepech. *Collared duck,* Gent. Mag. *Ruddy gooſe,* Lath.

Nearly as large as the Muſcovy duck. The ſpecies inhabits Ruſſia and Siberia during ſummer, and migrates into India at the approach of winter. Like the ſhieldrake it forms burrows under ground, and conſtructs its neſt in holes in the craggy banks of rivers. Their voice is ſhrill and powerful, and at times reſembling that of the peacock. The bill and legs are black; the head and upper part of the neck white, and collar black. This is the male bird, from which the female differs chiefly in being deſtitute of the black collar.

Ægyptiaca. Bill ſub-cylindric; body undulated; crown white, wing ſpot with a black collar. Linn. *L'Oie d'Egypt,* Buff. *Ganſer.* Albin. *Egyptian gooſe,* Lath. Donov. Brit. Birds.

Native of Egypt, the Cape of Good Hope, and other parts of Africa, from whence they have been imported into England, and have now become generally naturalized; it is a beautiful ſpecies, and highly ornamental in pleaſure grounds. It is as large as the common gooſe, and has the bill reddiſh with the tip black; the body waved with brown and ferruginous; temples, orbits, and ſpot on the breaſt cheſnut; back, rump, wings, and tail black; belly white; legs red, with black claws. In the female the cheſnut patch round the eye is ſmaller; the chin white; the cheſnut ſpot on the breaſt ſmaller, or ſometimes entirely wanting; the leſſer wing-coverts white; the others pale aſh with darker margins; the lower ones fringed with white, and forming a bar on the wing; ſcapulars and ſecond quills inclining to cheſnut. There is a variety with the bill grey; ſpot on the breaſt black, and the back, wings, and rump cheſnut.

Segetum. Cinereous, beneath dirty white; bill compreſſed at the baſe; tail-coverts white; legs ſaffron. Gmel. *Bean gooſe,* Arct. Zool.

Length two feet ſeven inches; the bill black, reddiſh in the middle; head and neck inclining to ferruginous; quill-feathers edged with black, tail with white; legs ſometimes reddiſh brown, with black claws. The ſpecies inhabits Europe and America; they breed in the Orkneys, and come in the autumn into the more ſouthern parts of Britain, and depart again in May. They are in particular fond of green wheat, and are therefore very deſtructive in corn fields.

Borealis. Bill narrow; head green; breaſt and belly white. Gmel. *Greenland duck,* Arct. Zool.

A ſpecies of the middle ſize between the duck and gooſe; it inhabits the fens of Iceland, and is very rare.

Cærulescens. Brown, beneath white; wing-coverts and hind part of the back blueiſh. Gmel. *Blue winged gooſe.*

Native of North America. Rather ſmaller than the common gooſe; the bill and legs red; crown yellowiſh; reſt of the head and neck white; ſhoulders and tail waved white and grey. Known at Hudſon's bay by the name of *Cath-catue-we-we.*

Bernicla. Brown, head, neck, and breaſt black; collar white. Linn. *Brenta,* Briſ. *Le Cravant,* Buff. *Brent gooſe, or Brand Gooſe,* Arct. Zool.

Leſs than the Bernacle gooſe, inhabits the north of America, Aſia, and Europe, and migrates towards the ſouth in autumn: feeds on ſea plants, berries, and marine inſects. The plumage of the female is more obſcure in colour than the male, and in young birds the white on the ſide of the neck is ſmall or entirely wanting. Like the Bernacle gooſe, theſe birds are frequent on our coaſts during winter. On the coaſts of Holland they are often taken at that ſeaſon in nets placed acroſs the rivers. Buffon relates, that they are ſometimes ſo abundant on the coaſts of France as to become extremely troubleſome; and mentions in particular, that, in the year 1740, they were literally a peſt to the inhabitants, not only deſtroying the ears of corn, but tearing up the ſtalks by the roots. They are eaſily tamed, and, when fattened, are eſteemed delicate eating. In Shetland it is called the Horra gooſe, being found in the ſound of that name.

Canadensis. Cinereous; head and neck black; cheeks and chin white, Linn. *L'Oie à cravate,* Buff. *Canada gooſe,* Cateſby, &c.

Length three feet and a half; the bill, tail, rump, and primary quill-feathers black; a triangular white ſpot reaching from the back of the head to the chin; the nape, tail-coverts, vent, and lower part of the belly white; legs lead colour. The ſpecies inhabits North America, where it appears to be met with in vaſt flocks during the ſummer, when they retire farther northward. In the vicinity of Hudſon's bay they conſtitute a principal article of food, the Indians killing ſome thouſands annually, which are either eaten freſh or ſalted and barrelled. It is ſaid the Indians wait the arrival of theſe birds with much expectation, and form a row of huts, conſtructed of the boughs of trees, at a muſket-ſhot diſtance from each other, acroſs thoſe parts where the birds are expected to paſs, where they lie ſecreted, and, when the geeſe fly near, ſo exactly mimick their note as to decoy them near enough to kill them with their muſket ſhot. Theſe birds are very ſhy, but an expert markſman by this means has been known to take two hundred geeſe in one day. The fleſh is good and the feathers in much requeſt, being equally fine as thoſe of the common gooſe.

Mollissima. Bill cylindrical; cere on the hind part bifid and wrinkled. Linn. *Anſer lanuginoſus,* Briſ. *Eidergans Waullbaum. Oie à duvet,* Buff. *Eider, or Cuthbert duck,* Arct. Zool.

The Eider duck inhabits the north of Europe, Aſia, and America, extending to the higheſt northern latitudes, and becoming ſcarce towards the ſouth. In Britain it is ſeldom found more ſoutherly than the Farn iſles, or in America than New York. They are numerous in the Eſquimaux iſlands, and in Greenland. The male has the bill, legs, front-band acroſs the eyes, breaſt, and lower part of the back and belly black; middle of the head, upper part of the back, ſhoulders, and wing-coverts white, and beneath the hind part of the head a blotch of pea-green. In young birds the neck and breaſt are commonly ſpotted black and white, and the crown of the head black; and it is ſaid, when they attain a great age, which ſometimes does happen, the plumage becomes entirely grey. The female is in general of a reddiſh brown, barred with black, and the hind part of the neck marked with longitudinal duſky ſtreaks; two bars of white on the wing; tail duſky, and legs black.

Theſe birds are ſmaller than the common gooſe, and feed on ſhell-fiſh, in ſearch of which they dive under water to a great depth; their fleſh is good, and the down obtained from their neſts in the breeding ſeaſon ſo abundant, and of ſuch an excellent quality, as to render it an article of conſiderable commercial importance in the north of Europe. The quantity of down found in one neſt weighs only about three quarters of an ounce, yet is ſufficient to fill the crown of a man's hat. Salerne relates, that three pounds of this down may be compreſſed into a ſpace not larger than one's fiſt, notwithſtanding it is ſo dilatable as to fill a quilt five feet ſquare. That found in the neſts is called live-down, and is more valued than the down plucked from the ſkins of the dead birds.

Anser. Bill ſemi-cylindrical; body above cinereous, beneath paler; neck ſtriated. Linn. *Anſer ſylveſtris*, Briſ. *Anas Araki*, Forſk. *Wild gooſe*, Will. *Grey Lag gooſe*, Arct. Zool.

β. *var.* domeſticus. Varies much in colours by domeſtication.

The wild gooſe weighs about ten pounds; its length is two feet nine inches, and breadth five feet. The bill is fleſh colour, with the tip white; the rump and vent white; the legs fleſh colour, and claws black. Theſe birds inhabit the fens of England, and are ſuppoſed not to migrate from hence, as in many other countries on the continent, being met with throughout the ſummer, and being alſo known to breed in Lincolnſhire, and Cambridgeſhire. During the winter ſeaſon they aſſociate in large flocks. On the continent they migrate in flocks of five hundred together; their columns, when their flock is large, are ſomewhat triangular, with one point foremoſt, but when ſmall, appear in a direct line. The gooſe, in a wild ſtate, ſeems pretty generally diffuſed over the globe: they are met with in Iceland, and from Lapland to the Cape of Good Hope. In Arabia, Perſia, and China they are frequent; indigenous to Japan, and on the American continent from Hudſon's bay to Carolina. They are alſo met with in the ſtraits of Magellan, in the Falkland iſles, and at Terra del Fuego. They are eaſily tamed, and have from ſeven to eight young at a time.

In a ſtate of domeſtication the grey lag gooſe varies from its parent origin in the colour of the plumage, but in a much ſlighter degree than either the mallard or the cock, being more or leſs grey, and having both the vent and tail-coverts almoſt conſtantly white. Tame geeſe are no where ſeen in greater abundance than in the fens of Lincolnſhire, many perſons keeping no leſs than a thouſand breeders. The uſe of the quills and feathers is well known, and for the ſake of theſe the birds are frequently ſtripped of their plumage whilſt alive; about Michaelmas they are deſpoiled of both quills and feathers, and four times afterwards between that period and the enſuing Michaelmas they are again ſtripped, but of their feathers only. Numbers die in conſequence of this cruel treatment, if the weather prove cold, otherwiſe they ſoon recover their ſtrength, and ſeem to ſuffer no very material injury. During their ſitting, each bird has its allotted ſpace, in rows of wicker pens placed one above another; and it is ſaid the perſon, who takes charge of them, and is called a Gozzard or Gooſe-herd, twice in a day drives the whole to water, and bringing them back to their habitations, places every bird in its reſpective neſt without miſſing one. In ſome counties the common price of geeſe is regulated by that of mutton, the former being ſtripped of the feathers, and both being the ſame *per* pound. The uſual weight of a fine gooſe is about ſixteen pounds, which, however, may be greatly increaſed by cramming them with bean meat and other fattening diet. Some nail the geeſe to the floor by the webs of their feet, during the time of fattening, a proceeding apparently cruel, but which is ſaid to occaſion no pain, and is intended to prevent the leaſt poſſibility of action. The French add to this the refinement of putting out their eyes, an act of barbarity, we conceive, devoid of any uſeful purpoſe. The geeſe in England, when fully fattened, have been known to weigh thirty pounds. The number of geeſe driven annually from diſtant counties to the London market appears incredible. They will walk from eight to ten miles a day on the average, travelling from three in the morning till nine at night. In this manner they are often brought to London in droves of many thouſands together. The weaker ones are much fatigued, and are fed on oats inſtead of barley, their uſual food, on the journey.

Moschata. Face naked and papillous, Linn. *Anas ſylveſtris Braſilienſis*, Ray. *Anas Indica Geſneri*, Will. *Le canard muſqué*, Buff. *Anitra muta*, Zinnan. *Muſcovy duck*, Will.

Larger than the wild duck; the bill two inches long, and red, except about the noſtrils, and at the tip, which are dark brown; face red; the crown of the head black; temples, chin, and throat, white, varied with black; breaſt and lower part of the belly brown, mixed with white; back and rump brown, gloſſed with golden green; upper part of the belly white; the three firſt quill-feathers white, the reſt brown; tail-feathers twenty in number and golden green, except the outer one on each ſide, which is white; the legs red. The plumage of the female is more obſcure in colour, and the naked papillous ſpace about the head ſmaller.

The name of Muſcovy duck uſually given to this ſpecies ſeems to imply that the breed originated in that part of the world; but, according to Ray, it is ſo called from the muſky odour, which it exhales, a ſcent ariſing from the gland on the rump; and it appears alſo from Marcgrave that they are indigenous in Braſil. In an unconfined ſtate, they make their neſts on the ſtumps of old trees; and perch under the ſhade of the foliage during the heat of the day. The fleſh is accounted excellent.

Rufa. Cinereous; head and neck rufous; breaſt black; back lineated with brown; wings cinereous brown. Gmel. *Anas ruficollis*, Scop. *Rufous necked duck*, Lath.

Size of the mallard; the bill black; head and neck rufous; breaſt black; back variegated with brown lines pointing backwards; tail ſhort; legs black. A ſpecies deſcribed on the authority of Scopoli, the native place not mentioned.

Leucocephala. Bill broad; tail-feathers rigid, pointed, grooved; the middle ones longeſt. Scop. *Anas merſa*, Pallas. *White headed duck*, Shaw. *Ural duck*, Lath.

Rather larger than the common teal; bill large, broad, and tumid above the noſtrils, the colour blue; head and part of the neck white; on the crown a large patch of black; breaſt cheſnut, with black ſtreaks diſpoſed tranſverſely; belly grey with ſmall black ſpots; back rufous; wings reddiſh, with brown dots and lines, ſmall, and without any appearance of a ſpeculum; tail long and wedged, the colour black; legs brown, on the forepart blueiſh, and placed far behind, as in the divers. The female is entirely brown, except the throat, which is white. The ſpecies is not unfrequent in the greater lakes of the Ural mountains, and the rivers *Ob*, and *Irtiſch*. It is ſeldom ſeen on the ground, as it is, from the ſituation of its legs, ſcarcely able to walk, but it ſwims very well, and what is remarkable, the tail is at that time immerſed in the water as far as the rump, and ſerves as a kind of rudder to direct its courſe, contrary to the manner in which the duck tribe uſually ſwim. The neſt is formed of reeds like that of the grebe, and floats in the water.

MONACHA. White, varied with black; bill yellowiſh with black tip; wing-ſpot violet green, Scopoli.

Larger than the wild duck; the lores grey; head, bill, and upper part of the breaſt ſpotted with black; firſt quill, and tail-feathers white with brown tip. Native place unknown.

TORRIDA. Head white; neck above black, beneath cheſnut. Gmel. *Branta torrida*, Scop. Torrid duck.

Native place unknown.

ALBICANS. Front and body beneath whitiſh, above brown, head and neck brown rufous. Gmel. *Branta albifrons*, Scop.

The feathers of the breaſt are cinereous, edged with pale ruſty, and a rufous bar near the tip; quill-feathers within, and at the tip white.

GEORGICA. Cinereous-waved; wing-ſpot greeniſh, edged with white; wings and tail duſky. Gmel. *Georgia duck*, Lath.

Deſcribed by Dr. Latham from a drawing in the Bankſian collection; the ſpecimen was found in South Georgia in the middle of January; it was a male bird, and the fleſh was excellent. The total length of this bird was twenty inches; the bill two inches long, turned up a little at the tip and yellow; irides cheſnut; wing-coverts pale-aſh; legs greeniſh-grey.

BAHAMENSIS. Grey; bill lead-colour, with a lateral tawny ſpot; wing-ſpot green and pale yellow. Linn. *Mareca prima Aldr.* Ray. *Le marec*, Buff. *Ilathera duck*, Cateſby, Lath, &c.

Native of Braſil and the Bahama iſlands, particularly that called Ilathera, whence its name, but it is not numerous. It is ſaid to perch and rooſt on trees. Its ſize is that of the common duck; the crown is reddiſh aſh, neck, back, ſhoulders, and rump reddiſh brown; cheeks and throat white; breaſt and belly rufous-grey, ſpotted with black; primary quill-feathers and leſſer wing-coverts duſky; greater ones green, with black tips; ſecondary quill-feathers yellow; legs lead-colour.

BRASILIENSIS. Brown, beneath cinereous; between the bill and eyes a yellow ſpot; chin white; tail wedged and black. Gmel. *Le mareca*, Buff. *Mareca duck*, Lath.

Inhabits the ſame country as the former, and with that ſpecies is indiſcriminately called by the natives *Mareca*. The bill is black; upper wing-coverts brown, gloſſed with green; greater ones edged with blue green, and black at the tip; quill-feathers white at the extremity; legs red.

ERYTHRORHYNCHA. Bill red; brown beneath, and temples white; tranſverſe bar on the wings white, and another below yellowiſh; tail black. Gmel. *Crimſon-billed duck*, Lath.

The length of this ſpecies is fifteen inches; the bill two inches long, and turning up at the end; legs black. It inhabits the Cape of Good Hope.

ALBEOLA. White; back and wings black; head blueiſh; the hind head white, (male) Linn. *Querquedula ludoviciana*, Briſſ. *Anas hyberna*, Briſſ. *Sarcelle blanche et noire*, Buff. Pl. Enl. *Petit canard a groſſe tete*, Buff. Oiſ. *Spirit duck*, Arct. Zool. *Buffel-headed duck*, Cateſby. (Female.) *Anas ruſtica*, Linn. *Querquedula carolinenſis*, Briſſ. *Sarcelle de la Caroline*, Buff. *Little brown duck*, Cateſby.

The two ſexes of this duck have been deſcribed as diſtinct ſpecies. They inhabit North America, and are found at New York in the winter, returning ſouthward in the ſummer to breed. They arrive about June in Hudſon's bay, and make their neſts in trees, in the woods near ponds. The male is rather larger than the teal, and about ſixteen inches in length; the female only fourteen.

STELLERI. White; hind-head ſomewhat creſted; tranſverſe ſpot on the nape, and each ſide of the bill green; tail brown; ten firſt quill-feathers blackiſh brown; the reſt black blue. Pallas. *Weſtern duck*, Arct. Zool.

A rare ſpecies, found on the ſea coaſts of Kamtſchatka, where it breeds in the moſt inacceſſible rocks, and flies in flocks. Its ſize is that of the common wigeon; the bill and legs black; orbits lunule at the baſe of the neck; and band from the wings to the back black. Female ferruginous.

CLYPEATA. Extremity of the bill dilated and rounded with an incurved nail. Linn. *Anas platyrynchos altera*, Ray. *Anas vireſcens*, Marſ. *Avis latiroſtra*, Klein. *Souchet*, Buff. *Shoveler*, Brit. Zool.

A native of Europe, Aſia, and America; in England the ſpecies is ſcarce, in Germany rather more common, and alſo throughout the Ruſſian dominions as far as Kamtſchatka; its food conſiſts of inſects, and ſhrimps have been likewiſe found in its ſtomach on diſſection. It breeds in the ſame places as the ſummer teal, laying its eggs on a bed of ruſhes; theſe eggs are of a rufous colour, and from ten to twelve in number. The ſize of the male is about twenty-one inches; the bill black; irides yellow; head and neck violet green; breaſt white; back, wings, and tail brown; belly cheſnut; vent white; firſt and ſecond wing-coverts pale blue, greater, brown tipped with white, the reſt edged with white; legs tawny. The female is ſmaller, and in general brown. Both ſexes vary occaſionally in colour. Dr. Latham conſiders the *Anas muſcaria* of Linnæus as a variety of this ſpecies, as it differs only in having the belly white; and another ſuppoſed variety inhabits Mexico; this is the *Tempatlahoac* of Ray, *Le canard ſauvage du Mexique* of Briſſon. It is the ſize of the tame duck. The bill is large and black; the head and neck greeniſh, gloſſed with purple; breaſt white; reſt of the body beneath fulvous, with two white ſpots on both ſides near the tail; and the legs red.

MEXICANA. Tawny; above black and white lineated; wings brown; leſſer coverts white; greater next the body green gold. Lath. *Anas clypeata mexicana*, Briſſ. *Yacapatlahoac*, Ray. *Mexican ſhoveler*, Lath.

Smaller than the common duck; the bill browniſh-red; greater wing-coverts brown; and the legs reddiſh. The ſpecies inhabits New Spain.

RUBENS. Brown; chin and breaſt cheſnut; wings tipt with grey; wing-ſpot purple, edged with white; tail ſhort and white. Gmel. *Red breaſted-ſhoveler*, Lath.

Size of the common duck; the bill is broad, and browniſh yellow; head large, eyes ſmall, and the legs ſlender and bay colour. Inhabits Europe.

JAMAICENSIS. Varied with brown, ſaffron, and ruſty; back, wings, and tail brown; upper part of the head black beneath, and chin white, with black ſpots. Gmel. *Teal of Guiana*, Bancroft. *Jamaica ſhoveler*, Lath.

Length ſixteen inches; the bill broad, blueiſh, orange at the ſides; legs orange; back brown, ſprinkled with yellowiſh ſagittated dots, and tail cuneated. It is a native of Jamaica, where it firſt appears in October or November, and retires northward in March.

SCANDIACA. Cheſnut; back, wings and tail black; belly white. Gmel. *Anas latiroſtra,* Brun. *Lapmark duck,* Arct. Zool.

Inhabits Denmark, and is common about Chriſtianſtedt, and alſo at Lapmark. Its ſize is that of the common duck; the bill is broad, with the legs black: the ſecondary quill-feathers white, with black tips; and the flanks ferruginous. The ſpecies frequents both the freſh and ſalt waters.

STREPERA. Wing-ſpot rufous, black, and white. Linn. *Anas platyrhynchos,* Ray. *Chipeau,* Buff. *Gadwall,* Will, &c.

Size of a wigeon; the bill flat and black; legs tawny; rump black; back brown, waved with paler; breaſt and belly grey, varied with white. The female is marked in a manner ſomewhat ſimilar to the male, but is more obſcure. In the breeding ſeaſon it is found throughout Sweden, Ruſſia, and Siberia, and as far north even as Kamtſchatka; in the winter it appears in France and Italy. It is ſeen in England during the latter ſeaſon, but not commonly. This bird is very ſhy, concealing itſelf during the day time among the ruſhes, and venturing out to feed only in the morning and evening. Its voice is like that of the mallard, but louder; and the fleſh is good.

FALCARIA. Creſted, variegated with hoary and brown; breaſt ſcale-waved; front, chin, collar, and bar on the wings white. Pallas. *Anas falcata,* Georgi. *Falcated duck,* Arct. Zool.

This is found in the eaſtern part of Siberia, from the river Jeniſci to the Lena, and beyond lake Baikal, and is ſuppoſed to winter in the Mongolian deſerts, and in China. Its ſize is that of the common wigeon; the bill black; crown teſtaceous, and the reſt of the head ſilky green, with a ſmall white ſpot on the front; ſpeculum blue black, edged with white; five inner quill-feathers long, falcated and varied with white and violet; legs lead-colour. A variety is deſcribed by Buffon under the title of *Sarcelle de Java,* in which the quill-feathers are not falcated; in this the vent is brown and the thighs white. This is deſcribed as a native of Java and China, and is perhaps the young or female bird.

DOMINICANA. Rufous; front of the head ſooty; wing-ſpot white; ſhafts of the tail-feathers deep black. Gmel. *Canard dominicain du Cap de Bonne Eſperance,* Sonn. *Dominican duck,* Lath.

Inhabits St. Domingo, and meaſures in length about twelve inches. The bill is black; breaſt and belly grey-brown mixed with white, and ſome of the greater wing-coverts white; wings brown; tail cuneated, the feathers pointed, and the legs brown.

SPINOSA. Brown; crown black; tail-feathers pointed. Gmel. *Sarcelle à queue épineuſe,* Buff. *Spinous-tailed teal,* Lath.

A native of Cayenne and Guiana. The bill is blueiſh; band acroſs the eyes, white in the middle, and black each ſide; tail ſhort; legs fleſh-coloured. Length from eleven to twelve inches.

AFRICANA. Reddiſh-brown; back, wings, and tail black; ſpot on the breaſt and tranſverſe bar on the wings white. Gmel. *Sarcelle d'Egypte,* Buff. *African teal,* Lath.

Rather larger than the garganey, length ſixteen inches. The colours of the female agree with thoſe of the male, excepting in being more obſcure, and the white ſpot on the breaſt waved with brown. This ſpecies is a native of Europe.

MADAGASCARIENSIS. Duſky green, beneath white; cap, front, and chin white; hind-head and neck greeniſh-black; throat and breaſt ferruginous, waved with brown. Gmel. *Sarcelle male de Madagaſcar,* Buff. *Madagaſcar teal,* Lath.

A native of Madagaſcar. This ſpecies is about twelve inches long, and has the bill yellow, tipped with black; between the ears is a pale green patch of an oval ſhape; and the legs and wings duſky, the latter marked with a white ſtreak.

COROMANDELIANA. Above gloſſy-brown, beneath white; crown black, the reſt of the head and neck white, ſpotted with black. Gmel. *Sarcelle de Coromandel,* Buff. *Coromandel teal,* Lath.

Much ſmaller than the common garganey; its bill is duſky; the lower part of the neck marked with decuſſating black lines; vent ferruginous at the ſides; and the legs black. The female is varied beneath with white and grey. Native of Coromandel.

MANILLENSIS. Head and chin white; neck, breaſt, and wing-coverts bay; wings and tail pale greeniſh. Gmel. *Sarcelle de l'iſle de Luçon,* Sonn. *Manilla teal,* Lath.

Leſs than the common teal, and inhabits the iſland of Manilla.

FORMOSA. Brown; crown black, edged with white; chin reddiſh, ſpotted with black; wing-ſpot black, edged with teſtaceous, and marked on the fore part with an oblique green ſpot. Georgi reiſe. *Baikal teal,* Lath.

Size of the common teal, and inhabits Ruſſia about the lake Baikal. The bill is black; legs duſky red; from the eye to the chin extends a black ſpot, paler on the hind part, and edged with green; the nape and ſides of the neck waved; vent black, with a white band, and tawny at the ſides; middle tail-feathers whitiſh. A variety of this bird inhabits China; it is of a brown colour, with the crown black; head yellowiſh brown at the ſides, and behind the eyes green with a curved black ſpot.

HINA. Region of the eyes green. Oſbeck. *Hina teal,* Lath.

Deſcribed on the authority of Oſbeck, who does not mention the ſize; the bill, he ſays, is blackiſh grey and ſoft, the head and chin brown; a white line paſſes below the eyes, and all the ſpace above is green; the neck and upper part of the back are white, ſpotted with black; lower part of the back and rump aſh-colour; upper part of the neck white, ſpotted with black, breaſt and belly white; feathers of the rump edged with white; feet and legs aſh-coloured. The female has the head and region of the eyes grey; chin white, above black, and in ſome parts of a reddiſh white, ſpotted with black. In China it is called *Hina-a.*

SPARMANNIA. Beneath dull white, above black, varied with ferruginous and white; ſcapulars white, edged and lineated with ruſty-white on the diſk. Lath. *Anas alandica,* Muſ. Carlſ.

Length twenty-three inches. The bill and legs black; tail ferruginous, ſomewhat faſciated with black. Inhabits the vicinity of Aboana.

CLANGULA. Varied black and white; head tumid and violet; at each corner of the mouth a large white ſpot. Linn. *Le Garrot,* Buff. *Golden eye,* Arct. Zool. Donov. Brit. Birds.

Inhabits Europe and the north of Aſia and America. It preys on ſhell-fiſh, frogs, and other aquatic animals, and forms a neſt of graſs of a rounded form, lined with feathers from the breaſt, and in which it depoſits from ſeven to ten eggs of a whitiſh colour. In the Linnæan Fauna Suecica, it is ſaid to build in the hollows of trees. The fleſh of this kind of duck is much eſteemed.

PERSPICILLATA. Black; crown and nape white; bill with a black ſpot behind the noſtrils. Lath. *Anas perſpicillata*, Linn. *Macreuſe à large bec*, Marchand, Buff. *Black duck*, Cook's Voy.

Size of the velvet duck, length twenty-one inches. The bill and legs are red; crown and neck marked with a white triangular ſpot. The female is ſmaller, ſooty and without the ſpot on the nape; on the cheeks two whitiſh ſpots. A native of America, breeds along the ſhores of Hudſon's bay, and feeds on graſs; the neſt is alſo compoſed of graſs, lined with feathers, and contains from four to ſix white eggs, which hatch the end of July. It is called by the natives *Miſſe qua gw ta wow*. Captain Cook met with it in Prince William's ſound.

GLAUCION. Body blackiſh; breaſt waved; wing-ſpot white and linear. Linn. *Anas peregrina*, S.G.Gmel. *Morillon*, Briſ. *Glaucium*, Arct. Zool. Smaller than the golden eye, and inhabits northern regions.

NOVÆ HISPANIÆ. White, ſpotted with black; head tawny, varied with blackiſh and greeniſh blue; wing-coverts and vent blue; ſpot between the bill and eyes, and bar on the wings white. Gmel. *Querquedula mexicana*, Briſ. *Toltecoloctli*, Ray. *Sarcelle du Mexique*, Buff. *Mexican duck*, Lath.

Size of the common teal; the upper mandible of the bill is blue, the lower black; the middle quill-feathers green without, tipped with tawny; legs pale red. The female differs in having the head, poſterior part of the neck, back, ſcapulars, wing-coverts and rump black, ſome of the feathers edged with fulvous, and others white; beneath black, varied with white, and the legs aſh-coloured. It inhabits the lakes of Mexico and Surinam, where it is ſaid to be continually dabbling in the mud with its bill for worms, frogs, fiſh, &c.

MALACORHYNCHOS. Blueiſh-lead colour; bill membranaceous at the tip; crown greeniſh aſh; wings with a tranſverſe white ſpot. Gmel. *Blue-grey duck, with a ſoft bill*, Cook's Voyage. *Soft billed duck*, Lath.

This bird is about the ſize of the wigeon, and inhabits New Zealand. Our circumnavigators met with it in Duſky bay in April. The bill is an inch and a quarter in length, of a pale aſh-colour, with the tip black; the latter part is membranaceous, and of ſuch a ſoft and flexible nature, that the bird is ſuppoſed to live by ſuction, or on worms which it finds in the ſoft mud on the ſea ſhore when the tide is down; it is ſaid to whiſtle like the whiſtling duck. The inhabitants of New Zealand call it *He-weego*.

AMERICANA. Pale ruſty, waved with black; crown and front ochraceous; wing-ſpot large, white; wings and tail brown. Gmel. *Canard genſer*, Buff. *American wigeon*, Arct. Zool.

Rather larger than the common wigeon, and inhabits America. The bill is lead-coloured, tipt with black; hind-head and neck varied with white and black; behind the eyes a black ſpot; vent black, and legs duſky. It is found from Carolina to Hudſon's bay, but is no where common. They are gregarious, and in Martinico, where they are abundant, aſſociate in large flocks, and do great miſchief in the rice plantations during the rainy ſeaſon. They ſeldom appear till after ſun-ſet, when they come forth from their hiding places in queſt of food; they ſit in January, and in March the young are hatched. The fleſh is excellent, but that of the domeſticated ones is preferable to thoſe killed in a wild ſtate.

CAPENSIS. Dirty white; back bay; wing-ſpot, blueiſh green edged with white. Gmel. *Cape wigeon*, Lath.

Length fifteen inches; the bill red, and black at the baſe; head ſpeckled with duſky; and the legs red. Inhabits the Cape of Good Hope.

PENELOPE. Tail rather pointed; vent black; head brown; front white; back cinereous waved. Linn. *Anas fiſtularis*, Briſ. *Canard ſiffleur*, Buff. *Wigeon*, Arct. Zool. Donov. Brit. Birds.

This ſpecies is common in various parts of Europe, Aſia, and Africa, migrating from Europe as far as Egypt: it is alſo found in Aleppo during the winter in plenty, and likewiſe on the borders of the Caſpian ſea. Both ſexes are alike in young birds till the following ſpring after hatching, when the male about March gains his full plumage. Theſe birds are common in England during the winter months.

ACUTA. Tail pointed, long, beneath black; a white line on each ſide on the hind-head; back cinereous and waved. Linn. *Anas caudacuta*, Ray. *Anas longicauda*, Briſ. *Canard a longue queue*, Buff. *Sea pheaſant*, or *cracker*, Will. *Pintail*, Donov. Brit. Birds, &c.

Found in England, but in leſs abundance than in many parts of the continent. It is very common in Ruſſia, appearing in flocks of ſome hundreds on the borders of the Don, and extending as far as Kamtſchatka. In the winter ſeaſon it is common in France, Auſtria, and Italy, and in plenty about the lake Baikal in Aſia. Upon the ſea-coaſts of China it is often ſeen in flocks; and is not uncommon in America. The fleſh is fine flavoured and very tender.

FERRUGINEA. Reddiſh-brown; bill dilated and rounded at the tip; legs blueiſh. Gmel. *Anas rufa*, Linn. Fn. Suec. *Red duck*, Arct. Zool. *Ferruginous duck*, Donov. Brit. Birds.

A rare ſpecies, found in Denmark and Sweden, and has been once taken in Lincolnſhire.

GLACIALIS. Tail pointed, long; body black, beneath white. Linn. *Canard a longue queue*, Buff. *Swallow-tailed ſhieldrake*, Will. *Long-tailed duck*, Brit. Zool. (male.) *Anas hyemalis*, Linn. (young male.) *Long-tailed duck*, Arct. Zool. (female.)

Size of the wigeon; the bill an inch and a half long, and black, except down the middle and at the tip, which parts are orange; the head in front and at the ſides are greyiſh, inclining to red; the poſterior part, with the breaſt and belly, white; on each ſide of the neck, juſt below the head, is an oval ſpot of black; the back, wings, and tail chocolate; the tail is white, except the four middle feathers, which are black, and of theſe the two middle ones are much longer than the reſt, exceeding them by more than three inches; the legs are dull red, ſometimes blackiſh, and furniſhed with black claws. This is the deſcription of the male bird in the adult ſtate: when young, they vary conſiderably. The variety deſcribed by Linnæus as a diſtinct ſpecies, under the name of hyemalis, has the tail nearly as in the preceding, but the two middle feathers rather ſhorter, the belly white, the back of the head cinereous; the temples, with the breaſt, back, and wings black. This kind has been deſcribed as the female by ſome authors: but, from recent obſervations, it appears that the latter ſex has the tail ſhort, cuneated, and deſtitute of the two middle long feathers; the body varied with rufous and grey; the body black, and the collar, with the lower part of the belly, white. This relates to the adult female; for, in young birds, the crown and collar are black, ſprinkled with white, and the black dull cinereous.

There is ſtill another variety of this ſpecies, called by Buffon *Sarcelle de Ferroe,* a bird found in the Ferroe iſlands, where it is known among the natives by the name of O'edel. The colour of its plumage is blackiſh-brown, beneath white; the head pale-grey at the ſides; the orbits white; hind-head, chin, and neck ſpotted with brown; wings with a reddiſh-brown ſpot.

Theſe birds inhabit the north of Europe, Aſia, and America. In England they are confined chiefly to the Orkneys, where they are met with from April to October. In Sweden, Lapland, and Ruſſia, it is not an uncommon ſpecies, and thence extends even to Kamtſchatka. In America it is found from Hudſon's bay to New York, remaining in Hudſon's bay and in Greenland throughout the year. Like the Eider duck, it forms the neſt of graſs near the ſea, and lays from ten to fifteen eggs of a white colour, and the ſize of a pullet's. The neſt is lined with down of a ſoft and valuable kind, but not in ſufficient abundance to reward the labour of collecting it. They fly with ſwiftneſs, and ſwim well; have a loud and ſingular cry, and ſubſiſt principally on ſhell-fiſh.

FULVA. Tawny; back, ſhoulders, wings, and rump tranſverſely ſtreaked with tawny and brown; tail varied with white and black. Gmel. *Penelope mexicana,* Briſ. *Quapachnauhtli,* Ray. *Mexican pochard,* Lath.

The ſize of this bird is uncertain; the bill and legs are duſky, with black claws; and the eyes are black. The ſpecies inhabits Mexico.

FERINA. Cinereous waved; head brown; band on the breaſt, vent, and rump black. Linn. *Anas fera fuſca,* Ray. *Penelope,* Briſ. *Poker, pochard,* or *red-headed wigeon,* Will. Lath.

Native of Europe, the north of Aſia, and America, paſſing from the north to the ſouth in the winter. During the latter ſeaſon, they are frequently in the fens of Lincolnſhire, where they are often caught, and ſent in conſiderable numbers to the London markets; the fleſh being much eſteemed. With us they are known by the name of *dun* birds. They paſs far to the ſouth in the winter, being met with at that time in Egypt. Feed on aquatic inſects and ſhell-fiſh. Their flight is ſtrong and rapid; their voice a peculiar kind of hiſſing. The ſize of the pochard is that of the wigeon; the female is darker in colour than the male, and has the head pale reddiſh-brown, with the belly and wing-coverts cinereous.

LURIDA. Black; head cheſnut; breaſt tranſverſely lineated with red. S. G. Gmel.

Rather larger than the common teal; the belly whitiſh, ſpotted with blackiſh, on the ſides and vent ſnowy; quill-feathers varied with cinereous and black; tail-feathers twelve in number and black. Native of the ſouthern part of Ruſſia, and found by Gmelin in his travels on the borders of the Caſpian ſea.

KEKUSCHKA. Ochrey-yellow, beneath ſnowy; back cinereous; rump and tail deep-black; quill-feathers from fifteen to nineteen, the tips white. S. G. Gmelin.

Found on the borders of the Caſpian ſea. Length twenty inches. The fleſh rancid.

QUERQUEDULA. Spot on the wings green; above the eye a white line. Linn. *Garganey,* Brit. Zool. Donov. Brit. Birds, &c.

Length ſeventeen inches; the bill lead colour; crown duſky and ſtreaked; cheeks and neck purple, with ſhort white lines; breaſt brown, with ſemi-circular black bars diſpoſed tranſverſely; belly white, ſpeckled behind; ſcapular feathers long, narrow, and ſtriped with white, aſh-colour, and black; tail duſky; legs lead-colour. Female browniſh-aſh, and without a green ſpot on the wing. Found, but not in any plenty, during the winter ſeaſon, in Britain and France; retiring towards the north to breed, as the ſummer approaches. In Sweden, Ruſſia, and Siberia, it is more common; and in Kamtſchatka it breeds.

CRECCA. Wing-ſpot green; a white line above and beneath the eyes. Linn. *Querquedula minor,* Briſ. *Krikente,* Bl. *Common teal,* Br. Zool. Arct. Zool., &c.

This well-known bird is about fourteen inches in length, and weighs twelve ounces; the bill is black; head and neck bright-bay; behind the eyes to the nape extends a broad green band, which terminates beneath in a white line; the body is whitiſh, with tranſverſe blackiſh lines above, and the fore-part of the neck and breaſt ſpotted with black; the vent black in the middle. The female has the head and neck varied with whitiſh and brown; and the vent totally white. The teal is very abundant with us in winter. It breeds in France, forming its neſt of ruſhes on the borders of ponds; or ſo contrived that, being placed at the water's edge, it may riſe and fall with it. Its food conſiſts of ſmall fiſh and aquatic plants. The ſpecies is found as far north as Iceland, and to the ſouthward as the Caſpian ſea.. The ſummer teal, *anas circia* of Linnæus, is ſuppoſed by ſome to be a variety of the common teal.

CAROLINENSIS. Black and white waved; head and upper part of the neck cheſnut; throat and breaſt ſpotted with black; wing-ſpot green; line beneath the eyes, and humeral arch white. Lath. *Anas crecca* (var.), Phil. Tranſ. *American teal,* Arct. Zool.

Inhabits America from Carolina to Hudſon's bay, in the laſt of which places it breeds: moſt commonly found in woody places near ſmall ponds, and lays from five to ſeven eggs. The head is marked each ſide with a green ſtripe; the wing-coverts are brown, and the legs duſky. The female is reddiſh-brown-aſh, ſpotted with black; the wings as in the male bird.

HISTRIONICA. Variegated with brown, white, and blue; ears, double line on the temples, collar, and pectoral bar white. Linn. *Le canardà collier,* Buff. *Harlequin duck* (male), Arct. Zool. *Anas minuta,* Linn. *Harlequin duck* (female), Lath.

Native of Europe and America, and ſubſiſts on the eggs of fiſhes, ſhell-fiſh, and aquatic inſects. They delight in ſhady places, and build their neſts on the ſhores of freſh water ſtreams; their eggs, about ten in number, are of a white colour, and reſemble thoſe of the pigeon.

FUSCESCENS. Browniſh; head and neck paler; wings cinereous, ſpot blue, tipped with white; tail duſky. Gmel. *Brown duck,* Arct. Zool.

The length of this ſpecies is ſixteen inches; the bill large, thick at the baſe, and blueiſh, with the tip black; breaſt pale-brown, edged with ruſt colour; legs duſky. Native of Newfoundland.

POECILORHYNCHA. Black; cheeks and part of the throat cinereous; wing-ſpot green, above white, beneath bounded with white and black; ſecondary quill-feathers white. Ind. Zool. *Spotted-billed duck,* Lath.

Native of Ceylon, where the ſpecies is very common. The bill is long and black, with a red ſpot on each ſide at the baſe, and the tip white; band acroſs the eyes, and the vent black; legs yellow.

DAMIATICA. White; head, upper part of the neck, ſhoulders, and tip of the tail black; nape with a ferruginous lunule; wings greeniſh-black. Gmel. *Anas damiatica, roſtro apice plano lato rotundo,* Haſſelq. *Damiatta duck,* Lath.

Rather larger than the mallard, and inhabits the ſhores of Egypt, thoſe eſpecially near the Mediterranean, as the bay near Damietta, and between Alexandria and Roſetta. It is conjectured to be of the ſame ſpecies as the black-headed duck of Shaw's travels, which is found in Barbary.

DISCORS. Wing-coverts blue; ſecondary quill-feathers green without; band on the front white. Gmel. *Querquedula americana*, Briſ. *Sarcelle ſoucrourou*, Buff. *White-faced teal*, Arct. Zool. *White-faced duck*, Lath.

The male is of the middle ſize between the teal and wigeon, the female rather ſmaller. In the firſt, the head and neck are violet, the cap and bill black; and before the eyes on each ſide a white ſtreak; the body brown, waved with grey; wing-ſpot green, edged above with white; the legs yellow. The female has the head, neck, and body, varied with grey and brown, and appears to be the blue-winged teal of Cateſby. Theſe birds inhabit the American continent as far to the north as New York; they arrive in Carolina about Auguſt, and remain there till October, feeding in the firſt inſtance on the rice, and when that fails attack the wild oats. They frequent ponds and freſh waters; and the fleſh is fat and well flavoured. The ſpecies is found alſo in South America, at Guiana, and Cayenne. A ſuppoſed variety of this bird appears in Hudſon's Bay in June, and departs at the ſame time as the former; it builds no neſt, but forms a hollow in decayed ſtumps of trees, in which it depoſits ten ſmall whitiſh eggs; and is ſaid to feed on graſs at the bottoms of ponds. In this kind the cap and tail are black; the greater wing-coverts marked with a duſky ſpot; ſecondary quill-feathers exteriorly, with the chin and belly white.

VIDUATA. Brown; fore-part of the head white; legs blue. Jacq. Beytr. *Canardà, face blanche*, Buff. *Canard du Maragnon*, Buff. *Spaniſh duck*, Lath.

A beautiful ſpecies, called by the Spaniards *Vindila*; it frequents the lakes of Carthagena in America, and has a whiſtling note.

JACQUINI. Cheſnut; back blackiſh; bill and legs black. Jacquin. *Jacquin's duck*, Lath.

Size of the laſt, and inhabits St. Domingo.

DOMINICANA. Greyiſh-aſh; face and chin white; band acroſs the eyes, with the hind-head, neck, and breaſt black. Gmel. *Canard Dominiquain du Cap de Bonne Eſperance*, Sonner. *Dominican duck*, Lath.

Inhabits the Cape of Good Hope; its bill and legs are black; and the body beneath paler. Its ſize that of the wild duck.

AUTUMNALIS. Grey; wings, tail, and belly black; wing-ſpot tawny and white. Jacquin Beytr. *Anas fiſtularis Americana*, Briſ. *Red billed whiſtling duck*, Lath.

The bill of this bird in the adult ſtate is red, with only the tip black, but in the young that part is entirely black. The ſpecies, according to Jacquin and others, is very common at New Grenada, in South America, and is frequently domeſticated in farm-yards between the tropics; it is nevertheleſs of a quarrelſome diſpoſition, and will often deſert thoſe places, and retire to the woody ſwamps. The Spaniards call it *Piſeſic* from its voice. This is rather a large bird, being about twenty-one inches in length.

LABRADORIA. Brown; head and neck reddiſh-white; collar and pectoral band black; ſcapular and ſecondary quill-feathers white. Gmel. *Pied duck*, Arct. Zool.

Inhabits the coaſt of Labrador, and meaſures about nineteen inches in length. The bill is orange at the baſe, the lower mandible duſky; from the crown to the nape marked with a black ſtreak; head and neck inclining to rufous; legs yellow. The female has the bill like the male; the plumage on the upper parts dirty mottled brown; on the wings a white ſpot; the legs black.

SUPERCILIOSA. Grey; eye-brows white; chin and throat dirty white; wing-ſpot green-blue, edged with black. Gmel. *Supercilious duck*, Lath.

Deſcribed from the drawings of ſir Joſeph Banks. The ſpecies inhabits New Zealand, and was found both in Charlotte ſound and Duſky bay, where it is known by the name of *He-turrera*. Its ſize is that of the mallard. The bill is lead-coloured, and the legs duſky-aſh.

CURVIROSTRA. Black; middle tail feathers (of the male) recurvate; chin with an oval white ſpot; bill hooked. Pallas. *Curve-billed duck*, Lath.

Larger than the common wild duck, and inhabits the Netherlands. The irides are fulvous; head, neck, and rump greeniſh-black; five outer quill-feathers white; chin white; wing-ſpot deep ſhining blue.

BOSCHAS. Cinereous; middle tail feathers (of the male) recurvate; bill ſtraight; collar white. Linn. *Anas fera*, Briſ. *Canard ſauvage*, Buff. *Wild duck*, Will. Donov. Brit. Birds.

This is the origin of our common tame duck, the varieties of which are extremely numerous, ariſing from the various modes of domeſtication adopted in different countries, and the facility with which it intermixes with others of the duck tribe in general. The principal varieties of *Anas Boſchas*, enumerated by writers, are the ſix following; β. *Anas domeſtica* (tame duck) variable in colour of the plumage by culture. γ. *Boſchas major*, Briſ. much larger than the tame duck, and having the back ſooty-black. δ. *Boſchas major griſea*, Briſ. Size of the laſt; body tinged greyiſh. ε. *Boſchas major nævia*, Briſ. Same ſize; the back ſpotted with yellowiſh. ζ. *Anas adunca*, Linn. *Hook-billed duck*, Will.

The duck in a wild ſtate is an inhabitant of Europe, Aſia, and America, frequenting watery places, and ſubſiſting chiefly on frogs, ſnails, and every kind of offal. Its neſt is uſually built near the water, or ſometimes in trees, and it has been known to depoſit its eggs in the deſerted neſt of the crow or magpie. The wild duck abounds in many of our marſhes, but no where appears in greater plenty than in Lincolnſhire, where prodigious numbers are annually taken in the decoys, and ſent to the markets. They pair in the ſpring, and lay from ten to ſixteen eggs; and the young take to the water as ſoon as hatched. They breed chiefly in the north of Europe, and are therefore found in far greater numbers in the winter ſeaſon with us than during ſummer. In France they are ſeldom ſeen, except in winter, making their firſt appearance in October, and departing in the ſpring. The means employed by different nations for the capture of the wild ducks is very diſſimilar; in England they are chiefly taken in decoys or by ſhooting; in France they are killed in vaſt numbers by being enticed within gunſhot likewiſe; but many are taken with hooks and lines baited with offal, and left floating on the waters they frequent. Upon the river Ganges, another method is adopted; a man wades into the water up to the chin, and having his head covered with an empty calabaſh, approaches the ducks, who being accuſtomed to ſee the calabaſhes frequently in the ſtream, remain quiet. Thus unperceived the man has time to approach the flock, and pull them by the leg under water one after the other, till he has caught whatever quantity can be conveniently carried away; with theſe he retires unſuſpected by the remaining ducks, and in like manner repeats his viſits till he has taken as many as he may think proper. Vaſt numbers of ducks are hatched by the Chineſe from the eggs by artificial means, the eggs being placed in boxes of ſand, and left on a hearth of brick-work, to which a proper degree of heat is communicated during the time required for hatching them.

Galericulata. Creſt pendent; on each ſide the poſterior part of the back a recurved, compreſſed, elevated feather. Gmel. *Querquedula ſinenſis*, Briſſ. *Kinmod ſuis*, Kæmpf. *Sarcelle de la Chine*, Buff. *Chineſe duck*, Lath. Rather leſs than a wigeon, with the bill dull red; the irides cheſnut: creſt green and red, legs tawny; back brown, gloſſed with blue-green; the wing-ſpot blue-green, edged beneath with white; the wings brown, edged with pale grey; the web on one ſide of the ſecond quill-feathers much broader than the other, and curved upwards in an elegant manner, when the wings are cloſed; this web is of a pale browniſh red, tipped with black, and conſtitutes a ſtriking character of the ſpecies. The female is like that of the ſummer duck, browniſh, with two white bars on the wings, and the breaſt marked with brown ſpots. This is a beautiful bird, and inhabits China and Japan; at Canton they are frequently expoſed for ſale in cages, and are bought by Europeans as objects of curioſity; the common price is from ſix to ten dollars a pair. Attempts have been made to naturalize them in our climate, but with little ſucceſs. The Engliſh know this ſpecies by the name of Mandarin duck.

Sponsa. Pendent creſt double, varied with green, blue, and white. Linn. *Anas æſtiva*, Briſ. *Yoztacton Yahauhqui*, Ray. *American wood-duck*, Brown. *Summer duck*, Cateſby.

This beautiful ſpecies inhabits Mexico, and ſome of the Weſt India iſles, migrating in the ſummer ſeaſon to the northward. It makes its neſt in the hollows of rotten trees, or between the furcated branches, whence it has received the name of tree-duck. This bird is about nineteen inches long; the bill and legs red; creſt ſtriated; chin white; neck and breaſt claret, the latter marked with triangular whitiſh ſpots; back brown; ſcapulars blue-green. The female is rather leſs than the male; the body brown above, beneath dirty white, and varied with triangular whitiſh ſpots.

Arborea. Brown; head ſub-creſted; belly ſpotted with white and black. Gmel. *Anas fiſtularis jamaicenſis*, Briſ. *Siffleur à bec noir*, Buff. *Black-winged whiſtling duck*, Lath.

A native of Jamaica, where it is ſaid to build in trees, and make a whiſtling noiſe. It alſo inhabits Guiana, where it is called *opano*. The ſize is ſmaller than that of the wild duck. Its bill is black; the crown duſky; hind head, back, and ſhoulders brown; temples and chin white; throat white, and, with the rufous breaſt, ſpotted with black; wings and tail duſky; legs long and lead-coloured, with the claws black.

Cristata. Creſted; cinereous; throat ſpotted with pale ſtraw colour; wing-ſpeculum blue, beneath edged with white; wings and pointed tail black. Gmel. *Creſted duck*, Lath.

Deſcribed from the drawings of ſir Joſeph Banks. The ſpecies inhabits Staaten Land, and meaſures in length twenty-eight inches.

Obscura. Brown, edged with yellow; wing-ſpot blue, with a tranſverſe black bar; tail wedged, duſky, edged with white. Gmel. *Duſky duck*, Lath.

Length two feet; the bill, crown, primary quill-feathers, and legs, duſky. The ſpecies inhabits New York.

Islandica. Creſted, black; throat, breaſt, and belly, white; legs ſaffron. Gmel. *Hrafra-ond*, Arct. Zool. *Iceland duck*, Lath.

Native of Iceland.

Novæ Seelandiæ. Black, beneath aſh-colour; quill-feathers cinereous; the ſecondary with a white band; tail dirty-green. Gmel. *New Zealand duck*, Lath.

Inhabits Duſky bay, in New Zealand, where it is called *Hepatck*.

Rufina. Black; head, and upper part of the neck, teſtaceous; crown reddiſh, (in the male creſted;) wings beneath, and at the edge, white; tail brown. Gmel. *Canard ſiffleur huppé*, Buff. *Red creſted duck*, Lath.

Found on the borders of the Caſpian ſea, and in the lakes of the deſerts of Tartary. The length is more than two feet; the bill red; irides brown; creſt rounded; legs brown, and red in front. The female is brown, with reddiſh bill.

Nyraca. Olive-black; head, throat, breaſts, and flanks, cheſnut; belly white; rump black; vent ſnowy. Guldenſtedt. *Olive-tufted duck*.

Inhabits the Tanais, and meaſures in length about ſixteen inches; feeds on fiſh and vegetables; the fleſh excellent. The female is ſmaller, and reddiſh in thoſe parts of the plumage, which, in the male, are cheſnut.

Arabica. Grey ſpotted; beneath, and rump whitiſh, with cinereous ſpots; wing-ſpot blackiſh, before and behind white. Forſk. *Arabian duck*.

Native of Arabia; the bill yellow, and black in the middle; legs yellowiſh.

Alexandrina. Bill and rump black; neck cinereous, with white ſemi-circles; belly whitiſh, and immaculate. Forſk.

Inhabits the ſame country as the preceding, and obſerved moſt commonly about Alexandria in Egypt.

Gattair. Fuſcous; wings above black, beneath white, edged with brown; quill-feathers 4—20, white in the middle. Forſk. *Egyptian duck*.

Native of Alexandria. The bill is black beneath, above brown; chin black; belly and tail-coverts white; legs blue-aſh.

Sirsæir. Bill beneath yellow; wing-ſpot divided obliquely, the upper half ſilky-green, the lower black before, and behind white. Forſk.

The bill is lead-colour; chin white; crown brown; back brown; the feathers edged with white; belly whitiſh; legs grey. The ſpecies inhabits Arabia.

Balbul. Bill black; wing-ſpot above obliquely green, beneath obliquely black. Forſk.

Native of Cahira.

Fuligula. Creſt pendent; body black; belly and wing-ſpot white. Linn. Fn. Suec. *Anas cirrhata*, Geſn. *Tufted duck*, Donov. Brit. Birds.

Inhabits Europe, and the north of Aſia. The length of this bird is ſixteen inches; the bill broad, livid, and black at the tip; head greeniſh; ſhoulders blackiſh-brown, with pale ſtraw-coloured dots; and duſky-blue legs. The female browniſh, and without creſt.

Duck's *Foot*, or *May-Apple*, in *Botany*. See Podophyllum.

Duck's *Meal*. See Lemna.

Duck's *Meat, Starry*. See Callitriche.

DUCKING, or plunging in water. Olaus Magnus tell us, this was a diverſion anciently practiſed among the Goths, by way of exerciſe; but among the Celtæ and Franks it was a ſort of puniſhment. Tacitus likewiſe aſſures us that it was executed, among the ancient Germans, on the lazy and infamous. At Marſeilles and Bourbon, their men and women, of ſcandalous life, are condemned to the *cale*, as they call it; that is, to be ſhut up, naked to the ſhift, in an iron cage, faſtened to the yard of a ſhallop, and ducked ſeveral times in the river. The ſame is done alſo at Thoulouſe to blaſphemers.

Ducking is alſo a puniſhment for ſeamen; who are thrown into the ſea from the top of the yard of the main-maſt ſeveral times, according to the quality of their offence. Sometimes a cannon-ball is faſtened to their feet, to make the fall the more rapid.

There is alſo a kind of dry-ducking, wherein the patient is only ſuſpended by a rope, a few yards above the ſurface of the water: this is a ſpecies of ſtrapada.

The puniſhment is uſually made public by the diſcharge of a cannon.

Ducking is alſo a penalty, which veteran ſailors pretend to inflict on thoſe who, for the firſt time, paſs the tropic of Cancer, the equator, or the ſtraits of Gibraltar, in conſequence of their refuſal or incapacity to pay the uſual fine levied on this occaſion.

Ducking-*Stool*, in our *Cuſtoms*. See Cucking-*Stool*.

DUCKSTEIN, in *Geography*, is a celebrated fine pale ale brewed at Konig's Lutter, a village of Germany, in the duchy of Brunſwick Wolfenbüttel, which now conſtitutes a part of the new kingdom of Weſtphalia.

DUCTRAP. See Lincolnville.

DUCKUP, a word uſed at ſea by the ſteerſman, or him that is at the helm, when either main-ſail, fore-ſail, or ſprit-ſail, hinder his ſight, ſo that he cannot ſee to ſteer by a land-mark, or the like; for then his word is duckup the clue-lines of thoſe ſails; and as to the ſprit-ſail, when a ſhot is to be made by a chaſe-piece, and the clue of that ſail hinders his ſight, they ſay duckup the clew-lines of the ſprit-ſail; that is, hale the ſail out of the way.

DUCLER, or Duclair, in *Geography*, a ſmall town of France, in the department of the Lower Seine, chief place of a canton, in the diſtrict of Rouen, ſituated on the river Seine; 12 miles W. of Rouen. It contains 1360 inhabitants; its canton has 25 communes, and a population of 14 540 individuals, upon a territorial extent of 232½ kiliometres.

DUCLOS, Charles Dineau, in *Biography*, was born, in 1705, at Dinant, in Britany. He was educated at Paris for the law; a profeſſion which he followed for a ſhort time only, when his talents and manners introduced him, with eclat, into the ſociety of men of letters. He was ſoon diſtinguiſhed as a writer, and was admitted into the academy of Inſcriptions in 1739, and into the French academy in 1747. In the latter he ſucceeded the celebrated Mirabeau as perpetual ſecretary. He was ennobled and penſioned by the king, and was appointed to the office of hiſtoriographer of France. He publiſhed works in many of the departments of literature. His novels are ſaid to be ingenious and intereſting, of which the beſt is intitled "Confeſſions du Compte ****." As an hiſtorian, he is known for a hiſtory of Lewis XI., in three volumes, 12mo. 1745, to which was added another volume, by way of ſupplement, in the following year. This is a work of conſiderable reſearch, written in a conciſe and elegant ſtyle. As a moral writer, he publiſhed "Conſiderations ſur les Mœurs de ce Siecle," which is much eſteemed for the truth of its maxims, and the ingenuity of its diſcuſſions. He had a conſiderable ſhare in the Dictionary of the French academy, and wrote ſome judicious remarks on the grammar of the Port Royal. He died in 1772, and ſince his death have appeared "Secret Memoirs of the reigns of Lewis XIV. and XV." in 2 vols. 8vo., which have been imputed to the pen of Duclos, and which contain many free and curious particulars of the periods treated on. Duclos was a man of great integrity, a faithful friend, and a patron of merit. He was firmly attached to ſound morals, and abhorred the relaxation of principle which prevailed in the modern ſchool. Gen. Biog.

DUCT, or Ductus, in *Anatomy*, a name given to various tubes in the body, and chiefly to thoſe which convey fluids ſecreted in glands to their ultimate deſtination; theſe are called *Excretory* ducts.

Ductus *Adipoſi*, tubes deſcribed by ſome anatomiſts, as conveying the adipous ſubſtance, which they ſuppoſed to be ſecreted in glands. See Cellular *ſubſtance*.

Ductus *ad Naſum*, or *Naſalis*, the tube which conveys the tears from the lacrymal bag to the noſe. See Eye, and Nose.

Ductus *Alimentarius*, or *Alimentalis*, a name ſometimes given to the whole alimentary tube, from its commencement at the mouth to the anus. See Stomach and Intestine.

Ductus *Chyliferus*, the thoracic duct. See Absorbents.

Ductus *Communis choledochus*, is that part of the hepatic duct between the junction of the cyſtic and the duodenum. It derives its name from the circumſtance of its conveying into the duodenum both the hepatic and cyſtic bile. The pancreatic duct alſo opens into it juſt before it penetrates the inteſtine. See Liver.

Ductus *Cyſticus*, the canal by which the bile paſſes to and from the gall-bladder. See Liver.

Ductus *Excretorii*. See Duct.

Ductus *Galactophori*, the excretory tubes of the mammary gland. See Breast.

Ductus *Hepaticus*, the excretory duct of the liver. See Liver.

Ductus *Hepato-cyſtici*, tubes conveying the bile from the liver directly into the gall bladder. Theſe do not exiſt in the human ſubject, but are found in birds.

Ductus *Lacrymales*, the tubes which convey the fluid ſecreted in the lacrymal glands. See Eye.

Ductus *Lactiferi*; the excretory tubes of the *Breaſt*, which ſee.

Ductus *Pancreaticus*, the excretory tube of the *Pancreas*, which ſee.

Ductus *Pecqueti*, the thoracic duct, ſo called from a Frenchman, who diſcovered it. See Absorbents.

Ductus *Salivales*, the excretory ducts which convey the ſaliva into the mouth. See Deglutition.

Ductus *Stenonis*, or *Stenonianus*, the duct of the parotid gland, ſo named in honour of Steno, its diſcoverer. See Deglutition.

Ductus *Warthorei*, the duct of the ſubmaxillary gland, named after Warthore, its diſcoverer.

Ductus *Wirtſungi*, the pancreatic duct, which was found out by a German anatomiſt, Wirtſung. See Pancreas.

Ductus *Pneumaticus*, in *Ichthyology*, the name of a certain duct or canal, found in all thoſe fiſh which have an air-bladder, reaching from that bladder to the orifice of the ſtomach, or ſome other part of it. This duct is variouſly ſituated in the different kinds. Artedi Ichthyolog. See Air-Bladder.

DUCTILITY, (from the Latin *ductile*,) means the property, or the capability, of becoming extended. The word *expanſibility* has been more commonly applied to denote the enlargement of ſuch bodies as conſiſt, or ſeem to conſiſt, of ſeparate parts, like the effluvia of odoriferous ſubſtances, colouring pigments, cotton, wool, &c. But the word *ductility*, denotes the enlargement of the dimenſions of ſolids, without loſing their continuity and conſiſtence. This property almoſt excluſively belongs to metallic bodies; for it can hardly be diſcerned in a few other bodies.

The methods of extending metallic bodies may be reduced to three: *viz.* by the ſtrokes of a hammer, by the more equable preſſure of flatting or rolling mills, and by drawing the metal through ſmall holes in a ſteel plate, as is practiſed in wire-drawing. And ſince the firſt of thoſe methods has been more generally and more uſually practiſed; therefore the words malleability and ductility have been indiſcriminately uſed to expreſs the ſame thing.

To theſe impreſſions certain metallic bodies yield much more readily than others, and ſome there are which will not yield at all; ſo that, when preſſed or hammered, they will rather break into fragments than expand.

Previous to the ſtatement of the various degrees of ductility, it will be neceſſary to ſay a few words with reſpect to the nature of dilatability itſelf, in order to prevent a wrong notion which unexperienced perſons are liable to adopt. When a piece of metal, in conſequence of its ductility, is ſaid to be extended; the meaning is not that the bulk of the metal is enlarged; but that one or two of its dimenſions, (*viz.* the length, the breadth, or the thickneſs,) is enlarged, whilſt one or both the others are diminiſhed. For inſtance, a cubic inch of gold is one inch long, one inch broad, and one inch thick; and the product of theſe three dimenſions, which gives the ſolidity, is one inch. Now if, by hammering, you extend the length of it, ſo as to make it two inches long, the breadth remaining the ſame, the thickneſs will be reduced to half an inch; and the product of theſe three dimenſions; *viz.* two inches, one inch, and half an inch, is equal to one inch, as before; which ſhews that the ſolid contents remain the ſame.

It muſt, however, be obſerved, that, ſtrictly ſpeaking, the bulk of a piece of metal is a little contracted by the hammering or preſſing; ſo that a ſort of concentration and hardening take place at the ſame time. In fact, the ſpecific gravity of a piece of ductile metal is greater after the hammering or preſſing than before. Both this additional hardneſs and increaſed ſpecific gravity are removed by heating the piece of metal to a certain degree.

Though we have mentioned the drawing through holes as one of the methods of extending metallic bodies; yet a neceſſary diſtinction muſt be pointed out with reſpect to this operation.—In the preſent ſtate of philoſophy, *ductility* is diſtinguiſhed from *tenacity*. The meaning of the former has already been explained; but the tenacity is meaſured by the reſiſtance which a wire of the metal oppoſes, without breaking, to the action of a certain force which draws it at one extremity, while the other extremity is fixed. Now it is upon this tenacity that the drawing of metals through holes depends. And, in fact, certain metals which ſhew under the hammer, or under the flatting mill, a much greater degree of ductility than others, are, at the ſame time, leſs capable of being drawn into fine wire, and *vice verſâ;* as will appear from the following liſts.

Of all the metallic bodies ſome are ductile, whilſt others are not, and this difference cauſed them to be diſtinguiſhed into two claſſes; calling the former metals, and the latter ſemi-metals, or imperfect metals; but the limits of theſe claſſes being very indefinite, little regard is now paid to this nominal diſtinction.

Ductile Metallic Bodies arranged in the Order of their Ductility.

Gold,
Platina,
Silver,
Copper,
Iron,
Tin,
Lead.

Metallic Bodies arranged in the Order of their Tenacity.

Gold,
Iron,
Copper,
Platina,
Silver,
Tin,
Lead.

For farther particulars reſpecting the tenacity of metals, ſee the articles TENACITY, and WIRE *Drawing*.

The ductility of gold exceeds that of every other metallic body, and ſince its value and its beauty have at all times encouraged the induſtry of workmen, no pains have been ſpared in endeavouring to expand the ſurface of it to the utmoſt limit of practicability; and a ſingle grain weight of gold is now commonly extended into a ſurface equal to 50 ſquare inches and upwards. Mr. Magellan ſays, that the fineſt gold leaf is extended by hammering between new ſkins, and that each troy ounce of pure gold muſt be alloyed with three grains of copper, otherwiſe it would be too ſoft to paſs over the irregularities of the ſkins. When extended to the utmoſt, 2000 leaves of ſuch gold, each containing a ſurface of 10.89 ſquare inches, weigh leſs than 384 grains; ſo that each grain weight of the metal will produce about 57 ſquare inches of gold leaf; and it is eaſily determined by calculation, that the thickneſs of ſuch gold leaf is about $\frac{1}{282000}$th of an inch. However, this is a conſiderable thickneſs, in compariſon of that of gold ſpun on ſilk in our gold thread.

To conceive this prodigious ductility, it is neceſſary to have ſome idea of the manner, wherein the wire-drawers proceed. The wire and thread we commonly call gold thread, &c. which is only ſilver wire gilt, or covered over with gold, is drawn from a large ingot of ſilver, uſually about thirty pounds weight. This they round into a cylinder, or roll, about an inch and a half in diameter, and twenty-two inches long, and cover it with the leaves prepared by the gold-beater, laying one over another, till the cover is a good deal thicker than that in our ordinary gilding; and yet, even then, it is very thin; as will be eaſily conceived from the quantity of gold that goes to gild the thirty pounds of ſilver: two ounces ordinarily do the buſineſs: and, frequently, little more than one. In effect, the full thickneſs of the gold on the ingot rarely exceeds $\frac{1}{400}$th, or $\frac{1}{500}$th part: and ſometimes not $\frac{1}{1000}$th part of an inch.

But this thin coat of gold muſt be yet vaſtly thinner: the ingot is ſucceſſively drawn through the holes of ſeveral irons, each ſmaller than the other, till it be as fine, or finer, than a hair. Every new hole leſſens its diameter; but it gains in length what it loſes in thickneſs; and, of conſequence, increaſes in ſurface: yet the gold ſtill covers it; it follows the ſilver in all its extenſion, and never leaves the minuteſt part bare, not even to the microſcope. Yet, how inconceivably muſt it be attenuated while the ingot is drawn into a thread, whoſe diameter is 9000 times leſs than that of the ingot!

M. Reaumur, by exact weighing, and rigorous calculation found, that one ounce of the thread was 3232 feet long; and the whole ingot 116,3520 feet, Paris meaſure, or 96 French leagues; equal to 126,4400 Engliſh feet, or 240 miles Engliſh; an extent which far ſurpaſſes what Fa. Merſenne, Furetiere, Dr. Halley, &c. ever dreamt of.

Merſenne ſays, that half an ounce of the thread is 100 toiſes, or fathoms long; on which footing, an ounce would only be 1200 feet; whereas, M. Reaumur finds it 3232. Dr. Halley makes ſix feet of the wire one grain in weight, and one grain of the gold ninety-eight yards; and, conſequently, the ten thouſandth part of a grain, above one third of an inch. The diameter of the wire he found one 186th part of an inch; and the thickneſs of the gold one 154,500th part of an inch. But this, too, comes ſhort of M. Reaumur; for, on this principle, the ounce of wire would only be 2680 feet.

But the ingot is not yet extended to its full length. The greateſt part of our gold thread is ſpun, or wound on ſilk, and, before they ſpin it, they flat it by paſſing it between two rolls, or wheels of exceedingly well poliſhed ſteel; which wheels, in flatting it, lengthen it by above one ſeventh. So that our 240 miles are now got to 274. The breadth, now, of theſe laminæ, or plates, M. Reaumur finds, is only one 8th of a line, or one 96th of an inch; and their thickneſs, one 3072d. The ounce of gold, then, is here extended to a ſurface of 1190 ſquare feet; whereas, the utmoſt the gold beaters can do, we have obſerved, is to extend it to 146 ſquare feet. But the gold, thus exceedingly extended, how thin muſt it be! From M. Reaumur's calculus, it is found to be one 175,000th of a line, or one 2,100,000th of an inch: which is ſcarce one 13th of the thickneſs of Dr. Halley's gold. But he adds, that this ſuppoſes the thickneſs of the gold every where equal, which is no-ways probable: for in beating the gold-leaves, whatever care they can beſtow, it is impoſſible to extend them equally. This we eaſily find, by the greater opacity of ſome parts than others; for where the leaf is thickeſt, it will gild the wire the thickeſt.

M. Reaumur, computing what the thickneſs of the gold muſt be where thinneſt, finds it only the 3,150,000th part of an inch. But what is the one 3,150,000th part of an inch? Yet this is not the utmoſt ductility of gold: for inſtead of two ounces of gold to the ingot, which we have here computed upon, a ſingle one might have been uſed; and, then, the thickneſs of the gold, in the thinneſt places, would only be the 6 300,000th part of an inch.

And yet, as thin as the plates are, they might be made twice as thin, yet ſtill be gilt; by only preſſing them more between the flatter's wheels, they are extended to double the breadth, and proportionably in length. So that their thickneſs, at laſt, will be reduced to one thirteenth, or fourteenth millionth part of an inch.

Yet, with this amazing thinneſs of the gold, it is ſtill a perfect cover for the ſilver: the beſt eye, or even the beſt microſcope, cannot diſcover the leaſt chaſm, or diſcontinuity. There is not an aperture to admit alcohol of wine, the ſubtileſt fluid in nature, or even light itſelf, unleſs it be owing to cracks occaſioned by repeated ſtrokes of the hammer. Add, that if a piece of this gold-thread, or gold-plate, be laid to diſſolve in aquafortis, the ſilver will be all excavated, or eat out, and the gold left entire, in little tubules.

It ſhould be obſerved, that gold, when it has been ſtruck for ſome time by a hammer, or violently compreſſed, as by gold wire-drawers, becomes more hard, elaſtic, and ſtiff, and leſs ductile, ſo that it is apt to be cracked or torn: the ſame thing alſo happens to the other metals by percuſſion and compreſſion. But ductility and tractability may be reſtored to metals in that ſtate, by annealing them, or making them red-hot. Gold ſeems to be more affected by percuſſion and annealing, than other metals.

Platina, ſilver, and copper, may, likewiſe, be expanded into leaves, but not nearly ſo thin as thoſe of gold.

With reſpect to the arrangement of iron and tin in the firſt of the above-ſtated liſts, we are not quite determined as to which of them the preference may be due.

Zinc has the remarkable property of being malleable, or ductile, not in the uſual temperature of the atmoſphere, but in a higher temperature. When heated to between 210° and 300° of Fahrenheit's thermometer, zinc is perfectly malleable, and may be ſtretched into wires, or into pretty thin plates. And when ſo treated, it will afterwards remain malleable. Some metallic ſubſtances do not ſuffer the ſtrokes of a hammer nearly ſo well as the more uniform preſſure of the flatting mill; and this is peculiarly the caſe with zinc.

It is not with zinc alone, but with all other ductile metals, that their ductility is greater in a certain temperature, which generally exceeds that of the atmoſphere; thus iron in a red heat is incomparably more ductile than at a lower temperature. Heat, in ſhort, tends to ſoften the metal; or, which amounts to the ſame thing, to increaſe its ductility; and as hammering or rolling hardens the metal at the ſame time that it extends it, the workmen, in the courſe of their operation, find it neceſſary to ſoften the metal by the application of heat, in order to render it capable of farther extenſion. This heating or ſoftening is, in ſome caſes, repeated ſeveral times before the work is quite finiſhed.

The alloys of two or more metallic bodies are leſs ductile, than the pure metals themſelves; yet ſuch alloys are highly uſeful in a variety of caſes, and the pure metals are often alloyed for no other purpoſe than for diminiſhing their ſoftneſs and ductility. In the coinage of moſt countries the noble metals are generally alloyed with a little copper, which increaſes their hardneſs and elaſticity.

The moſt extenſively uſeful alloy is that of copper and zinc, which forms *braſs.*—Its colour, its ductility, and its not being eaſily oxydated, have rendered it peculiarly uſeful for a variety of purpoſes, and eſpecially in watch-work, where no other metallic ſubſtance has been found nearly ſo uſeful.

Braſs, when properly made, is ductile and tenacious to a conſiderable degree. It will extend pretty well under the hammer, and it may be eaſily drawn into very fine wire. A ſlight degree of heat will, in ſome meaſure, increaſe its ductility; but when heated to about 300°, or upwards, then the ſtrokes of the hammer will reduce it to powder. It is a ſort of braſs (but the preciſe proportion of the ingredients is kept ſecret,) that is expanded into leaves like gold; and is commonly ſold under the name of *Dutch gold.*

Though tin is more ductile than zinc; yet the alloy of copper and tin is, upon the whole, leſs ductile than that of copper and zinc. Paerner ſays, that much copper and little tin form a malleable compound, as well as much tin and little copper; but that when the two metals are alloyed from eight to ten parts of copper to one of tin, then the alloys are brittle and untractable.

The alloy of lead and antimony forms the metal which is uſed for printer's types, and its ductility may be varied by varying the proportion of antimony. According to Gmelin, one part of antimony and 12 parts of lead, form a hard alloy, but capable of being beat into ſheets. One part of antimony and eight parts of lead, form a compound harder and more fuſible than lead, but malleable; and ſuch is alſo the caſe with one part of antimony and three of lead; but with a ſmaller proportion of lead the compound is too hard to bear the ſtrokes of the hammer.

An alloy of zinc and lead has, on account of its brilliancy and hardneſs, been recommended for the conſtruction of economical and other articles. When a great deal of zinc is alloyed with lead, the compound is harder than lead, but very malleable. See METALS, GOLD, &c.

DUCTILITY *of Glaſs.* We all know, that, when well penetrated with the heat of the fire, the workman can figure and manage glaſs like ſoft wax; but what is moſt remarkable, it might be drawn, or ſpun out into threads, exceedingly fine and long.

Our ordinary ſpinners do not form their threads of ſilk, flax, or the like, with half the eaſe and expedition, as the glaſs ſpinners do threads of this brittle matter. We have ſome of them uſed in plumes for children's heads, and divers other works, much finer than any hair, and which bend and wave like it with every wind.

Nothing is more ſimple and eaſy than the method of making them: there are two workmen employed: the firſt holds one end of a piece of glaſs over the flame of a lamp; and, when the heat has ſoftened it, a ſecond operator applies a glaſs hook to the metal thus in fuſion; and, withdrawing the hook again, it brings with it a thread of glaſs, which ſtill adheres to the maſs: then, fitting his hook on the circumference of a wheel about two feet and a half in diameter, he turns the wheel as faſt as he pleaſes; which, drawing out the thread, winds it on its rim; till, after a certain number of revolutions, it is covered with a ſkain of glaſs-thread.

The maſs in fuſion over the lamp diminiſhes inſenſibly; being wound, as it were, like a pelatoon, or clue of ſilk, upon the wheel; and the parts, as they recede from the flame, cooling, become more coherent to thoſe next to them; and this by degrees: the parts neareſt the fire are always the beſt coherent, and, of conſequence, muſt give way to the effort the reſt make to draw them towards the wheel.

The circumference of theſe threads is uſually a flat oval, being three or four times as broad as thick: ſome of them ſeem ſcarce bigger than the thread of a ſilk-worm, and are ſurpriſingly flexible. If the two ends of ſuch thread be knotted together, they may be drawn and bent, till the aperture, or ſpace in the middle of the knot, doth not exceed one 4th of a line, or one 48th of an inch diameter.

Hence M. Reaumur advances, that the flexibility of glaſs increaſes in proportion to the fineneſs of the threads; and that, probably, had we but the art of drawing threads as fine as a ſpider's web, we might weave ſtuffs and cloths hereof for wear. Accordingly, he made ſome experiments this way; and found he could make threads fine enough, as fine in his judgment, as any ſpider's web: but he could never make them long enough to do any thing with them.

Ductility *of Spider's Webs*. See Web.

DUD, in *Geography*, a town of Africa, in Moſambique, where the king reſides.

DUDA, a town of Lithuania, in the palatinate of Wilna; 28 miles E.N.E. of Lida.

DUDAIM, in *Botany*, (Hebr. דודאים), plants mentioned in Geneſis, chap. xxx. v. 14, 15, 16, and in Solomon's Song, chap. vii. v. 14, concerning which there have been great diſputes among the learned. The Septuagint, the Latin vulgate, and our tranſlation, underſtand the above word to mean the fruit or apples of the Mandrake, *Atropa Mandragora* of Linnæus, which is unqueſtionably the Μανδραγορας of Dioſcorides, and other ancient writers. All that can be gathered from the above chapter in Geneſis is, that the Dudaim were found in the fields during the wheat harveſt, and, either for their rarity, flavour, or ſome other quality, were greatly eſteemed by women. The ſame word in Solomon's Song expreſſes ſome fruit or flowers, that "give a ſweet ſmell," and are acceptable alſo to the male ſex. No wonder that with ſo powerful a ſtimulus to their curioſity, and ſuch light materials to guide it, critics ſhould have taken a very wide range in their inquiries. Some have taken Lilies, Roſes, Violets, Daffodils, Snowdrops, or Jaſmine for the Dudaim; others Melons, Plantain-fruits, Whortle berries, Dwarf-brambles, the berries of *Phyſalis*, or Winter Cherry, Grapes of ſome peculiar kind, or even the ſubterraneous *Fungi* called Truffles. Some have ſuppoſed the word to mean the ingredients, whatever they might be, of a charm or philter, and hence have again recurred to the Mandrake, celebrated through all antiquity for ſuch imaginary virtues, and whoſe hiſtory is tricked out with all the traditionary nonſenſe that might confirm the report of theſe qualities. Perhaps the moſt judicious writer on the Dudaim is Liebentank, who, in 1660, after reviewing all that had previouſly been aſſerted or imagined, gave it as his opinion that nothing certain could be decided on the ſubject. His diſſertation has gone through numerous editions. Such a deciſion, however, ſeems only to have ſtimulated the ingenious to freſh inquiry. The younger Rudbeck publiſhed a profound diſſertation at Upſal in 1733, intended to refute all the foregoing opinions, and to propoſe Raſpberries as the Dudaim. His learned fellow-countryman, Olaus Celſius, in his Hierobotanicon, publiſhed in 1745, ſlightly mentioning this ſuggeſtion, contends that the object of their common inquiry could be no other than the fruit of *Oenoplia* or *Napeca, Rhamnus* (or rather *Zizyphus*) *Spina Chriſti* of Linnæan writers. "The controverſy, in ſhort, ſeemed to be arrived at this point, that as nothing could plauſibly be determined, diſtinction was to be obtained by ſome new ſuggeſtion only.

If we may offer an opinion, as we prefer truth to ſingularity or novelty, it will be in favour of the Mandrake, whoſe hiſtory is perfectly in union with the ſlight mention of the Dudaim in Geneſis, and whoſe reputed properties of exciting love and promoting conception, account equally well for the deſire of Rachel for this fruit, and for Leah's reluctance to let her partake of it. From the great ſtreſs laid on the perſon who gathered it, "*my ſon's Mandrakes*," it may be conjectured that ſome additional virtue was imparted to a plant, otherwiſe common enough, by its being gathered by a youthful or innocent perſon. Such notions frequently occur in the hiſtory of amorous incantations; for it is the policy of ſuperſtition gratuitouſly to enhance the value of ordinary or worthleſs things. Finally, the etymology of the Dudaim from דודים Dodim, loves, confirms the idea of a philter, and accords with the Mandrake. But it does not follow that the Dudaim of Solomon's Song muſt be the very ſame plant. Superſtition or taſte has fixed in every country, upon ſome flower or other with which to aſſociate ideas of affection; and the Mandrakes that "gave a ſweet ſmell" might literally mean any "fragrant flowers of love." S.

DUDDEN, in *Geography*, a river of England, which runs into the Iriſh ſea; about three miles S. from Dalton, in Lancaſhire.

DUDELDORFF, a ſmall town of France, in the department of Forêts, chief place of a canton in the diſtrict of Bittbourg, with a population of 467 individuals only: but the canton contains 7263 inhabitants, diſperſed in 16 communes, on a territorial extent of 317½ kiliometres.

DUDEN, a town of Aſiatic Turkey, in the province of Caramania; 10 miles N. of Satalia.—Alſo, a river of Aſiatic Turkey, which runs into the ſea near Satalia.

DUDENHOFEN, a ſmall town of Germany, in the county of Hanau Munzenberg, which is now in the conſcription of the new kingdom of Weſtphalia.

DUDERSTADT, a ſmall town of Germany, in the lower Eichsfeld, which by the peace of Luneville was transferred from the elector of Mayence to the king of Pruſſia, but which the latter loſt again at the peace of Tilſit, in 1807. It is at preſent in the new kingdom of Weſtphalia.

DUDITH, Andrew, in *Biography*, was born at or very near Buda, in Hungary, in Feb. 1533. His father was a native of Hungary, and his mother, a noble Venetian, was named Sbardellat, an appellation often applied to her ſon Andrew. Scarcely had the ſubject of this article paſſed the boundary of infancy, before he exhibited a livelineſs of imagination and a brilliancy of parts, that preſaged the future great man. At an early period of life his father was killed.

killed in battle with the Turks, and the youth was, by the advice of his uncle, the biſhop of Watzeu, ſent to Breſlau for his education. At the age of eighteen he was removed to Verona for the completion of his ſtudies. Here he acquired a high reputation for diligence and uncommon talents. He is mentioned in a letter of Paul Manutius as one of the greateſt geniuſes of the age. In 1554, he attached himſelf to the train of cardinal Pole, who was nominated papal legate to the court of England, and Dudith recommended himſelf by his manners and aſſiduity to the notice and eſteem of queen Mary and her ſiſter Elizabeth. Leaving Pole in England, he went to Paris, where he made himſelf acquainted with the philoſophy of the times, and ſtudied more critically the ancient languages. After this, he ſpent ſome years at Padua, and obtained the friendſhip of many of the firſt literati of the age. While he was in Italy, he tranſlated into Latin "The Judgment of Dionyſius Halicarnaſſenſis on the Hiſtory of Thucydides," and laid the foundation of other literary works. From Italy he went to France, on a miſſion from the grand duke of Tuſcany to the celebrated Catherine de Medicis, whom he addreſſed in her native language with ſo much fluency and purity of diction, as to excite her admiration and applauſe. In the year 1560, he repaired to the court of Vienna, where he was ſhortly after appointed one of the privy councillors to the emperor Ferdinand II., and afterwards nominated to the biſhopric of Tina, in Dalmatia. Two years after this he was deputed by the clergy of Hungary to be one of their repreſentatives in the council of Trent. In this capacity, by his eloquence and judicious advice, he acquired much reputation. His talents, however, ſoon excited the jealouſy of the papal legates, and the more ſo when they perceived that the powers of Dudith were likely to be employed in expoſing their ſyſtem. The freedom with which he diſcuſſed topics of high intereſt and importance was the means of getting him recalled: but when the king knew from himſelf what had paſſed, and how nobly he had acted his part, ſo far from cenſuring Dudith, he rewarded him with the biſhopric of Chonat, in Hungary. The emperor next ſent him as his ambaſſador to Poland, and on his return gave him ſtill higher church preferment. He was a ſecond time, under Maximilian II., ſent ambaſſador into Poland; here he ſeems to have abandoned his religious opinions, and to have determined to reſign all his preferment in the church of Rome. Having formed the reſolution, he without heſitation made a ſacrifice of his wealth, and married privately one of the maids of honour to the queen of Poland. This conduct highly exaſperated the clergy with whom he had been connected, but he ſtill retained the good-will and confidence of the emperor, who appointed him his reſident in Poland, where he made an open and undiſguiſed profeſſion of the proteſtant religion. In Poland he became acquainted with the Unitarian brethren, and a convert to their faith, for which he was to the end of life a zealous advocate. In 1575 he returned, after much and indefatigable ſervice performed for the emperor, to the court of Vienna. But on the death of his ſovereign, three years after, he retired into Moravia, and from thence to Breſlau, where he remained in great privacy until the death of Stephen Batori, in 1579, which gave riſe to a conteſt for the crown of Poland: in this ſtruggle Dudith was employed by the emperor Rudolphus II., to ſecure the election for his brother Maximilian. He was, however, unſucceſsful, and returned to Breſlau, where he died in 1589, in the ſixtieth year of his age. Dudith was unqueſtionably one of the moſt conſiderable men of the age in which he flouriſhed. Moreri ſays, "that he had been a catholic, proteſtant, and Socinian; and that he died without any fixed principles of religion." This is probably a calumny invented by the catholics, whoſe cauſe he not only deſerted, but whoſe conduct he ſometimes expoſed. His works are many, and on various ſubjects of phyſics, poetry, and theology; in Moreri's account they are enumerated at length. His life was regular and virtuous; his manners polite and conciliating, and his benevolence warm and unconfined. As a politician he was a man of honour and integrity; and in his diplomatic character he was ardent and ſtrenuous for the intereſts of the princes by whom he was employed. He was an excellent ſcholar, and eminently ſkilled in the languages; and ſo much an admirer of the writings of Cicero, that he is ſaid to have copied all the works of that author thrice with his own hand. Moreri.

DUDLEY, Edmund, in *Biography*, was an eminent lawyer and ſtateſman in the reign of Henry VII. who made himſelf extremely unpopular by the abuſe of his legal knowledge, and oppreſſive meaſures. He, with ſir Richard Empſon, another great law officer of a ſimilar characteriſtic complexion, contrived to obtain the monarch's favours by flattering his weakneſs, and promoting his avaricious views. Through the latter part of that reign, they became the inſtruments of regal rapacity; and aſſiſted in filling the coffers of the treaſury, by arbitrary and vexatious proſecutions of the people, upon obſolete penal ſtatutes. On the acceſſion of Henry VIII. they both fell into diſgrace; and met with their juſtly deſerved fate. The voice of the people for juſtice became extremely clamorous, and the king, to appeaſe the menacing ſtorm of popular diſcontent, now riſing into turbulent rage, gave up Dudley and Empſon as victims; and they were both attainted, and beheaded.

Dudley, John, duke of Northumberland, ſon of Edmund Dudley already mentioned, was born in 1502, and was about eight years of age at the time of his father's execution. He was very ſoon after this event reſtored in blood by act of parliament; and when able to ſerve his country, attended the duke of Suffolk in an expedition to France, where, on account of his gallantry, he obtained the honour of knighthood. He was afterwards patronized by cardinal Wolſey, and lord Cromwell. In 1542, he was raiſed to the dignity of viſcount Liſle, a title which belonged to his mother in her own right, and ſoon after created knight of the garter. In the next year, he ſailed, as lord high admiral of England, with a fleet of 200 ſail to the firth of Forth, where he landed a body of troops and took poſſeſſion of Edinburgh. From Scotland he proceeded to aſſiſt the king at Boulogne, and very much contributed to the capture of that place, of which, as a reward for his ſervices, he was appointed governor. In 1546, he was appointed lieutenant-general, and commander by ſea, and with a very inferior force, not only fruſtrated an intended invaſion by the French, but carried an alarm to their coaſts. He was one of the commiſſioners who received the oath of Francis on the peace, and who made a ſettlement of the army accounts; for theſe ſervices he was amply rewarded by grants of church lands, which relieved him from the embarraſſments which his extravagance had occaſioned. By the laſt will of Henry VIII. he was nominated one of the ſixteen to whom the government of the country was committed, during the minority of Edward VI. In the year 1547, he was created earl of Warwick, with the grant of Warwick caſtle and manor. He continued to aſcend in the ſcale of preferment, and was ſucceſſively created lord ſteward of the houſehold, earl marſhal of England, and finally, in October 1551, he obtained the high title of duke of Northumberland. The duke of Somerſet had long been Dudley's rival, and the jealouſies fomented between theſe powerful noblemen, created much anxiety in the breaſt of the young king, who, if poſſible, hoped to unite them, by propoſing a marriage between Warwick's eldeſt ſon and Somerſet's daughter, which took place. The conciliation was of ſhort duration; the duke of Northumberland felt that he could riſe no higher but by the fall of his rival. The latter was aware of his deſign, and urged by fears for his own ſafety, entered the houſe of Northumberland one morning, with an intent to kill him: but being received with apparent kindneſs, he was unequal to the execution of the bloody deed. The intention being known, Somerſet was committed to the Tower, brought to trial and convicted of compaſſing the death of a privy counſellor. To the diſgrace of the age and of his enemy the duke of Northumberland, who ſat as one of his judges, he was executed Jan. 1552. He now had the full aſcendancy over the mind of Edward, procured a marriage between his fourth ſon Guilford Dudley, and lady Jane Grey, a branch of the royal family, and then forced the young king to ſet aſide from the ſucceſſion his ſiſters Mary and Elizabeth, and to bequeath the crown to his daughter-in-law. This, which he hoped would raiſe him to the higheſt point of honour, cauſed his downfall and death. The king died in July 1553, and the duke immediately proclaimed his daughter lady Jane; but the people little approved of the ſucceſſion, and an inſurrection in Suffolk put a ſpeedy end to his ambitious projects. He headed the army and ſet out to cruſh the rebellion, but during his abſence from the metropolis, Mary was proclaimed queen, and at Cambridge he was glad to join in the acclamations of "long live queen Mary." This, however, did not ſatisfy the new government; he was almoſt immediately arreſted, brought to London, and committed to the Tower. In the hope of pardon, or with a view of averting the wrath of the queen from his family, he conformed to the Roman catholic religion. Mercy was not among the attributes of Mary: the duke had reſiſted her power and inſulted her authority, and ſhe determined he ſhould pay the penalty of his life. He ſubmitted to his fate with compoſure. On his trial he requeſted permiſſion to aſk, if a man could be guilty of treaſon that obeyed orders given him by the council under the great ſeal; and if thoſe involved in the ſame guilt with himſelf could ſit as his judges? Being anſwered that the great ſeal of an uſurper was of no authority, and that perſons not lying under any ſentence of attainder, were ſtill innocent in the eye of the law, and might be admitted on any jury; he acquieſced, and pleaded guilty. He ſuffered, Aug. 22, 1553, in the fifty-ſecond year of his age, leaving ſeveral children, of whom Guilford Dudley and the amiable lady Jane ſuffered for his guilty ambition. Biog. Brit. Hume's Hiſt.

Dudley, Robert, earl of Leiceſter, fifth ſon of the duke of Northumberland, was born in 1532. He was knighted at an early age, and was a gentleman of the bed chamber in the reign of Edward VI. He was of courſe involved in the diſgrace of his father, but was in a very ſhort time reſtored in blood; he even roſe in favour under the reign of Mary, and was appointed to the head of the ordnance. When Elizabeth aſcended the throne, honours were ſhowered upon him with an unſparing hand; he was created maſter of the horſe, knight of the garter, and privy counſellor; and to enable him to maintain the ſplendour of his ſtation, the queen beſtowed upon him grants of ſeveral manors and large eſtates. His known favour at court obtained for him rank and honour with the corporations and public bodies throughout the kingdom. In the year 1560 he loſt his wife, and as it was known he was ambitious of being thought the ſuitor of the queen, he laboured under the ſuſpicion of having been the cauſe of his lady's death. In 1564, he was created baron Denbigh, and earl of Leiceſter, and in the ſame year was elected chancellor of the univerſity of Oxford. He is ſuſpected of having inſidiouſly urged the duke of Norfolk to that courtſhip of the Scottiſh queen, which ended in his ruin, Leiceſter himſelf being one of the peers who pronounced his condemnation in 1572. He is charged alſo with having married lady Douglas Howard, and refuſing to acknowledge it, compelled her to marry ſir Edward Stafford. With all theſe ſtains on his character, he affected extraordinary piety, and put himſelf at the head of the puritan party. He erected an hoſpital at Warwick, with a liberal endowment, and gave the maſterſhip of it to the celebrated puritan Thomas Cartwright. In 1575, he had the honour of entertaining his ſovereign at Kenelworth caſtle; and the ſumptuous feſtivities on this occaſion, are mentioned among the ſplendours of that magnificent reign. In 1578, he married the widow of Walter Devereux, earl of Eſſex, having been ſuſpected of too cloſe an intimacy with her during her late huſband's life; ſo ill, indeed, did the public conceive of him, that it was currently reported Eſſex was taken off by the contrivance of the earl of Leiceſter. About the year 1584, the revolted ſtates of the Low Countries offered to throw themſelves on the protection and under the government of queen Elizabeth: to this ſhe did not agree, but ſent them over aſſiſtance, *viz.* 5000 foot and 1000 horſe, under the command of the earl of Leiceſter. He was attended by many of the nobility and gentry, and failed in December 1585 to Fluſhing, where he was received with the moſt profound reſpect, and by the States themſelves, he was raiſed to the ſupreme executive authority, as well civil as military throughout their dominions. This increaſe of his power gave offence to the queen, who conceived that ſhe ſhould have been conſulted before it had been granted by the States, or accepted by her ſubject. In battle, he was not remarkably ſucceſsful, and in one of the ſkirmiſhes, had the misfortune to loſe his nephew, the excellent ſir Philip Sidney. On his return to the Hague, he was received with coolneſs by the States, and he thenceforth, by his affected zeal for the Proteſtant cauſe, and his pretended piety, made a party with the people, and eſpecially with the clergy, who from their pulpits inveighed againſt the magiſtrates, and extolled the earl as the champion of true religion. On his return to England, he was favourably received by Elizabeth, who was at that time in great perplexity how to act reſpecting the queen of Scots. When it was debated in council, whether ſhe ſhould be brought to public trial, Leiceſter gave his opinion for private aſſaſſination, and thus ſtrengthened the ſuſpicions of his own criminal practices againſt his enemies, which will for ever adhere to his memory. In 1587, he reſumed his command in the Low Countries, but with as little ſucceſs as before; he was accordingly recalled, and accuſed of miſmanagement. Being, however, ſupported by the queen, he was appointed by her to the office of lieutenant-general of the army, when the nation was threatened with a Spaniſh invaſion. He died in the ſame year, 1588, at the age of fifty-ſix, leaving behind him one natural ſon by lady Sheffield, and was interred in a chapel of the collegiate church of Warwick, where a noble monument was erected to his memory. Biog. Brit. Hume.

Dudley, *Sir* Robert, was the natural ſon of the earl of Leiceſter already noticed in the preceding article. He was born in 1573, and educated at Chriſt-church college, Oxford, where he obtained great credit for his induſtry and talents. By the death of his father, he was left, after the deceaſe of his uncle, the caſtle of Kenelworth, and the bulk of his eſtate. Robert was, however, of an enterpriſing diſpoſition,

poſition, and, having married the ſiſter of Thomas Cavendiſh the great navigator, he undertook a voyage of adventure and diſcovery. He wiſhed to have made an expedition, at his own expence, to the ſouth ſeas, which was prevented by government ; but he was allowed to ſail with a ſquadron, under his command, in 1594, to the river Oronoque ; in which expedition he took and deſtroyed ſeveral Spaniſh ſhips. In 1596, he diſtinguiſhed himſelf at the taking of Cadiz, and was on that occaſion honoured with knighthood. After this he made an attempt to eſtabliſh the legitimacy of his birth ; but failing, he reſolved to take up his reſidence abroad, and fixed upon Florence, where he aſſumed the title of earl of Warwick. Some time after this he received letters of recal from his ſovereign, which he refuſed to obey, and on that account was deprived of his eſtate for life, by the ſtatute of fugitives. Kenelworth caſtle was now veſted in the crown, but as it would return to the heirs of ſir Robert at his death, propoſitions were made to him by the prince for the purchaſe of it : to this he agreed, but it is probable, that he received very little, if any, of the money which was to be paid for it. Sir Robert was now anxious to return home, and to ingratiate himſelf with the king, he drew up an extraordinary ſcheme to enable him to raiſe money without the intervention of parliament. James did not venture upon the project, which, however, was made known, and ſome perſons ſuſpected to be the authors of it, were impriſoned on the ſuſpicion. Dudley remained at Florence, and was created a duke of the holy Roman empire, upon which he aſſumed his grandfather's title of Northumberland. Finding no means of returning to his native country, he applied himſelf to various projects that might be uſeful to the ſtate in which he found protection. He laid the foundation of many improvements in navigation and commerce, and particularly in pointing out a method of draining the moraſs between Piſa and the ſea. He is ſaid alſo to have been chiefly inſtrumental in making the port of Leghorn a free port. Between the years 1630 and 1646, he publiſhed a large work, entitled, "Del Arcano del Mare," &c. in two volumes folio. This work is full of charts, plans, &c. and is replete with projects relative to maritime affairs, which are ſaid to diſplay much genius, and an extenſive knowledge. "It is," ſays the writer of the article in the Biographia Britannica, "a ſingular treaſury of curious and important ſchemes, which manifeſtly prove the author's high capacity for the advancement of uſeful knowledge, no man having ever had a ſtronger propenſity to reduce ſpeculation to practice than he ; and the ſucceſs that attended his labours in this reſpect ought to derive an extraordinary degree of credit, to whatever he ſuggeſts as practicable : though, beyond all doubt, ſomething of the like genius muſt be required, in ſuch as attempt to make uſe of any of his projects, which are delivered in a manner not very intelligible to vulgar underſtandings." Sir Robert was attached to ſcience in general, had ſome knowledge of chemiſtry, as it was then ſtudied, and profeſſed himſelf verſed in phyſic. He gave his name to a medicine, which he either purchaſed or invented, which was long in great reputation under the name of lord Warwick's powder. When he went abroad, he took with him the daughter of ſir Robert Southwell, to the prejudice of his wife, whom, with four daughters, he left at home. At Florence he lived in great ſtate, and by the pope's diſpenſation he married the lady who went out with him, though his wife was ſtill living in England. He died at his ſeat near Florence in 1649, leaving a numerous foreign poſterity. Biog. Britan.

Dudley, in *Geography*, a market-town in the hundred of Halfſhire, in the county of Worceſter, is ſituated on the northern borders of that ſhire, where it joins Staffordſhire, and is nearly ſurrounded by the latter. It conſiſts of two pariſhes, and comprehends 1922 houſes, and 10,107 inhabitants. The adjacent country abounds with collieries, and moſt of the population are engaged in the coal buſineſs, and in the making of nails, and hard-ware. At the northern extremity of the town are ſome conſiderable remains of a caſtle, which, according to ſome writers, is ſaid to have been built by Dodo, or Duddo, a Saxon prince, whoſe name is perpetuated, and incorporated in that of the town. Leland ſtates, that the caſtle is within the confines of Staffordſhire. It ſtands on an elevated rock of lime-ſtone ; and, according to Gough, commands "an extenſive proſpect into five ſhires, and part of Wales." In the reign of king Stephen it belonged to the Pagenels, from whom it deſcended to the family of Somerys, in the time of Henry III. and from them to the Suttons' temp. Edward II. It now belongs to viſcount Dudley and Ward, who derives his title from this place. The caſtle ſuſtained a ſiege of three weeks in the time of the civil wars, when it was much battered, and has ever ſince continued a ruin.

In the town are two churches, three charity ſchools, and ſeveral chapels for diſſenters. Here are a market on Saturdays, and three annual fairs. At a ſhort diſtance from the town are the ruins of a monaſtic building, called Dudley priory.

Dudley *and Owen Canal*, in Worceſterſhire, Shropſhire, and Staffordſhire, is about 13 miles in length ; it commences in the Worceſter and Birmingham canal, at Selby cut, and terminates in the old Birmingham canal at Tipton Green ; it has a branch two miles in length, communicating with the Stourbridge canal at Black Delph, ſee Canal. It has been ſaid, that at Wind-mill hill colliery, to which a branch of this canal extends, a ſeam of coal, of the amazing thickneſs of 45 feet, is worked ; this thickneſs, if correct, may probably be owing to ſeveral ſeams of coal, approaching ſo near together, as to be all worked together, although they may in reality be ſeparated, by thin beds of ſhale. See Colliery.

Dudley, a town of America, in the ſtate of Maſſachuſetts, and county of Worceſter, containing 1140 inhabitants; 18 miles ſouthward of Worceſter, and 60 S. W. of Boſton.

DUDSWELL, a townſhip in Lower Canada, about 20 miles N. E. of Aſcot, having about 50 inhabitants. The river St. Francis paſſes through the ſouthern part of this town in a weſtern courſe, and ſoon after turns N.W. which courſe it purſues till it falls into St. Lawrence.

DUDUA, or **Duduſa**, in *Ancient Geography*, a town of Aſia, in Galatia. Ptolemy.

DUDUM, a town of Africa, in Interior Libya, ſouth of the river Niger. Ptolemy.

DUE Cori, *Ital. Muſ.* two choruſſes or choirs, placed at a diſtance from each other, ſometimes performing in four parts alternately, or antiphonally ; and ſometimes uniting in eight real parts. We hear of compoſitions in the fifteenth and ſixteenth centuries, not only for eight, but 36 parts ; ſuch was a motet by Ockenheim, the maſter of Jorquin, as all the muſical writers of the ſixteenth century triumphantly tell us.

Zarlino ſays, that ſo great was the rage in his time for multiplying parts in muſical compoſitions, that ſome maſters, not content with three or four, which ſufficed to their predeceſſors, had increaſed them to fifty ; from which, he truly obſerves, nothing but noiſe and confuſion could ariſe. However, in another part of his book, he tells us, that Adriano Willaert had invented maſſes *à Due Cori, ever a tre,* or as ſome call them, *a Cori Spezzati*, which had an admirable effect. We know not how Ockenheim diſpoſed his parts; but they would have furniſhed nine choirs of four voices each. In the large churches of Italy, where the performers are divided into two bands, placed in oppoſite galleries, all the imitations and ſolo parts are diſtinctly heard, and when united in at leaſt eight *real* parts, completely fill the ears of the audience with all the charms of congregated ſound. We have never heard this ſpecies of compoſition attempted in our cathedrals, when a powerful band of inſtruments and additional voices are joined to the uſual choral performers. Indeed, all our chanting and common choir ſervice, derived from the ancient antiphonal ſinging, is of this kind: the performers being equally divided, and placed on each ſide the choir, form two bands, one of which is called the dean's ſide, and the other the chanters': *Decani, Cantoris;* but the number of voices in our cathedral eſtabliſhments is not ſufficient to produce the great effects which might be obtained from the united force of all the vocal and inſtrumental performers that are aſſembled upon particular occaſions, ſuch as the Feaſt of the Sons of the Clergy at St. Paul's; the Triennial Meetings of the three Choirs of Worceſter, Hereford, and Glouceſter; the Feaſt of St. Cecilia, at Saliſbury; and occaſional performance of oratorios in other cathedrals and churches of the kingdom; but above all from ſuch a ſtupendous congreſs of muſicians as has been aſſembled at Weſtminſter Abbey.

We are in poſſeſſion of a maſs compoſed by Orario Benevoli, in 24 real parts for ſix choirs, and a ſong of 40 real parts, or ten choirs, by our venerable countryman Tallis. Theſe are curioſities, harmonical phenomena. But there can be little melody in any of theſe multiplied parts; but to make them move at all without violation of rule, requires great meditation and experience.

Many of the movements in Corelli's concertos, when the Ripienos differ eſſentially from the principal parts, and many of Handel's choruſſes, are written *a Due Cori;* but their effect is loſt by the band being all crowded together in one orcheſtra. It is only in the two oppoſite galleries of a church, or other large building, that has two galleries fronting each other, ſuch as, before the fire, our beautiful Pantheon contained, that ſuch grand effects can be produced, as we have heard in the churches of Italy.

DUE *Terre*, in *Geography*, a town of Naples, in the province of Bari; 6 miles S.S.W. of Bari.

DUEGNAS, or DUENNAS, a town of Spain, in the province of Leon, on the Piſuerga, on the frontiers of Old Caſtile; 3 leagues S. of Palencia.

DUEL, a ſingle combat, at a time and place appointed, in conſequence of a cartel, or challenge.

The word is uſually derived from *duellum*, uſed by the barbarous Latin writers, *quaſi duorum bellum*.

Duels were anciently allowed by common law, in caſes where proof could not be had. In which view, Fleta defines duel, "ſingularis pugna inter duos ad probandam veritatem litis; & qui vicit, probaſſe intelligitur." Stat. de Finib. Levat. 27 Edw. I.

This duelling was ſo general a method of terminating differences among the nobility, that even eccleſiaſtics, prieſts, and monks, were not excuſed from the ſame; only to prevent their being ſtained with blood, they obliged theſe to procure champions to fight in their ſtead; as is ſhewn at large by father Dacheri, in his Spicilegium, tom. viii.

None were excepted from theſe legal duels but women, ſick people, and cripples, and ſuch as were under twenty-one years of age, or above ſixty.

The cuſtom was, for the two champions to enter a liſt, or ſmall incloſure, appointed by the authority of the ordinary judge, not only on criminal occaſions, but on ſome civil ones, for the maintenance of their right.

The monk Sigebert even relates, that a queſtion on a point of law being preſented to the emperor Otho I. *viz.* whether repreſentation had place in direct ſucceſſion? and the doctors finding themſelves embarraſſed in the reſolution thereof, the emperor remitted the deciſion of ſo critical a point to the judgment of arms, and pitched on two bold fellows to maintain the *pro* and the *contra*. The victory fell to him who contended for repreſentation; in favour of whom a law was immediately made, which is in force to this day.

This cuſtom came originally from the northern nations; among whom it was uſual to end all their differences by arms, as we are aſſured by Paterculus. It afterwards paſſed as a law among the Germans, Danes, and Franks; eſpecially after Gondebaud, king of the Burgundians, admitted it in lieu of ſwearing. Towards the concluſion of the fifth century, M. Godeau, in his Hiſtory of the Church, VII. cent. ſays, that the Lombards firſt introduced into Italy the barbarity of ſingle combats, whence the cuſtom ſpread throughout the reſt of Europe. This mode of trial was introduced into England, among other Norman cuſtoms, by William the Conqueror; but was only uſed in three caſes, *viz.* one military, in the court-martial, or court of chivalry and honour; the ſecond, criminal, in appeals of felony; and the third, civil, upon iſſue joined in a writ of right, which was the only deciſion of ſuch writ of right after the conqueſt, till Henry II. with conſent of parliament introduced the alternative of the grand aſſize, or a peculiar ſpecies of trial by jury. See BATTLE.

The preparation for the combat, and the proceſs of it, are deſcribed under the article CHAMPION. We ſhall only farther obſerve, that when the day of combat was come, they made choice of four cavaliers to guard the field; and performed divers ceremonies, prayers, oaths, &c. deſcribed by Paſquier, and other authors, and quoted by Du-Cange, who mentions an ordonnance of king Philip the Fair in 1306, preſcribing the ſeveral rules, conditions, and ceremonies to be obſerved herein.

The method of trial by duel was inſtituted as a method of conſulting Providence, to learn who was the criminal; and it was imagined, that God, thus interrogated, would not fail to declare himſelf in favour of the innocent. But it happened ſo often, that the unjuſt accuſer came off victorious, that they at length began to be convinced, they muſt not preſcribe to his wiſdom the neceſſity of interrupting the courſe of ſecond cauſes. This was giving rules to murder, and diſguiſing aſſaſſinations under method and meaſure.

Saxo Grammaticus obſerves, that as early as the year 981, the kings of Denmark had abrogated the proof by duel; and in lieu thereof, appointed the proof by red-hot iron, which was alſo annulled in its turn.

But duels were condemned before by a council held at Valentia, in 855, where the perſon who killed his enemy was excommunicated; and the perſon killed was pronounced unworthy of burial. Afterwards, the popes, Nicholas I. Celeſtine III. and Alexander III. likewiſe interpoſed; and Frederic I. and II. prohibited them in Germany; Louis VII. began to reſtrain them in France, in the year 1168; and St. Louis proceeded to aboliſh them; but his ordonnance, A.D. 1260, only took place in his own territories, and not in thoſe of his vaſſals. After his example, the counts d'Auvergne and Poictou, and ſeveral other lords, forbad them likewiſe. Philip the Fair, following the footſteps of his grandfather, St. Louis, at one time forbad all gages, or pledges of battle;

and yet he permitted them in four caſes, in the ordonnance above mentioned of the year 1306. The laſt duel of note was in the year 1547, before king Henry II. between Jarnac and Chaſtaignerie, mentioned by Thuanus, and de Serres.

In England, the trial by duel is diſuſed; though the law on which it is founded be ſtill in force. It appears from Madox's Hiſtory of the Exchequer, that trials of this kind were ſo frequent in England, that fines, paid on theſe occaſions, made no inconſiderable branch of the king's revenue, vol. i. p. 349. The laſt trial of this kind was appointed in the year 1631, between Donald lord Rey, or Rhee, appellant, and David Ramſey, eſq. defendant, in the painted chamber at Weſtminſter. But that quarrel terminated without bloodſhed, being accommodated by Charles I.; as was alſo another of the ſame kind in 1571, by the interpoſition of queen Elizabeth. Another inſtance occurs ſeven years after that in 1631. Ruſhworth's Obſervations on the Statutes, &c. p. 260. See Battle and Combat.

Duel is alſo uſed for a ſingle combat on ſome private quarrel or occaſion. See Challenge.

The duel muſt be premeditated; otherwiſe it is only a rencounter.

The folly, or rather madneſs, of duelling reigned for ſome ages in France; where the flower of the nobleſſe periſhed thereby. It is one of the glories of Louis XIV. to have uſed all his power and authority for aboliſhing duels. The ſevere edicts and laws he made againſt duelliſts have, in a great meaſure, put a ſtop to the cuſtom.

Deliberate duelling is by the law of England a ſpecies of murder; and accordingly, it charges both the crime and puniſhment of murder on the principals, and on their ſeconds alſo. (Blackſt. Com. vol. iv. p. 199. 1 Hawk. P. C. 82.) It requires, however, ſuch a degree of paſſive valour to combat the dread of even undeſerved contempt, ariſing from the falſe notions of honour too generally received in Europe, that the ſtrongeſt prohibitions and penalties of the law will never be entirely effectual to eradicate this unhappy cuſtom, till a method be deviſed of compelling the original aggreſſor to make ſome other ſatisfaction to the affronted party, which the world ſhall eſteem equally reputable, as that which is now given at the hazard of the life and fortune, as well of the perſon inſulted, as of him who hath given the inſult. To this purpoſe Dr. Robertſon obſerves, that the dominion of faſhion is ſo powerful, that neither the terror of penal laws, nor reverence for religion, has been able entirely to aboliſh a practice unknown among the ancients, and not juſtifiable by any principle of reaſon; though at the ſame time, it muſt be admitted, that to this abſurd cuſtom we muſt aſcribe, in ſome degree, the extraordinary gentleneſs and complaiſance of modern manners, and that reſpectful attention of one man to another, which, at preſent, render the ſocial intercourſes of life far more agreeable and decent than among the moſt civilized nations of antiquity. Hiſt. Ch. V. vol. iii. p. 16, &c. 8vo.

DUEREN, in *Geography*. See Duren.

DUERO, Douero, or *Douro*; a river, which riſes near Agreda in Spain, and purſuing a weſterly courſe, paſſes Oſma, Aranda-de-Duero, Toro, Zamora, &c. in Spain; and reaching the borders of Portugal, it paſſes by Miranda, where, taking a ſouth-weſterly direction, it ſeparates the province of Tra-los-Montes from Spain, till, a little below Eſpadacenta, it again takes a weſterly courſe acroſs the kingdom of Portugal, having the provinces of Tra-los-Montes and Entre-Duero-e-Minho on the north, and Beira on the ſouth, and diſcharges itſelf into the Atlantic, a little below Oporto.

DUEROZHOF, a town of Germany, in the duchy of Carniola; 4 miles E. of Gurckfield.

DUESME, a ſmall town of France, in the department of the Côte d'or, on the river Seine; 12 miles S. of Chatillon.

DUET, Duo, *Ital.*, a muſical compoſition in two parts, whether vocal or inſtrumental. This title is general for all muſic in two parts; but in ſpeaking of a dramatic duet, in an opera, the term requires a more extended explanation.

Though many admirable theatrical duets had been compoſed by the Italians, before Rouſſeau wrote the muſical articles for the Encyclopédie, or collected them into a dictionary; yet he was the firſt to analyſe that ſpecies of compoſition, to point out its forms, and account for its effects. And this he has done ſo judiciouſly, and with ſuch enlarged views, that, though long, we ſhall tranſlate the chief part of his article, for the ſake of its ingenuity, and the author's reaſoning on the ſubject.

He obſerves, that "the rules for vocal duets, and, in general, for all muſic in two parts, are the moſt rigorous, with reſpect to harmony, of any muſical productions. Many paſſages are prohibited, and many movements, which would be admitted to a greater number of parts; for there are paſſages and combinations, which pleaſe when accompanied by a third or fourth part, without which they would ſhock the ear. Beſides, as only two ſounds are wanted, it would be unpardonable not to chooſe the beſt. Theſe rules were formerly more ſevere in chamber duets, ſuch as thoſe of Steffani and Clari; but in later times, they have been relaxed, ſince every one ſets up for a compoſer."

The citizen of Geneva might have aſſigned other reaſons for this relaxation, by allowing dramatic duets, where not only the harmony of two parts was to be ſelect and poliſhed, but generally two diſtinct characters to be ſupported; where perpetual fugue or imitation to the ſame words was abſurd, and where a dialogue was to be preſerved almoſt entire, and where the union of the two voices was reſerved for moments of paſſion, expreſſive of joy, ſorrow, or anger.

"A duet may be regarded in two lights: as a melody in two parts, ſuch, for example, as the firſt movement of Pergoleſi's "Stabat Mater," the moſt perfect and touching duo (in 1768) which ever dropt from the pen of a muſician; or, as imitative and theatrical muſic, ſuch as the duos in opera ſcenes. In both ſpecies, the duet is of all kinds of muſic, that which requires the moſt taſte and ſelection of paſſages, and is the moſt difficult to treat without neglecting the *unity of melody*. Let me be allowed here to make a few remarks on dramatic duets, the particular difficulties of which are ſuperadded to thoſe of all other duets in general.

"It has been well remarked, that duets are out of nature in imitative muſic, where paſſion is to be painted: for nothing is leſs natural than to hear two perſons talking at once during a certain time, either to ſay the ſame thing, repeat the ſame ſentiment, or to contradict it, without ever liſtening or waiting for an anſwer; and though this may be admitted in particular caſes, it certainly ought not to be ſuffered in a tragedy, where ſuch indecency is neither ſuitable to the dignity of the perſonages, the interlocutors, or to the education which we may ſuppoſe them to have received. It is only, therefore, in great tranſports of paſſion that the heroic interlocutors can be ſuppoſed to interrupt each other, and ſpeak at the ſame time; and even then, it is extremely ridiculous that ſuch ſimultaneous diſcourſe ſhould be prolonged in a regular manner.

"The firſt means, therefore, of avoiding this abſurdity, is to place thoſe duets in lively and touching ſituations, where the agitation of the characters throws them into a kind of delirium; capable of making the audience and themſelves forget thoſe theatrical decorums, which enforce illuſion in cold ſcenes, and deſtroy it in the heat of paſſion. The ſecond means is, to compoſe duets as much as poſſible in dialogue. This dialogue ſhould not be formally phraſed and divided into long periods, like recitative, but formed of interrogations, replies, and exclamations, ſhort and ſpirited, which give an opportunity for the melody to paſs rapidly from one to the other by turns, without ceaſing, to form ſuch a melody as the ear can ſeize. Another neceſſary attention is, not to take indifferently for ſubjects all the violent paſſions; but only ſuch as are ſuſceptible of a pleaſing melody, and are a little contraſted; ſo as to require a melodious accent and an agreeable harmony, in two parts. Rage and fury march too faſt to take a likeneſs: we diſtinguiſh nothing; we only hear a confuſed roar and barking, and the duo has no effect. Beſides, that perpetual repetition of abuſe and inſult belongs more to watermen and drovers than to heroes: it more reſembles the threats of bullies, who wiſh to make themſelves feared more than to hurt. But ſtill more muſt be avoided that exceſs of tenderneſs and feeling, which only talks of charms, chains, and darts; a flat and frigid jargon, with which true paſſion is totally unacquainted, and which are no more wanted for good muſic than good poetry. The inſtant of ſeparation, when one of the two lovers is dragged away to death, or flying to the arms of another;—the ſincere return of a rover;—the affecting conflict of a mother and a ſon, who wiſh to die for each other;—all theſe moments of affliction, which draw delicious tears from the ſpectators: theſe are the ſubjects for duets, when treated by the poet with that ſimplicity of language which penetrates the heart. Whoever has frequented the Lyric theatres muſt know what tenderneſs and emotion can be excited in a whole audience, by the ſingle word *addio*. But the moment the poet aims at wit, or lets any affected phraſe eſcape him, that inſtant the charm is broken, and we muſt laugh, or die with fatigue.

"Theſe obſervations regard the poet. With reſpect to the compoſer, it is his buſineſs to find a ſuitable melody to the ſubject, and diſtribute it in ſuch a manner, that each of the interlocutors, ſpeaking by turns, ſhall ſo connect the muſical phraſes, without changing the ſubject, or at leaſt the movement, that paſſing in its progreſs from one part to the other, without a junction, it ſhall ſeem as uniform as if ſung by a ſingle voice. The duets that produce the beſt effects are thoſe of voices of equal pitch, becauſe the harmony is more compreſſed. And among voices of the ſame kind, the beſt effects are produced by *ſopranos*, or treble voices, whoſe diapaſon being moſt acute renders the accents moſt diſtinct, and their tones more touching. And theſe are the only duets uſed by the Italians in their ſerious operas: and I have no doubt but that the employing *caſtrati* in male parts was originally owing to this obſervation. But though there ſhould be an equality between the two voices in a duo, and a unity of melody, it does not follow that the two parts ſhould be exactly alike in the caſt of melody; for, beſides the neceſſary diverſity of ſtyle, it ſeldom happens that the ſituation of the two characters is ſo perfectly ſimilar, that they ſhould expreſs their ſentiments in the ſame manner: ſo that the compoſer ought to vary their accents, and give to each the character which beſt ſhall paint the ſtate of their minds, eſpecially in their alternate recitative.

"When the two parts unite and ſing together, which ought to be ſeldom uſed for a ſhort period, a melody ſhould be found that admits of moving in 3ds or 6ths, in which the ſecond part has its effect without diſturbing the firſt. (See UNITY *of Melody*.) Care muſt be taken to avoid harſh diſcords, high and piercing ſounds, reſerving the *fortiſſimo* of the orcheſtra for moments of tranſport and diſorder, in which the performers ſeem "to forget themſelves," infuſe their ſufferings into the ſouls of ſpectators of ſenſibility, and make them experience the power of harmony ſoberly conducted: but theſe moments ought to be rare, ſhort, and artfully introduced. The ear and the heart muſt be prepared by a ſweet and affecting muſic for a criſis of this kind; that both may aſſiſt the compoſer and performer in raiſing ſuch emotions, which muſt be tranſient and conformable to human weakneſs: for when the agitation is too ſtrong, it cannot be durable; and whatever is out of nature never touches the heart."

He then illuſtrates his reflections by the exquiſite duet in Metaſtaſio's "Olimpiade," ſet by Pergoleſi, which has been the model of almoſt all dramatic duets ever ſince: recommending to the reader the ſeeking in the works of that firſt muſician of his time, and of our own, how ſuch a duet ſhould be treated; which, he truly ſays, is but a recapitulation of the preceding ſcene:

"Mia vita . . . . . . addio.
Ne' giorni tuoi felici
Ricordati di me," &c.

The art, however, has not ſtood ſtill ſince the time when the ſweet and admirable Pergoleſi was prematurely ſnatched from the muſical world. Jomelli, Penz, Piccini, Sacchini, Anfoſſi, Traetta, Sarti, Mozart, Cimaroſa, and Paeſiello, though they have adhered to his model, have extended, refined, and poliſhed melody, invented ingenious and pictureſque accompaniments, without forgetting the poet, the actor, or dramatic effects.

Duets introduced in *intermezzi* and comic operas, turn on ſuch whimſical circumſtances, and are ſung by ſuch groteſque characters, that there is no reducing them to rule; yet the Italians, with all their good taſte in ſerious muſic, have ſo natural a tendency to buffoonery, that, in their burlettas, there is no kind of imitation which they have not tried to tune, or ſquabble which they have not painted by variety of meaſures and characteriſtic melodies. Comic duets are hardly ever ſung by two ſimilar voices, but generally by a ſoprano and tenor or baſe: "and (ſays Rouſſeau) if they have not the pathos of tragic duets, in revenge, they are ſuſceptible of the moſt piquant variety. All the ſubtilties of coquetry, all the peculiarities of the advocati, Dottori, of Pantaloon, Harlequin, Columbine, and the contraſt of all the follies of our ſex, and the artifice of the other; in ſhort, all the acceſſory ideas of which the ſubject is ſuſceptible, all concur to render theſe duos intereſting and amuſing." As a model of perfection among comic duets, he inſtances "Lo Conorco a qu'g l'Occhietti," in Pergoleſi's "Serva Padrona;" which, however admirable in its day, has been often far ſurpaſſed in agreeable air, unity of melody, ſimple, pure, and brilliant harmony, accent, dialogue, and taſte, by Cimaroſa, Paeſiello, and Mozart.

DUETTI DA CAMERA, ſuch as thoſe of the elder Bononcini, Steffani, Clari, Haſſe, and Handel, are almoſt all *fugati*. They uſed to be regarded, particularly thoſe of Steffani, as excellent *ſolfeggi*, by the great opera ſingers, a century ago.

DUETTINI, *Ital.*, a little duet, ſuch as thoſe of Aprili, Moſtellari, Millico, and others.

DUFF'S GROUP, in *Geography*. See DISAPPOINTMENT *Iſland*.

DUFFEL, a ſmall town of France, in the department of the two Nethes, chief place of a canton in the diſtrict of Malines, on the river Nethe; 3 miles N. of Malines, and

3 miles S.W. of Lierre. It has a population of 2831 individuals. The canton contains 8 communes and 8579 inhabitants, upon a territorial extent of 90 kiliometres.

DU-FRESNE, Charles Du-Cange, in *Biography*, a learned Frenchman, was deſcended from a reſpectable family, and born at Amiens, in the year 1610. After having acquired the elements of polite literature in the Jeſuits' college, at his native place, he ſtudied the law at Orleans, and, in 1631, was ſworn-advocate to the parliament of Paris. Having practiſed at the bar for ſome time, he declined the exerciſe of this profeſſion, and returning to Amiens, devoted himſelf to the general ſtudy of languages and philoſophy, law, phyſic, divinity, and hiſtory. In 1668 he again ſettled at Paris, and in purſuance of a propoſal laid before Colbert, and approved by him, he was employed in collecting memoirs and manuſcripts for compiling a hiſtory of France. His plan for the execution of this project, to which he had devoted conſiderable time and attention, not being approved by the miniſter, he relinquiſhed this tedious and laborious undertaking; and directed his views to the completion of his gloſſary of low Latin, entitled, "Gloſſarium Mediæ et infimæ Latinitatis," which was received by the public with general commendation; and though Valeſius diſcovered in it ſeveral miſtakes, it is deemed by the learned an excellent and uſeful work. It was afterwards conſiderably enlarged; and the edition of Paris by Carpentier, in 1733, compriſed 6 folio volumes, to which Carpentier has ſince added 4 volumes, by way of ſupplement. The whole has been abridged, conſolidated, and improved in an edition, comprehending 6 volumes, 8vo., and publiſhed at Halle from 1772 to 1784. The next performance of Du-Freſne was a "Greek Gloſſary of the Middle Age," compiled moſtly from MSS., little known, and compriſed in 2 volumes, folio. This learned writer was the author or editor of ſeveral other works; among which we may reckon his Genealogical Chart of the Kings of France, his Hiſtory of Conſtantinople under the Kings of France, and his editions of Cinnamus, Nicephorus, Anna Comnena, Zonaras, and the Chronicon Alexandrinum, with diſſertations and notes. Du-Freſne, or as he is commonly called Du-Cange, died in 1688, leaving four children, penſioned by Louis XIV., in conſideration of the father's merit.

Though the general merits and abilities of this profound and accurate etymologiſt have already been recorded, we here with gratitude pay tribute to his memory, for the aſſiſtance which he has frequently afforded us as muſical hiſtorians, when all other reſources failed. In the ſlow progreſs of the art of muſic from the time of Guido, whoſe labours were wholly devoted to the facilitating the ſtudy of canto fermo by the monks and choriſters; in the gloſſary "De la Baſſe Latinité," (6 vols. folio), we find the derivation and early uſe of muſical terms and phraſes, particularly in France and neighbouring ſtates; and there is ſcarcely a term connected with the muſic of the church, of which an early uſe may not be found, either in this Gloſſary, or in its continuation by Carpentier, 4 vols. folio.

For the hiſtory of the muſic of the Greek church, great information may be obtained from "Gloſſaire de la Langue Grec," of the middle ages, printed at Lyons, 2 vols. folio, Gr. et Lat.

DU-FRESNOY. See Fresnoy.

DUFRESNY, Charles Riviere, was born at Paris in the year 1648. He paſſed for the grandſon of Henry IV., and was thought to have borne ſome reſemblance to that prince. Of the place and manner of his education, little worthy of notice has come down to us. In mature life, he manifeſted a general taſte for the arts, without having made any of them his particular ſtudy. He was a ſelf-taught poet and painter; but eſpecially excelled in the art of laying out gardens, a talent which gained him great credit with his ſovereign Louis XIV., to whom he was a ſervant of the bed-chamber, and who made him alſo comptroller of the royal gardens. In a ſhort time after, he applied for, and obtained a patent for the manufacture of looking-glaſſes. With theſe modes of obtaining an ample competence, he was always poor, and his circumſtances ſo embarraſſed, that he was at length obliged to ſell the places and privileges which he enjoyed, to extricate himſelf from debt. When he quitted court, he wrote with ſucceſs for the ſtage; and his reputation was ſo conſiderable, that he was compared by D'Alembert with Detouches, with regard to their comic talents, and declared to be the more original, free, and inventive, of the two. In 1710, he obtained the ſole right of printing the "Mercure Galant," of which he profited only a ſhort time, being obliged to ſell his privilege. About the time of Law's projects under the regency, he was in a deplorable ſituation; but the readineſs of his invention did not fail him in his exigencies: he drew up and preſented a humorous petition to the regent, and obtained the extravagant ſupply of 200,000 livres. He was twice married, and in both inſtances he ſought the connection to relieve his wants. He died poor, in the year 1724; and in a few years after his deceaſe, his works were collected, and publiſhed in 6 vols. 12mo. They chiefly conſiſt of dramatic pieces, poetry ſet to muſic, ſerious and comic amuſements, hiſtorical anecdotes, &c. Whatever he wrote is characterized by a happy mixture of fire and delicacy, by a ſpecies of gaiety entirely his own and unſtudied, and by a ſtyle which always keeps alive the attention, though no one could ſucceſsfully take the author as a model. Moreri.

DUGDALE, *Sir* William, a learned antiquarian, was born at Shuſtoke, near Coleſhill, Warwickſhire, in the year 1605. His father was a country gentleman, who, after his ſon had received the uſual elementary inſtructions in grammar learning, inſtructed him in the laws of his country, and in the principles of general hiſtory. After the death of his father he was introduced to the ſociety of ſome perſons converſant in antiquities, and began to make collections for a hiſtory of his native country. In 1638 he viſited London, when he became acquainted with the celebrated ſir Henry Spelman, by whoſe means, and the intereſt of other learned antiquaries, by whom Mr. Dugdale's talents were highly appreciated, he obtained a purſuivant's place in the Herald's office, where he came to reſide in 1640. Here, and from the records in the Tower, he enjoyed ample opportunities to enlarge his collections. During the civil war he attended the king officially, and was with him at the battle of Edge Hill, and at Oxford, where he was created maſter of arts. In 1644 he ſucceeded to the place of Cheſter herald, and, by the king's expreſs command, he continued at Oxford till it ſurrendered to the parliament's forces in 1646. He did not ſpend this time in vain, but employed himſelf moſt diligently in inveſtigating all the ſources of learning which the univerſity libraries afforded. Here he chiefly collected the materials for the "Monaſticon," in which he was engaged with Mr. Roger Dodſworth. To complete this great work he afterwards viſited Paris, where, by the indulgence of Andrew du Cheſne, and other learned men, he obtained many records relative to the priors alien in England. The firſt volume of the "Monaſticon Anglicanum" was publiſhed in 1655. This work contains an account of all the religious houſes in England from their foundation to their diſſolution. The remaining volumes were publiſhed in 1661 and 1673. Two volumes of additions were printed by John Stephens in 1722 and 1723, and the whole is regarded as a valuable collection of national matter, and is now become very rare. The publication of Dugdale's part gave offence to the puritans, who imagined the author's main deſign was to bring back popery; it was the cauſe, likewiſe, of many law-ſuits, by bringing to light old deeds and other writings, or at leaſt of pointing out where they might be found. In the year 1656, Dugdale publiſhed his "Antiquities of Warwickſhire illuſtrated," of which a ſecond edition was printed by Dr. Thomas in 1730. While this work was printing, Dugdale employed his leiſure time in collecting materials for a hiſtory of St. Paul's cathedral in London, which he publiſhed in 1658. Upon the reſtoration he was advanced to the office of Norroy King at Arms. His next work was "The Hiſtory of Embanking and Draining of divers Fens and Marſhes, both in foreign Parts and in this Kingdom, and of the Improvements thereby." In 1677 he was advanced to the office of Garter King at Arms, to which was annexed the honour of knighthood. After this he publiſhed various other works, chiefly relating to heraldry. Beſides the volumes of which he was chiefly or ſolely the author, he edited the ſecond volume of "Sir Henry Spelman's Councils," and the ſecond volume of his "Gloſſary." He compiled alſo a work, entitled "Origines Judiciales," which relates to the forms and rules of Engliſh courts of juſtice and the principal law offices, a work that has been recommended by biſhop Nicholſon as an uſeful introduction to the legal hiſtory of England; nor muſt we omit his "Baronage of England," in three volumes folio. He died at his houſe in Warwickſhire in 1686, being in the 81ſt year of his age, leaving one ſon and a daughter; the former was in the Herald's office and was knighted; the latter married Elias Aſhmole. Biog. Brit.

DUGGA, or TUGGA, in *Geography*, a town of Africa, in the kingdom of Tunis; 70 miles S.W. of Tunis.

DUGHET, GASPAR, in *Biography*, a landſcape painter, celebrated under the name of GASPAR POUSSIN.

He was born in France, A.D. 1600, and at a very early age diſcovered an apt genius for painting. Finding in himſelf a ſtrong love for that art, he reſolved to devote himſelf to it, and, with a view to the attainment of excellence in his profeſſion, ſet forward towards Rome, where he was confident of meeting with aſſiſtance from Nicolo Pouſſin, who had then riſen to eminence, and who had married Gaſpar's ſiſter.

On his arrival at Rome, he was at firſt employed merely in preparing Pouſſin's palette, pencils, and colours; but gradually improving himſelf by the inſtructions he derived from that great maſter of his art, by the ſight of his works during their progreſs, and the opportunity of obſerving his method in painting them; and ſtill more, finally, by the example of his great powers, he grew into conſiderable reputation as a landſcape painter, and, at length, effectually eſtabliſhed his claim to celebrity.

Whether he found himſelf unequal to the higher paths of art, in which Nicolo moved, or whether his good ſenſe dictated to him the impolicy of attempting eminence in the ſame province with his maſter, he adopted a ſtyle, which though manifeſtly formed under the ſuperintending genius of Pouſſin, neither aimed at the ſame ſpecies of compoſition, nor bore an exact reſemblance in manner. The landſcape of Nicolo is ſelect, poetic, and aſpires to the ſublime: Gaſpar, although not deficient in poetical compoſition, choſe the taſk of more humble and minute attention to natural effects and natural ſcenes. The quiet valley, the ſlumbering lake, and the rich autumnal foliage of the grove; or the bleak hill, the driving ſhower, or eddying whirlwind, came from his hand, ſtamped with a characteriſtic impreſſion of reality. His pencil was rich, free, and flowing. In this branch of painting, therefore, though he did not ſurpaſs, he might ſtand in competition with his preceptor; but here his ſkill terminated; in figures he was ſo totally incompetent, that he was frequently fain to ſolicit his maſter to paint thoſe which he introduced into his landſcapes. Whether their places were marked out by him, or choſen by Nicolo, they are always introduced with admirable taſte and propriety. His ſcenery alſo is excellently choſen in point of natural beauty, as are the ſites of his buildings; and thoſe buildings are productive of the moſt pleaſing effect by a mixture of elegance and ſimplicity. His grounds are agreeably broken; and the force of his figures, trees, and other objects, is ſo judiciouſly proportioned to their reſpective diſtance, as ſometimes even to cauſe the moſt pleaſing deception. He was exceedingly expeditious in his work; his imagination was ſcarcely more ready to invent than his hand was to execute; and it is confidently reported by authentic writers, that he finiſhed a large landſcape, and inſerted all the requiſite figures, within the compaſs of one day!

Gaſpar had three manners in his painting, which are diſtinguiſhable without any great nicety. The firſt was rather dry, and the laſt, though agreeable, was feeble, and unequal to that of his middle time; his ſecond manner was, by many degrees, his beſt, as it was at once more ſimple and more learned; and his colouring appears ſo freſh, ſo full of truth and nature, that no eye can behold his landſcapes of that period without admiration. The works of Gaſpar are deſervedly eſteemed in every nation where the art of painting is either cultivated or underſtood.

During his abode in Rome he adopted the family name of his brother-in-law and benefactor, and is commonly ſpoken of by that only. He died in the year 1663. Partly Pilkington's Dictionary of Painters.

DUGINSKOI, in *Geography*, a cape of Ruſſian Siberia, in the ſea of Ochotſkoi. N. lat. 59° 15′. E. long. 149° 14′.

DUGNY, a town of France, in the department of the Meuſe and diſtrict of Verdun; three miles S. of Verdun.

DUGUET, JAMES JOSEPH, in *Biography*, was born at Montbriſon, near Lyons, about the year 1649. At a very early age he diſcovered a ſtrong memory, and a certain quickneſs for imbibing inſtruction, which his father took great pains in cultivating. At a proper age he turned his thoughts to the ſtudy of theology, which he purſued at Saumur. In 1671, he was appointed profeſſor of philoſophy at the college of Troyes, and at the ſame time was requeſted to deliver a ſeries of catechetical inſtructions to the poor; ſuch, however, was his popularity, that perſons in the higher ranks of life crowded to hear his lectures, almoſt to the excluſion of thoſe for whom they were originally deſigned. In the year 1677 he was ordained prieſt, and at the ſame time diſcharged the duties of profeſſor of theology. At this period he eſtabliſhed his celebrated eccleſiaſtical conferences, which were attended by the moſt numerous audiences, and procured for him a high reputation for extenſive knowledge, judgment, and piety. He laboured ſo aſſiduouſly in the various duties in which he was engaged, that his health was conſiderably injured, and he was obliged to apply for a relaxation from his employments. In 1685 he retired to Bruſſels, but finding the air of that city not congenial to his conſtitution, he returned to Paris, where he lived in a ſtudious retirement, concealed from the greater part of his acquaintance. In the latter years of his life he was involved in much trouble, by the decided part which he took in the controverſy between the Jeſuits and Janſeniſts, and was obliged frequently to change his reſidence. He died at Paris in 1733, being in the 84th year of his age. As an author, he publiſhed commentaries or expoſitions on the greater part of the books of the Old Teſtament, beſides many practical pieces in theology and morals: alſo, "A Collection of Letters on Piety, &c.," in nine volumes 12mo. Of theſe and other pieces Moreri has given an ample account. Duguet was very highly eſteemed by his contemporaries, as well for his piety as for the excellence of his temper and the gentleneſs of his manners. What he had been in the younger part of life he continued to be in the extreme of old age: ſo excellent is the advice, "Train up a child in the way he ſhould go, and he will not depart from it when he is old." His writings, which are little known here, are by his countrymen highly applauded for perſpicuity, purity, and elegance. Moreri.

DUHAM, in *Geography*, a town of Bohemia, in the circle of Boleſlaw; 20 miles W.N.W. from Jung Buntzlau.

DUHOKUNDA, a town of Africa, in the kingdom of Jemarrow.

DU JARDIN, in *Biography*. See JARDIN.

DUIDA, in *Geography*, a mountain of South America, in the range of Parima, in which is a volcano. N. lat. 3° 13′.

DUILLIUS, C., in *Biography*, the firſt Roman who obtained a conſiderable naval victory, was conſul in the year 260 B.C. After his colleague, Cn. Corn. Scipio, had been taken at ſea by the Carthaginians in the firſt Punic war, he proceeded, with a newly-built Roman fleet, to Sicily in queſt of the enemy, and, by means of a *corvus*, was enabled to grapple with the enemy's veſſels as they approached, and thus to convert the combat into a ſort of land fight. By this unexpected manœuvre he took 80, and deſtroyed 13 ſhips of the Punic fleet, and obtained, as a reward, a triumph. A naval column was erected in the forum to perpetuate the event, which was ſtanding in Pliny's time, and was found again, with its inſcription, in the year 1560. The ſenate likewiſe rewarded his valour by permitting him to have muſic playing and torches lighted, to attend him when he returned from any evening entertainment. Medals were ſtruck in commemoration of the victory. Cic. De Senectute.

DVINA, in *Geography*, a river of Ruſſia, called "Sievernaia Dvina," the Northern Dvina, which name it aſſumes on its junction with the two rivers, the Sookhona and the Youga, that ariſe in the government of Vologda. This junction is formed at the city of Uſtiug, whence the Dvina takes a north-weſtward courſe, and at Archangel falls into the White ſea, after having divided itſelf into two conſiderable arms. In its courſe it receives ſome pretty large rivers, and ſeveral leſſer ſtreams; ſuch as, on the right, the Luſa, the Vichegda, and the Pinega; and, to the left, the Vaga, the Yemza, &c. The merchant veſſels run into the eaſtern arm of the Dvina, on which the fort Novaia Dvinka is built; but, at firſt, the weſtern, where ſtands the monaſtery Korelſkoi Monaſtir, was the moſt frequented; but this is no longer paſſable. In general the ſhoals increaſe from year to year in both, and ſuch large ſhips cannot now run in as formerly. The Dvina has the honour of having given reception, in 1553, to the firſt Engliſh ſhip that ever came to Ruſſia. This river flows moſtly through a ſwampy and woody region; it is navigable from Uſtiug, and tolerably abounds with fiſh.

DVINA. See DUNA.

DUINGEN, DUIN, or *Dudingen*, in *Geography*, a town of Germany, in the circle of Lower Saxony, and principality of Calenberg; 18 miles S.E. of Hameln.

DUINO, DOINO, or *Tybein*, a ſea-port town of Germany, in the duchy of Carniola; 8 miles N.W. of Trieſte, and 174 S.S.W. of Vienna. N. lat. 45° 55′. E. long. 14° 46′.

DUISBURG, or DUISBOURG, in Latin *Duiſburgum*, *Duicziburgum*, and *Tuiſcoburgum*, a town of Germany, in the grand duchy of Berg, which, ſince the acceſſion of the grand duke, Joachim Murat, to the throne of Naples, has been annexed to the French empire. It is ſuppoſed to derive its name from the Tuiſcones, and to be the Diſpargum, or Duiſparcum, in which the Frankiſh king Clodio, ſurnamed Long-haired, reſided.

Duiſburg is ſituated on the eaſtern ſhore of the Rhine. It was formerly a free imperial and Hanſeatic city, under the protection of the dukes of Limburg and counts of Berg. In 1290, it was mortgaged to Theodore VIII., count of Cleves, and in 1347 to John, duke of Cleves. In 1805, it was ceded, along with the duchy of Cleves, by the king of Pruſſia, to the grand duke of Berg.

An univerſity was founded at Duiſburg for Proteſtants in the year 1655, but it was never very flouriſhing under the Pruſſian dominion, Halle and Francfort on the Oder being generally preferred. In 1800, Duiſburg had but 12 profeſſors and 39 ſtudents. Murat, as grand duke of Berg, attempted to reſtore the univerſity of Duiſburg to its ancient importance. He increaſed the number of profeſſors to 18, *viz.* 6 profeſſors of philoſophy, 3 of Calviniſt, 2 of Roman Catholic, and 1 of Lutheran theology; 3 of phyſic, and 3 of law. Count Bork of Hüth was its curator. Its revenue was 20,000 dollars.

Duiſburg has two very fine churches, and three monaſteries. Its principal manufactures are thoſe of hardware and woollen cloth.

Gerard Mercator, one of the moſt illuſtrious geographers of the 16th century, is buried at Duiſburg.

DUISBURG, PETER DE, in *Biography*, a native of the duchy of Cleves, and a prieſt of the Teutonic order in Pruſſia, flouriſhed in the early part of the 14th century. He wrote a chronicle of Pruſſia in Latin, from the year 1226 to 1325, which was continued, by an anonymous writer, to 1426. It was tranſlated into German verſe by N. Jeroſchinus and Wigandus, brothers of the ſame order to which Duiſburg belonged. The original was edited, in 1679, by the learned Hartknock, who ſubjoined to it nineteen diſſertations, which throw great light upon the hiſtory of Pruſſia. Moreri.

DUITZ, or DUYTZ, in *Geography*, a town of Germany, in the kingdom of Weſtphalia, and duchy of Berg, on the eaſt ſide of the Rhine, oppoſite to Cologn, chiefly inhabited by Jews, who are not permitted to dwell in Cologn, or even to enter that city, without permiſſion.

DUIVEN, or DUV'N, JOHN, in *Biography*, a portrait painter, born at Goude, in Holland; a diſciple of Walter Crabeth; died in 1640.

DUKANA, in *Geography*, a river of Ruſſian Siberia, which, united with the Ancha, forms the Juna.

DUKE, DUX, a ſovereign prince, without the title, or quality of king. Such are the duke of Lorraine, duke of Holſtein, &c.

The word is borrowed from the modern Greeks, who call *doucas* what the Latins call *dux*.

There are alſo two ſovereigns, who bear the title of grand-duke; as, the grand-duke of Tuſcany, and the grand duke of Muſcovy, now called the *czar*, or emperor of Ruſſia; the heir of the throne of Ruſſia is now called grand-duke of Ruſſia. The emperor of Germany is arch-duke of Auſtria. The king of Poland aſſumes the title of grand-duke of Lithuania.

DUKE, *Dux*, is alſo a title of honour, or nobility, the next below princes.

The dukedom, or dignity of duke, is a Roman dignity, denominated *a ducendo*, leading or commanding. Accordingly, the firſt dukes, *duces*, were the *ductores excercituum*, commanders of armies. Under the late emperors, the governors of provinces, in war time, were intitled *duces*. In after-times, the ſame denomination was alſo given to the governors of provinces, in time of peace. The firſt governor under the name of duke, was a duke of the Marchia Rhætica, or Griſons, whereof mention is made in Caſſiodorus; and there were afterwards thirteen dukes in the eaſtern empire, and twelve in the weſtern. The Goths and Vandals, upon their over-running the provinces of the weſtern empire, aboliſhed the Roman dignities wherever they ſettled. But the Franks, &c. to pleaſe the Gauls, who had long been uſed to that form of government, made it a point of politics, not to change any thing therein; and, accordingly, they divided all Gaul into duchies and counties; and gave the names ſometimes of dukes, and ſometimes of counts, *comites*, to the governors thereof.

In England, during the Saxons' time, Camden obſerves, the officers and commanders of armies were called dukes, *duces*, after the ancient Roman manner, without any addition. After the Conqueror came in, the title lay dormant, till the reign of Edward III., who created his ſon Edward, firſt called the Black Prince, duke of Cornwall, which hath ever ſince been the peculiar inheritance of the king's eldeſt ſon during the life of his father, ſo that he is *dux natus, non creatus*. After whom, there were more made, in ſuch manner as that their titles deſcended to their poſterity. They were created with much ſolemnity, "per cincturam gladii, cappæque, circuli aurei in capite impoſitionem." However, in the reign of queen Elizabeth, A. D. 1572, the whole order became utterly extinct; but it was revived about fifty years afterwards, by her ſucceſſor, in the perſon of George Villiers, duke of Buckingham.

Though the French retained the names and form of the ducal government, yet, under their ſecond race of kings, there were ſcarcely any ſuch things as dukes; but all the great lords were called *counts*, *peers*, or *barons*; excepting, however, the dukes of Burgundy and Aquitain; and the duke of France, which was a dignity Hugh Capet himſelf held, correſponding to the modern dignity of maitre de palais, or the king's lieutenant.

By the weakneſs of the kings, the dukes, or governors, ſometimes made themſelves ſovereigns of the provinces truſted to their adminiſtration. This change happened chiefly about the time of Hugh Capet; when the great lords began to diſmember the kingdom, ſo that the prince found more competitors among them than ſubjects. It was even with a great deal of difficulty they could be brought to own him their ſuperior, or to hold of him by faith and homage.

By degrees, partly by force, and partly by marriages, thoſe provinces, both duchies and counties, which had been rent from the crown, were again united to it. But the title duke was no longer given to the governors of provinces. From that time duke became a mere title of dignity, annexed to a perſon, and his heirs male, without giving him any domain, territory, or juriſdiction over the place whereof he is duke. All the advantages thereof now conſiſt in the name, and the precedence it gives.

The dukes of our days retain nothing of their ancient ſplendour, but the coronet on their eſcutcheon; which is the only mark of their departed ſovereignty. They are created by patent, cincture of the ſword, mantle of ſtate, impoſition of a cap, and coronet of gold on the head, and a verge of gold in their hand.

The eldeſt ſons of dukes are, by the courteſy of England, ſtyled *marquiſſes*, though they are uſually diſtinguiſhed by their fathers' ſecond title, whether it be that of marquis, or earl; and the younger ſons, *lords*, with the addition of their Chriſtian name, as lord James, lord Thomas, &c. and they take place of viſcounts, though not ſo privileged by the laws of the land. The title of duke is the next dignity to the prince of Wales.

A duke has the title of *grace*; and being writ to, he is ſtyled, in the herald's language, *moſt high*, *potent*, and *noble prince*. Dukes of the blood royal are ſtyled *moſt high*, *moſt mighty*, and *illuſtrious princes*.

DUKE, among Hebrew grammarians, is an appellation given to a ſpecies of accents, anſwering to our comma. See ACCENT.

DUKE-DUKE, a quality given in Spain to a grandee of the houſe of Sylva, on account of his having ſeveral duchies, from the uniting of two conſiderable houſes in his perſon. Don Roderigo de Sylva, eldeſt ſon of Don Ruy Gomez de Sylva, and heir of his duchies and principalities, married the eldeſt daughter of the duke de l'Infantado; in virtue of which marriage, the preſent duke de Paſtrana, who is deſcended therefrom, and is grand-ſon of Don Roderigo de Sylva, has added to his other great titles, that of duke-duke, to diſtinguiſh himſelf from the other dukes, ſome whereof may enjoy ſeveral duchies, but none ſo conſiderable ones, nor the titles of ſuch eminent families.

DUKE's *County*, in *Geography*, a county in the ſtate of Maſſachuſetts, N. America, comprehending the iſlands of Martha's Vineyard, Chabaquiddick, Noman's and Elizabeth's, and ſituated in the S.E. coaſt of the ſtate. The number of inhabitants is 3118, who ſend three repreſentatives, and, in conjunction with the iſland of Nantucket, one ſenator to the general court. The chief town is Edgarton.

DUKE *of Glouceſter Iſland*, an iſland in the South Pacific ocean. S. lat. 19° 11'. W. long. 140° 11'.

DUKEE, or DUKI, a town of Aſia, in the country of Candahar, in the road from Candahar to Moultan; 180 miles S.E. of Candahar.

DUKLA, a town of Poland, in the palatinate of Sandomirz; 60 miles S.S.W. of Sandomirz.

DUKORTCHINA, a town of Ruſſia, and one of the 12 diſtricts of the government of Smolenſko, ſeated on the Dnieper.

DUKOVA, a town of Lithuania, in the province of Minſk; 16 miles S.E. of Minſk.

DULAS, a river of Wales, in the county of Carmarthen, partly ſeparating this county from that of Glamorgan, which runs into the ſea, about four miles S.E. of Kidwelly.—Alſo, a river of Wales, in the county of Carmarthen, which runs into the Towy, about 1½ mile S.S.W. of Llangattock.—Alſo, a river of Wales, in the county of Brecon, which runs into the Wye, near Hay.—Alſo, a river of Wales, in the county of Radnor, which runs into the Ithon, near Llanbeder.—Alſo, a river of Wales, in the county of Montgomery, which runs into the Severn, near Llanidlos.—Alſo, a river of Wales, in the iſle of Angleſea, which runs into the Iriſh ſea, forming a bay and harbour at its mouth, with a village of the ſame name; 10 miles N.W. of Beaumaris.

DULCIANA, in *Muſic*, a very pleaſing ſolo ſtop in the organ, brought hither by Snetzler. It has ſince been very ſucceſsfully imitated by Green, Grey, and others. It is a very long and narrow pipe, in uniſon with the open diapaſon; is as ſweet as a reed-ſtop, and ſeldom wants tuning.

DULCIFICATION, in *Chemiſtry*, is an old term not very accurately defined, but is generally meant to ſignify the rendering mild, or leſſening the corroſive quality of acids or alkalies, by any combination which is not ſuppoſed actually to neutralize them. The term, however, is incorrect, and ſhould be diſuſed.

DULCIGNO, in *Geography*, a town of European Turkey, in the province of Albania, on the coaſt of the Adriatic, containing about 7000 or 8000 inhabitants. The harbour ſerves as a retreat for corſairs; 15 miles S.W. of Scutari. N. lat. 42° 23′. E. long. 18° 56′.

DULCIMER, a muſical inſtrument in a triangular form, ſtrung with about 50 wire ſtrings, reſting on a bridge at each end; the acute gradually ſhortening to about 18 inches, and the grave lengthening to about 36; it is ſtruck with a ſmall iron rod in each hand. The baſe ſtrings are doubled in uniſon, and its tone is not diſagreeable. When played on, it is laid on a table before the performer, who with the ſmall iron rods ſtrikes it with more or leſs force, as light and ſhade may be wanting. The inſtrument has not the honour to be admitted into concerts, and is ſeldom uſed, except at puppet-ſhews, and by itinerant muſicians.

DULCINISTS, in *Eccleſiaſtical Hiſtory*. See Apostolici.

DULCINO, in the *Italian Muſic*, a wind inſtrument, otherwiſe called *quart fagotto*. It ſerves for tenor to the hautboy, and is no more than a little baſſoon. Broſſ. Dict. Muſ. in voc.

DULCINUS, in *Biography*, a leader of a religious ſect, was a native of Novara, in the duchy of Milan. The ſect, ſometimes denominated Dulciniſts, and ſometimes the "ſect of the apoſtles," was founded by Gerard Sagarelli, who was burnt alive, for his hereſy, as it is called by Moreri, at Parma, in the year 1300. According to the learned Moſheim, the Dulciniſts aimed at introducing among Chriſtians the ſimplicity of the primitive times, eſpecially the manner of life that was obſerved by the apoſtles, as nearly as could be collected from their writings. On the death of the founder, Dulcinus boldly headed the ſect, and avowed his faith in the predictions of Sagarelli, *viz.* that the church of Rome would ſpeedily be deſtroyed, and that a pure ſyſtem of religion would be built on its ruins. That he believed what he aſſerted is evident from the means which he took of defending himſelf and followers againſt their enemies and perſecutors. For two years the Dulciniſts, by force of arms, maintained their ground againſt the ſupporters of the papal intereſts; which terminated, however, in the overthrow and capture of their leader, after he had ſignalized himſelf in ſeveral obſtinate and well conteſted battles. His life was the forfeit of his heroiſm and honeſty. Moreri. Moſheim.

DULCIS Assa, or *Aſä*. See Asa.

DULEDGE, in *Gunnery*, a peg of wood which joins the ends of the ſix fellows, which form the round of the wheel of a gun carriage; and the joint is ſtrengthened on the outſide of the wheel by a ſtrong plate of iron, called the duledge plate.

DULEEK, in *Geography*, a ſmall town in the county of Meath, province of Leinſter, Ireland, ſituated on the Nanny Water. It is of little importance, but is a thoroughfare to the northern parts. According to a MS. at Cambridge, the firſt church in Ireland that was built of ſtones, was erected there. It is twenty-one miles north from Dublin, and four ſouth from Drogheda.

DULGIBINI, in *Ancient Geography*, a people of Germany, ſo called by Tacitus, and ſuppoſed to be a colony of Cheruſci, whoſe chief habitation was the town of Aſcalingium, now Lingen, upon the Ems. Ptolemy denominates them *Dulgumini*.

DULIA, ΔΟΥΛΕΙΑ, *Service*. See Worship, Latria, and Hyperdulia.

DULICHIUM, in *Geography*, one of the iſlands called Echinades, ſituated W. of Greece in the Ionian ſea. It was alſo called Dolicha, and ſo diſtinguiſhed by M. D'Anville, who ſuppoſed it to have been near Cephallenia, and called it Ithaca. Its name is now Theaki, or Little Ceſalenia.

DULKAK, among Arabian writers, a fabulous ſea-monſter in form of a man, riding on an oſtrich, which is ſaid to attack ſhips, and fight with the men on board. Hofm. Lex. in voc.

DULKEN, or Dulcken, in *Geography*, a town of Germany, in the kingdom of Weſtphalia, and duchy of Juliers; 20 miles N.N.W. of Juliers.

DULLAERT, Heyman, or Herman, in *Biography*, painter of hiſtory and portraits, born at Rotterdam in 1636. He was a diſciple of Rembrandt, whom he imitated ſo ſucceſsfully, that one of his pictures, repreſenting Mars in armour, was ſold at Amſterdam at a public ſale, in 1696, for a work of that great maſter. He is praiſed by Houbraken for the beauty of his colouring, and freedom of pencil. He is ſaid to have been alſo well ſkilled in muſic. He died in 1684. Vie des Peintres Flamands, &c.

DULMA, a Turkiſh diſh, made of any vegetable, as cucumbers, onions, cabbage leaves, &c. ſtuffed with forced meat Pococke's Egypt, p. 183.

DULMAN, or Dulmen, in *Geography*, a ſmall town of Germany, formerly in the biſhopric of Munſter, in Weſtphalia, but at preſent in the kingdom of Weſtphalia; 21 miles S.W. of Munſter.

DULNESS *of* Hearing. See Hearing.

DULOPOLIS, in *Ancient Geography*, a *town of ſlaves*, a town of Africa, in Libya.

DULVERTON, in *Geography*, a market town and pariſh in the hundred of Williton Freemannon, in the county of Somerſet. It ſtands in a narrow valley, near the banks of the river Ex, which divides the pariſh, and alſo ſeparates the counties of Devon and Somerſet, at this place. The town conſiſts of two ſtreets, both of which are paved, and in the principal one is the market-houſe, a commodious building, and the butchers' ſhambles. Here is a weekly market on Saturday, and, what is rather unuſual, the poor have the rents and tolls of the market diſtributed among them annually. The town conſiſts of 195 houſes and 1049 inhabitants: moſt of theſe are occupied in the manufacture of coarſe woollen cloths and blanketings.

It appears from ſome records that the town was occupied by the Weſt Saxon kings, and was poſſeſſed by the crown when the Domeſday book was compoſed.

About one mile ſouth of the town is Combe, an ancient ſeat of the Sydenham family, who purchaſed it in the time of queen Elizabeth. Half a mile ſouth-eaſt of Dulverton is Pixton, a pleaſant ſeat of lady Acland. Collinſon's Hiſtory of Somerſetſhire, vol. iii.

DULWICH, a hamlet in the pariſh of Camberwell, in the county of Surry, is noted for a large *college* which was founded here in 1614, by Edward Alleyn, an actor of ſome profeſſional reputation in the reigns of Elizabeth and James I. The building was erected after a deſign by Inigo Jones, and contains a chapel, maſters' apartments, and chambers for the poor men, women, and children belonging to the foundation. This provided for a maſter, who muſt always be of the name of Alleyn or Allen, and who is lord of the manor wherein the building is ſituated; for ſix poor men, ſix women, and twelve boys. The latter, at proper age, are either ſent to the univerſity, or put out apprentices. The original revenues have been enlarged by ſubſequent donations, particularly in 1686, by Mr. Cartwright, a comedian and bookſeller, who bequeathed all his library and pictures, with 400*l.* in caſh, to the college. In 1750 lady Falkland left a bequeſt of 300*l*. Dulwich was formerly celebrated for its mineral waters, but theſe have either ſubſided or loſt their medicinal qualities. "Lyſon's Environs of London."

DUM *non fuit compos mentis*, in *Law*, a writ that lies for one, who aliens any lands or tenements while not of ſound memory or judgment, in order to recover the ſame from the alienee, againſt whom the writ is taken. See Lunatic.

Dum *fuit infra ætatem*, a writ which lies for him, who, before he came to full age, made a feoffment of his land, to recover it again of the vendee. Fitz. Nat. Br. fol. 102. See Infant.

DUMA, in *Ancient Geography*, a large village of Paleſtine, in the ſouthern part of the tribe of Juda, upon the confines of the territory of the town of Eleutheropolis, according to Euſebius and Jerome.

Duma, in *Geography*, a town of Arabia, in Neged, in a hilly country called Jof al Siran, between mount Schamer and Sham, or Syria.—Alſo, a town of Germany, in the kingdom of Weſtphalia, on a river of the ſame name, which ſoon after runs into the Wipper; 14 miles S.S.E. of Duſſeldorp.

DUMANDRE, Anthony, in *Biography*, ſculptor. He was born of a good family in Lorrain, and ſerved as a cadet in the army of Louis XIV. in the regiment of Picardy, together with his brother Hubert, with whom he alſo went afterwards to Paris, to ſtudy ſculpture, and thence into Spain, by the invitation of Philip V. His principal works are in the royal gardens of St. Ildefonſo, at Madrid, and at Aranjuez. On the eſtabliſhment of the academy of fine arts of San Fernando, at Madrid, in 1752, he was appointed director. He died in 1761. Diccionario Hiſtorico de las Bellas Artes en Eſpana.

Dumandre, Hubert, ſculptor and architect; the brother of Anthony Dumandre, laſt mentioned, whom he accompanied into Spain. Many works in the gardens of St. Ildefonſo are by him, as is alſo the ſepulchre of Philip V. in the collegiate church of the ſame place. He died at Madrid in 1781, at the age of 80. Diccionario Hiſtorico de las Bellas Artes en Eſpana.

DUMARING, in *Geography*, a town of the iſland of Borneo, on the eaſt coaſt. N. lat. 2° 10′. E. long. 117° 30′.

DUMATHA, in *Ancient Geography*, a town of Arabia, called by Ptolemy Dumætha, and placed in Arabia Petræa.

DUMB Cane, in *Botany*. See Arum *Seguinum*, n. 26.

DUMBARTON, in *Geography*, the county town of Dumbartonſhire, or as it was anciently called, the Sheriffdom of Lenox, in the weſt of Scotland. The town of Dumbarton is ſituated at the confluence of the Leven with the Clyde, in N. lat 56°. W. long. 4° 32′.

When Britain was under the Roman government, this town formed the extreme poſt regularly occupied by the Roman legions to the weſtward: and the remains of the celebrated wall, built to prevent the inroads of the northern inhabitants, and ſtretching from Dumbarton acroſs the country towards Aberdeen, upon the eaſt coaſt, are ſtill to be ſeen on the chain of mountains near Dumbarton. The town is not of great extent, but well built of free-ſtone, and the principal ſtreet is in the form of a creſcent, extending nearly from eaſt to weſt, along the north bank of the river Leven, which ſerves as a harbour to the town, and where veſſels of upwards of 200 tons burthen can diſcharge and receive their cargoes. The caſtle of Dumbarton is built upon an inſulated rock, about three quarters of a mile from the town, and is ſtill kept as a fortreſs, although in the modern art of war, it is not probable that it could reſiſt a ſiege of even twenty-four hours. In former times, however, it was conſidered a place of conſiderable importance, and before the improvements which have taken place within the laſt two centuries, would probably be deemed impregnable. A ſingular ſtory of its being taken by ſurpriſe is recorded; when the officer who commanded the party, which conſiſted only of one hundred men, after fixing the ſcaling ladders, which were placed in the middle of the night to the ſteepeſt part of the rock, aſcended laſt, one of his ſoldiers being ſeized with a giddineſs, either from terror or fatigue, became unable to proceed when far up the ladders. With an aſtoniſhing preſence of mind he was laſhed to the ladder, until his comrades had effected their enterpriſe, when he was relieved without ſuſtaining any injury after the fort had ſurrendered. In the preſent ſtate of this country it is uſeful as a depot of arms, and is generally garriſoned either by detachments from the veteran battalions, or by ſkeleton regiments ſent home to recruit. It is well ſupplied with water, and the barracks are pleaſantly ſituated and commodious.

The town of Dumbarton is governed by a provoſt, magiſtrates, and common council conſiſting of fifteen members. It returns a member to parliament in conjunction with the city of Glaſgow, and borough towns of Renfrew and Rutherglen. The preſent member is Archibald Campbell, of Blythſwood, eſq. Formerly the noble family of Argyle was ſuppoſed to poſſeſs conſiderable influence in directing the affairs of this borough; and the preſent duke, when marquis of Lorne, and afterwards his brother, lord John Campbell, filled the office of provoſt or chief magiſtrate. This influence is now ſuppoſed to be upon the decline, and the direction of the borough is placed in other hands.

The trade of Dumbarton is not very extenſive; there are, however, very large manufactories of glaſs in the town, and very extenſive print fields upon both ſides of the Leven in the vicinity, which muſt circulate a large ſum of money annually in wages. A great deal of grain alſo is frequently imported from the north of Ireland, for the ſupply of the weſtern counties of Scotland.

The river Leven, although only about ſix miles in length from Lochlomond to its confluence with the Clyde, is deep and rapid. The water emptied from the lake is very pure and ſoft, and is uncommonly well calculated for bleaching, dyeing, printing, and other chemical operations. The Leven abounds with very fine ſalmons, the fiſhery of which is the property of the corporation of Dumbarton, and of ſir James Colquhoun of Luſs, bart. and yields to the proprietors a conſiderable annual revenue. The trout alſo are uncommonly fine and large.

The county of Dumbarton is bounded on the ſouth by the river Clyde, which divides it from Renfrewſhire, on the weſt by Loch Long, an arm of the frith of Clyde, which extends about twenty-four miles, and forms the diviſion between Dumbartonſhire and Argyleſhire, and on the eaſt and north, by the counties of Renfrew, Lanark, Sterling, and Perth.

This county is neither very extenſive nor populous. By the account taken under the authority of the act of parliament, 1801, it is eſtimated to contain 1346 ſquare miles, and 20,710 inhabitants. The valued Scotch rental of the county, as fixed at the union, is 158,627 pounds Scots, of the value of twenty-pence ſterling each; and the real annual rent in ſterling money is computed at 109,700*l*. The laſt is probably too low at the preſent day, as the arable lands in this, as in moſt other counties, have riſen amazingly at the expiration of the reſpective leaſes, and even the moor and paſture grounds being much higher now than formerly. The population of the town of Dumbarton is eſtimated at 1850.

A great part of the lands of Dumbartonſhire are mooriſh and mountainous, but it alſo contains much good arable land, particularly in the eaſtern part, near Kilſyth, along the bank of the Clyde, and on the banks of Lochlomond. In theſe places, when the ſeaſon is favourable, the crops, if not ſo luxuriant as in ſome other parts of the iſland, are generally good and early; the agriculture has moſt rapidly improved of late years, and is now almoſt univerſally conducted in a judicious and induſtrious manner. The potatoes of moſt parts of Dumbartonſhire are particularly admired for their ſuperior quality. The eaſtern part of the county is plentifully ſupplied with coal and lime, but in the weſtern part, the exertions made to procure theſe valuable minerals have not hitherto been ſo ſucceſsful. The navigation of the Clyde, however, by affording water carriage at an eaſy rate, in a great meaſure counteracts this inconveniency.

The chief natural curioſity of Dumbartonſhire is Lochlomond, the beauty of which has been ſo univerſally admired, and made ſo often the ſubject of deſcriptive writing, that it ſeems unneceſſary to ſay much of it. Its length is about 24 miles, its greateſt breadth about 7 or 8 miles, and beſides the pureneſs and tranſparency of the water, the richly wooded iſlands with which it abounds, the romantic grandeur of the ſurrounding ſcenery, and the delightful ſeats and villas with which its banks are covered, form an aſſemblage of pictureſque beauty rarely equalled.

The county of Dumbarton returns one member to parliament; the preſent member is Henry Glaſsford, eſq. of Dugaldſton. The electors are, as in the other counties of Scotland, freeholders; holding from the crown lands of the value of 400 pounds Scotch of valued rent or upwards. The number of thoſe qualified ſeldom much exceeds 30.

The chief landed proprietors are, the dukes of Montroſe and Argyle, lords Elphinſtone (lieutenant for the county,) Blantyre, and John Campbell, ſirs James Colquhoun of Luſs, and Charles Edmonſtone of Duntreath, Meſſrs. Ferguſon of Raith, Denniſtown of Colgrain, Buchanan of Ardenconnell, Buchanan of Auchintorlie, Hamilton of Barns, Buchanan of Ardoch, Glaſsford of Dugaldſton, Smollet of Bonhill, Graham of Gartmore, Croſs of Auchintoſhan, the Right Hon. Hay Campbell of Succoth, late lord preſident of the Court of Seſſion, and Archibald Colquhoun of Killermont, lord advocate of Scotland, general Giles of Gileſton, Alſton of Weſterton, Ewing of Keppoch, Colquhoun of Camſtradden, Colquhoun of Garſcadden, and ſome others.

DUMBLANE, or Dunblane, a pariſh and town of Perthſhire in Scotland. The town appears to have originated from a cell of Culdees, which was eſtabliſhed here at an early period: ſubſequently a biſhop's ſee and cathedral were fixed and erected in this place. Of the latter, ſome remains ſtill ſtand to ſhew the ſite and ſtyle of the building. It ſtood on an eminence, cloſe to the river Allan, and was founded by king David in 1142. It is now unroofed and verging to decay; yet is venerably grand in its ruins. The choir is ſtill kept in repair, and uſed as the parochial church. The town contained, by the late population return, 493 houſes, and 2619 inhabitants. The pariſh extends about nine miles in length and ſix in breadth. Near Kippencroſs in this vicinity is a plane tree, one of the largeſt in Scotland; its girth being 72 feet. A few miles from Dumblane is Sheriff Muir, a place rendered famous by the battle fought in November 1715, between the royal forces under the duke of Argyle, and the rebel army, commanded by the earl of Marr.

DUMBNESS, in *Pathology*, *mutitas* of the noſologiſts, an inability of ſpeech, or of uttering articulate ſounds.

The power of ſpeech may be loſt, in conſequence of a palſy of the tongue and other organs connected with the modulation of the voice; or of a loſs of the tongue from cancerous ulceration, or from a wound. But in the condition, which is generally underſtood by the appellation of dumbneſs, the organs of the voice are not imperfect; the phyſical defect being altogether confined to the organs of hearing. Perſons in this condition, therefore, are *dumb*, only becauſe they are *deaf*; or, in other words, they are incapable of uſing language, the ſounds of which they have never been able to hear, and conſequently never could attempt to imitate. Thoſe who are born deaf, or become ſo from diſeaſe in early infancy, are, therefore, the only ſubjects of this unfortunate privation. See Deafness.

Of the two moſt important channels of knowledge, the ſenſes of ſight and hearing, a deprivation of the latter would ſeem, perhaps on a ſlight view, to be a leſs fatal impediment to the acquiſition of information, than the former; but when it is conſidered, that a want of the ſenſe of hearing involves with it the loſs of the principal medium of mental intercourſe, language, it becomes evident that the bar to intellectual improvement is by ſuch a deprivation doubly augmented. Hence a general opinion has prevailed, in all ages, that the deaf and dumb were cut off by nature from the acquiſition of knowledge, and they have therefore generally been abandoned to a ſtate of mental deſtitution, for which no remedy was believed to be diſcoverable.

> "Nec ratione ullâ docere, ſuadereque ſurdis
> Quid facto eſſet opus."
>
> Lucret.

> "T' inſtruct the deaf no art could ever reach,
> No care improve them, and no wiſdom teach."

It has been proved, however, by the attempts of ſeveral individuals, at different periods, in modern times, that this opinion is erroneous; and that it has either ariſen from a ſuperficial or miſtaken view of the means by which the mind acquires the knowledge of language, and of abſtract or general ideas, when the ſenſes are perfect; or from a conviction of the difficulties attending any attempt to imitate the ſame proceſs, when one ſenſe is ſhut up. It was from the latter conſideration probably, that Dr. Johnſon was induced to call the education of the deaf and dumb "a philoſophical curioſity."

The earlieſt eſſay at the education of theſe unfortunate beings appears to have been made in Spain, by Peter Ponce, a Benedictine monk, towards the end of the ſixteenth century, which was attended with ſucceſs, according to the authority of Valleſius (de ſacrâ philoſophiâ) and Antonio Perez. A countryman of his, Bonnet, ſecretary to the conſtable of Caſtile, whoſe younger brother had loſt the ſenſe of hearing when two years old, undertook a ſimilar taſk, and publiſhed a ſyſtem, which he formed on the occaſion, in 1620, and which he dedicated to Philip III. under the title of "Reduction de las letras, y arte para enſenar à trablar los mudos." The tuition of the deaf was ſubſequently treated of by Helmont, a German, in a very ingenious publication, entitled "Alphabeti verè naturalis Hebraici breviſſima Delineatio," printed at Salſburgh, in 1657; in which the author mentions the trial of his ſkill upon one pupil only, who became maſter of his vernacular tongue very expeditiouſly, and acquired the Hebrew of himſelf. But a more general reputation for this ſort of inſtruction was obtained by Amman, a Swiſs phyſician, ſettled in Holland, about 1690, in conſequence of his ſucceſs with the only daughter of Peter Kolard, a beautiful girl, born deaf. He publiſhed a ſmall treatiſe upon the ſubject in Latin, under the title of "Surdus loquens," in 1692; an enlarged edition of which appeared in 1700, with the title of "Diſſertatio de loquelâ."

About the ſame time our countryman Dr. Wallis, a man of extenſive ſcience and great acuteneſs, was led to pronounce, on ſpeculation, the practicability of teaching the deaf to ſpeak, and was prevailed upon, ſome years afterwards, to verify his theory in the tuition of Mr. Whalley, a young gentleman of Northampton. He fully ſucceeded in this eſſay, and alſo with a ſon of admiral Popham, and was afterwards employed in the inſtruction of other deaf and dumb pupils, but without teaching them to ſpeak. He publiſhed an account of his "method of inſtructing perſons Deaf and Dumb," in the Philoſophical Tranſactions for the year 1698. Dr. Holder engaged in the ſame ſort of tuition about the ſame period, but with leſs extenſive practice and reputation than Wallis; and printed his "Elements of Speech," relating to this ſubject, in 1669.

Dalgarno, one of the ſchemers of an univerſal language, employed his pen next upon the tuition of the deaf and dumb, led to the ſubject not by practical inſtruction but philoſophical diſquiſition: he examined the topic in an acute and learned performance, entitled "Didaſcalocophus, or the Deaf and Dumb Man's Tutor." The ſubject was alſo treated in a more general manner, as a ſpeculative inquiry in a volume, with the title of "Philocophus, or the Deaf and Dumb Man's Friend," by a phyſician of the name of Bulwer, in 1648; and in "A Treatiſe concerning thoſe that are born Deaf and Dumb," by George Sibſcote, in 1670.

In more recent times this art has been ſucceſsfully and extenſively exerciſed by Father Vannin and Monſ. Perreize, in Paris; by Mr. Heinich, in Leipſic; by Mr. Baker, in London; by Mr. Braidwood, in Edinburgh; by the Abbé de l'Epée; and at preſent by the Abbé Sicard, his ſucceſſor, in Paris; and by Mr. Watſon, formerly the aſſiſtant to Mr. Braidwood, now teacher in the aſylum, for the ſupport and education of the deaf and dumb children of the poor, inſtituted in London in 1792, as before mentioned. See DEAFNESS.

Although the attempts to lay down ſyſtems, and to inculcate the facility of educating the deaf and dumb have been numerous; yet ſo limited has been the circulation of theſe writings, (owing, perhaps, in a great degree to the general incredulity as to the practicability of the ſchemes,) that each of the earlier writers conſiders himſelf as original on the ſubject, being ignorant that his work had been preceded by others of a ſimilar nature. Mr. Braidwood never publiſhed any account of his method of inſtruction: but the benevolent Abbé de l'Epée, and his ſucceſſor, the Abbé Sicard, have given the world an ample account of their ſyſtems. The work of the former was tranſlated into Engliſh in 1801, under the title of, "The Method of educating the Deaf and Dumb, confirmed by long experience, by the Abbé de l'Epée;" the volume of the latter, entitled, "Cours d'Inſtruction d'un ſourd-muet de naiſſance, pour ſervir a l'Education des ſourds-muets, &c., avec Figures et Tableaux, par Rochambroiſe Sicard," was printed at Paris in the year 1800.

The different teachers of the deaf and dumb have had two ends in view: the one was to teach the uſe of written language, and, through that medium, to enlighten the mind with various ſpecies of knowledge, and alſo to enable their pupils to converſe by means of writing, or other ſymbols; and the other was to inſtruct them in the actual exerciſe of the organs of articulation, or to converſe by ſpeaking. Dr. Wallis, it would ſeem, ſucceeded in teaching the latter to his two firſt pupils; but, probably, for the ſame reaſon which has induced the Abbé Sicard to relinquiſh the taſk; *viz.* that the benefit to the deaf is by no means proportionate to the labour of acquiring *utterance*, he ſeems to have confined himſelf afterwards to the inſtruction of the mind, Mr. Braidwood, of Edinburgh, however, appears to have carried the difficult and laborious acquirement of *ſpeech* in his pupils to a conſiderable degree of perfection, and to have enabled them to anſwer orally the oral propoſitions of others, which they diſcerned with ſurpriſing readineſs, by watching the motions of the organs of ſpeech of thoſe with whom they converſed. But as they were unable, from the want of hearing, to modulate the voice, or correct the articulation nicely, their utterance is ſaid to have been indiſtinct and diſcordant, and not always intelligible, like the firſt words of the infant, to thoſe unaccuſtomed to hear it; and, in like manner, their underſtanding of the language of others, not habituated to their ſtrongly marked motions of the tongue, lips, &c. was neceſſarily imperfect.

Mr. Braidwood is ſaid to have been very deſirous of tranſmitting his art to poſterity, but alleged, that he could not communicate it ſo fully in writing as to enable any other perſon to teach it. The following imperfect outline of his method has been given by an eye-witneſs of his inſtructions: His firſt ſtep was to teach the pupil to pronounce the ſimple ſounds of the vowels and conſonants. He pronounced the ſound of *a* ſlowly, pointing out the figure of the letter at the ſame time, and making his pupil obſerve the motion of his mouth and throat: he then put his finger into the pupil's mouth, depreſſed or elevated the tongue, and made him keep the parts in that poſition: then he took hold of the outſide of the wind-pipe, and gave it ſome kind of ſqueeze, which it is impoſſible to deſcribe: all the while he was pronouncing *a* the pupil was anxiouſly imitating him, but at firſt ſeemed not to underſtand what he would have him to do. In this manner he proceeded till the pupil had learned to pronounce the ſounds of the letters. He then went on in the ſame manner to join a vowel and a conſonant, till at length the pupil was enabled both to ſpeak and to read. We have the authority of Mr. Pennant for ſtating, that Mr. Braidwood's pupils were not only taught the *pronunciation*, but perfectly to underſtand the *meaning* of what they read. Of this he mentions a ſtriking example, in a young lady of about 13 years of age, who had been ſome time under the care of Mr Braidwood. "She readily apprehended all I ſaid," he obſerves, "and returned me anſwers with the utmoſt facility. She read, ſhe wrote well: her reading was not by rote; ſhe could clothe the ſame thoughts in a new ſet of words, and never vary from the original ſenſe." But we are not informed of the method or the nature of the ſigns by which the ſignification and conſtruction of language were rendered intelligible to Mr. Braidwood's pupils.

The abbé de l'Epée, deſpiſing the ſecrecy and quackery of Heinich and Perreize, and not ſeeing the difficulty of expoſition which occurred to Mr. Braidwood, publiſhed a minute account of his principles and practice in the tuition of the deaf and dumb; of which we ſhall endeavour to ſketch the outline. The purport of ſuch inſtruction, he obſerves, is to introduce into the minds of the pupils by *the eye*, what has been introduced into our own by *the ear*; that is, to teach by the uſe of viſible ſigns or ſymbols, inſtead of audible ones. It is obvious that there is no natural connection between articulate ſounds, and the ideas which they are employed to expreſs; nor between the ſame ideas, and the written characters that are uſed to repreſent them. The variety of languages, as well as of alphabetical, cypheral, and ſymbolical writing, inconteſtibly proves the truth of this poſition. Both words and written characters are, therefore, arbitrary repreſentatives of the objects of our ſenſes, and of the ideas of the mind, agreed upon by national compact; and they convey no idea to thoſe in whoſe mind they have not been aſſociated, by habit, with the objects which they have been aſſumed to repreſent. Hence, to a perſon unacquainted with any language, or ſet of repreſentative ſigns of ideas, it is as eaſy to teach one language, or one mode of writing, as another; and a written language may be taught, independently of an oral one, and *vice verſâ*, by either of which the faculties of the mind may be fully exerciſed, and the ſtores of human knowledge laid open to its acquiſition.

Now all language is taught, in the firſt inſtance, by ſenſible ſigns, with which the oral ſound of the word is accompanied by the teacher. Thus a child learns to connect the idea of a well-known fruit, with the ſound of the word *apple*, becauſe he hears that word repeated when the fruit is ſhewn to him: and in the ſame manner he learns to aſſociate particular words with every other object of the ſenſes, by the habitual conjunction of the audible with the viſible ſign. Afterwards in learning to read or write, he acquires a ſimilar habit of aſſociating the appearance of certain viſible ſigns or letters, with the ſame objects, or their oral repreſentative ſigns; ſo that when the objects themſelves are abſent, the ideas of them may be recalled to his mind either by the *viſible* ſigns, in written language, or their *audible* ſigns, in oral language.

It is clear, then, that although the deaf are excluded from receiving ideas by audible ſigns, yet it is as poſſible to inſtruct them by written characters, always accompanied by ſome ſenſible ſigns, as to inſtruct thoſe who can hear, by words delivered orally, along with ſigns or geſtures indicative of their ſignification. This, it is true, is a taſk of infinitely more labour than oral inſtruction, in which two ſenſes combine to ſtrengthen the aſſociation of words with things. But when it is recollected, how the acuteneſs of any one ſenſe is increaſed, when the privation of another cauſes it to be greatly exerciſed, part of the difficulty will diſappear: and experience has now amply demonſtrated the practicability of the ſcheme. "I ſoon ſaw," ſays the abbé de l'Epée, "that a deaf and dumb perſon, under the guidance of a good maſter, is an attentive *ſpectator* who acquaints himſelf with the number and arrangement of the letters of a word preſented to him, and that he retains them better than other children, to whom they are not yet become familiar by daily reiterated uſe."

The firſt part of the abbé's plan of tuition, then, conſiſted in inſtructing the deaf and dumb, by writing and the intervention of methodical ſigns, in various departments of knowledge. It was ſome time before he thought of attempting, what Amman had effected in Holland, Bonnet in Spain, and Wallis in England; namely, to make his pupils *ſpeak*. This was firſt ſuggeſted to him by the work of Bonnet, before mentioned; and it is an enterprize, he ſays, that does not require great talents, but much patience. We ſhall firſt briefly ſhew his method of teaching written language, with a knowledge of its ſignification and grammatical conſtruction; and afterwards his mode of teaching articulation, or ſpeech.

In learning our native language, as we have already ſtated, a ſign of the hand or the eye was the ſole means by which we were taught to unite the idea of the objects with the ſounds (their names) that ſtruck our ear. Whenever we heard thoſe ſounds, the ſame ideas aroſe in our minds, becauſe we recollected the ſigns made to us when they were pronounced. Exactly ſimilar are the meaſures adopted with the deaf and dumb by the abbé de l'Epée. He commences with teaching them a *manual alphabet*, ſuch as boys at ſchool make uſe of to hold converſation at one end of a form with their companions at the other. Here the viſible figure of the fingers, in different poſitions, is ſubſtituted for the audible ſounds, which we connect with written letters in ordinary tuition: and the various figures of theſe letters ſtrike forcibly the eyes of the deaf and dumb perſons, who no more confound them, than we confound the various ſounds that ſtrike our ears.

He next writes in large characters, with a white crayon upon a black table, theſe two words, *the door*, and ſhews them the door. They immediately apply their manual alphabet five or ſix times to each of the letters compoſing the word *door*, (*i. e.* they ſpell it with their fingers,) and impreſs on their memory the number of letters, and the arrangement of them: this done, they efface the word, and taking the crayon themſelves, write it down in characters, no matter whether well or ill formed; afterwards they will write it as often as you ſhew them the ſame object.

The ſame courſe is purſued with reſpect to every object pointed out to them, the name being previouſly written down. And experience has demonſtrated, that a deaf and dumb perſon, poſſeſſing any mental powers, will acquire by this method upwards of eighty words in leſs than three days: in a very ſhort time, therefore, the pupil will obtain a knowledge of all the words which expreſs the different parts of our frame, from head to foot, as well as of thoſe that expreſs the various objects that ſurround us, if properly pointed out to him, as we write their names on the table, or on cards put into his hands.

The abbé begins early with verbs and little phraſes, and not, as is uſual, with the declenſion of nouns and pronouns, becauſe it is more amuſing to the pupils, and furniſhes better means of developing their faculties. The firſt or ſecond day he guides their hands, or writes for them the preſent tenſe of the indicative of the verb, *to carry*.

"Several deaf and dumb perſons being round a table," he ſays, "I place my new ſcholar on my right hand; I put the fore-finger of my left hand on the word *I*, and explain it by ſigns in this manner: ſhewing myſelf with the fore-finger of my right, I give two or three gentle taps on my breaſt. I then lay my left fore-finger on the word *carry*, and taking up a large quarto volume, I carry it under my arm, on my ſhoulder, on my head, and on my back, walking all the while with the mien of a perſon bearing a load. None of theſe motions eſcape his obſervations.

"I return to the table; and in order to explain the ſecond perſon, I lay my fore-finger on the word *thou*, and carrying my right hand to my pupil's breaſt, I give him a few gentle taps, making him notice that I look at him, and that he is likewiſe to look at me. I next lay my finger on the word *carrieſt*, the ſecond perſon, and having delivered him the quarto volume, I make ſigns for him to perform what he has juſt ſeen me perform: he laughs, takes the volume, and executes his commiſſion very well."

In this ingenious and patient manner the tutor goes through the various perſons, ſingular and plural, both to the inſtruction and amuſement of his pupils. Nevertheleſs, a ſmall difficulty occurs in the outſet. "The pupil, having his left fore-finger upon *I*, carries his right to my breaſt, thinking that my name was *I*, as he had ſeen me ſeveral times deſignate myſelf by that word." This the abbé ingeniouſly explains, by letting him ſee that every individual of the group denominates himſelf *I*. By following out the ſame plan with different words, the pupil will underſtand in a day or two every phraſe compoſed of only one of the ſix perſons of the preſent of a verb tranſitive with its objective, ſuch as theſe: "I draw the table; thou draggeſt the chair; he offers an arm chair; you puſh the door; they ſhut the window:" becauſe all theſe words expreſs actions, of which the ſigns are caught in an inſtant; and becauſe the eyes of the ſpectators teſtify that theſe operations are performed.

The abbé then proceeds with the articles, caſes, numbers, and genders of nouns, furniſhing the pupil with ſigns which diſtinguiſh each of theſe properties that apply to nouns. Thus he is informed, by writing on the table, that *the*, *of*, *of the*, connect words as our joints do our bones: after this, the right fore-finger two or three times bent in the form of a hook becomes the ſyſtematical ſign for an article; and other ſigns are uſed for the caſes, genders, &c.

"Names of qualities, as *good*, *great*, *wiſe*, *learned*," ſays the abbé, "infer neceſſarily ſome noun ſubſtantive, expreſſed or underſtood, to which they are applied: but if we conſider the qualities only which are expreſſed, without reference to any noun ſubſtantive, then theſe qualities being ſubject to have other qualities applied to them, become themſelves nouns ſubſtantive, as *goodneſs*, *greatneſs*, *wiſdom*, *learning*. Our mode of expreſſing this ſort of adjective is the following: if we would dictate the word greatneſs, for inſtance, we make the ſign for *great*, which is an adjective; then we ſubjoin the ſign for a ſubſtantive, which announces that this adjective is *ſubſtantified*, or made a ſubſtantive, and can itſelf receive other adjectives. I give ſeveral examples, after which my pupil will commit no miſtake, either in reading a book, or in writing as we dictate to him."

In this manner the pupil is inſtructed in the various parts of grammar, in the "whole metaphyſic of verbs," their numbers, tenſes, and modes, in conjunctions, prepoſitions, &c. by a ſeries of viſible *ſigns*, not more arbitrary than the articulate and audible ſigns of ſpeech. And the abbé has convinced many academicians and learned men, that the deaf and dumb are by theſe means rendered capable of underſtanding the grammatical difference of every word in the conſtruction of language. He then proceeds to ſhew, 1, the fecundity of methodical ſigns ariſing out of the ſign for the infinitive of the verb; and, 2, that there is no metaphyſical idea, of which a very clear explanation may not be given by means of analyſis, and the help of methodical ſigns.

In illuſtration of the firſt of theſe propoſitions, he obſerves that "the ſame operation or diſpoſition of the mind, of the heart, of the body, &c. can be expreſſed by a verb, by a noun ſubſtantive, by a noun adjective, and ſometimes by an adverb. Since the operation or diſpoſition is the ſame, there muſt neceſſarily be the ſame radical ſign, to which are joined other ſigns, to indicate, in verbs, the difference of their perſons, their numbers, tenſes, and modes; in nouns, whether ſubſtantive or adjective, their caſes, numbers, and genders; and to characterize nouns adjective made ſubſtantive or adverbial.

"This radical ſign is the ſign for the infinitive of the verb. I take, for example, the verb *to love*, in all its parts, whether active or paſſive, with all the words derived from or related to it, ſuch as *friendſhip*, *love*, *loved*, *lovely*, *lovelineſs*, *friend*, *lovelily*, *friendly*, *friendlily*, *lover*, *amateur*, &c. All theſe words have the ſame radical ſign, that of the infinitive *to love*. It is executed by looking at the object in queſtion, and preſſing the right hand ſtrongly upon the mouth, while the left is laid upon the heart; then carrying the right with freſh vivacity to the heart, conjointly with the left, and concluding with the ſign for the infinitive. The pupil to whom I am dictating a leſſon or a letter, muſt not miſtake in the choice of any one of theſe words, which are upwards of two hundred and forty in number, compriſing all perſons, numbers, tenſes, and modes of the verb active and paſſive; the caſes, numbers, and genders of the nouns ſubſtantive and adjective, and the adverbs.

"If a part of a verb is to be dictated, I firſt make the ſign for the perſonal pronoun, which carries along with it that for number; then the radical ſign; and according to what is requiſite, the ſigns for tenſe and mode.

"If I want to dictate *friendſhip*, I make the radical ſign, accompanied by the ſign for ſubſtantive, which will be enough to make it underſtood that ſuch is the noun ſubſtantive I require.

"If *love* is the noun I want, I make the ſame ſigns as for friendſhip, only giving a greater degree of vivacity to my action on the mouth and on the heart, becauſe love is more ardent than friendſhip.

"The word *beloved* is an adjective, agreeing both to maſculine and feminine: the ſign for adjective ſubjoined to the radical ſign will ſuffice.

"Is *amiable* the word? I make the radical ſign, then the ſign for an adjective, but of one terminating in *able* formed from a verb: to this I muſt ſubjoin the ſign for poſſible, or for neceſſary, as before laid down."

This exemplification is equally applicable to the infinitives of all verbs, and to the words derived from or related to them.

In illuſtration of the other propoſition, the abbé remarks, that there is nothing which cannot be clearly ſignified by words; and that there is no word in any language, of which the ſignification may not become intelligible, by analyſis, in uſing other words to a neceſſary extent: that is, every word ſignifies ſomething, and is capable of being explained. "The procedure is the ſame with the deaf and dumb. We continue writing till we attain words, comprehended by ſigns, which illuſtrate what was obſcure. Inſtances of being forced to have recourſe to a ſecond operation are rare; if they were frequent, it would prove that my ideas were not very clear, and that my expreſſions were ill choſen." In order to illuſtrate this point, he gives the following example.

There is perhaps no word more difficult to explain by ſigns than this, *I believe*. I effect the explanation of it in the following manner: having written upon the table *I believe*, I draw four lines in different directions, thus:

I believe
- I ſay *yes* with the mind. I think *yes*.
- I ſay *yes* with the heart. I love to think *yes*.
- I ſay *yes* with the mouth.
- I do not ſee with my eyes.

Which ſignifies, my mind conſents, my heart adheres, my mouth profeſſes, but I do not ſee with my eyes. I then take up what is written upon theſe four lines, and carry it to the word I believe, to make it underſtood that the whole is there compriſed.

"If, after this explication, I have occaſion to dictate the word, *I believe*, by methodical ſigns, I firſt make the ſign for the ſingular of the perſonal pronoun, as I have ſhewn in its place: I next put my right forefinger to my forehead, the concave part of it being deemed the ſeat of the mind, that is, the faculty of thinking, and I make the ſign for *yes*: after that, I make the ſame ſign for *yes*, putting my finger to that part, which is commonly conſidered as the ſeat of the heart, in the mental economy, that is, our faculty of loving, (we have ſeveral times explained that theſe two faculties are ſpiritual, and occupy no ſpace in reality:) I proceed to make the ſame ſign for *yes* upon my mouth, moving my lips: laſtly, I put my hand upon my eyes, and, making the ſign for *no*, ſhew I do not ſee. There only remains the ſign for the preſent to be made, and then I write down, *I believe*; but when written, it is better underſtood by my pupils than by the generality of thoſe who hear. It is perhaps ſuperfluous to repeat, that all theſe ſigns are executed in the twinkling of an eye."

In three ſeparate chapters, the Abbé explains, how ſpiritual operations, which are the objects of logic, may be explained to the deaf and dumb, how they are inſtructed in the firſt truths of religion; and how they may be initiated even into the myſteries of our religion, by the uſe of theſe methodical ſigns. In a word, by theſe means he enables the mind to develope its powers, and to enter into even the more abſtruſe operations of intellect, into grammatical, logical, and metaphyſical reſearch.

To a perſon unaccuſtomed to reflect on the ſources and means of improving the underſtanding, and not aware, that there is no actual connection in nature, between articulate ſounds and the ideas which they repreſent, or that viſible as well as audible ſigns, being alike arbitrary, may be equally aſſociated with ideas, by habit, this method of tuition may appear altogether fanciful and impracticable. But experience has demonſtrated its practical utility. M. Linguet, a member of the Royal Academy, having aſſerted that perſons thus inſtructed could be conſidered as little more than *automata*, was invited by the Abbé de l'Epée to be preſent at his leſſons. M. Linguet complied with the invitation, and the Abbé having deſired him to fix upon ſome abſtract term, which he would by ſigns communicate to his pupils, he choſe the word, *unintelligibility;* which, to his aſtoniſhment, was almoſt inſtantly written by one of them. The Abbé informed him, that to communicate this word, he had uſed five ſigns, which, though ſcarcely perceivable by him, were immediately and diſtinctly apprehended by his ſcholar. The firſt of theſe ſigns indicated an internal action; the ſecond repreſented the act of a mind that reads internally, or, in other words, comprehends what is propoſed to it; a third ſignified that ſuch a diſpoſition is poſſible; theſe, taken together, form the word *intelligible:* a fourth ſign transforms the adjective into a ſubſtantive; and a fifth, expreſſing negation, completes the word required. M. Linguet afterwards propoſed this queſtion, "What do you comprehend by metaphyſical ideas?" which being committed to writing, a young lady immediately anſwered on paper in the following terms: "I underſtand the ideas of things which are independent of our ſenſes, which make no impreſſion on our ſenſes, which cannot be perceived by our ſenſes."

On reading this account of a human being, raiſed from a ſtate of mental vacuity, little elevated above the brute, to a condition of high intellectual cultivation, and to the enjoyment of the beſt faculties and feelings of our nature, we cannot refuſe our aſſent to the ſplendid eulogy of the dramatic poet (M. Bouilly) in his "Comparative Eſtimate of Worth."

"*Science* would decide for D'Alembert, and *nature* ſay Buffon; *wit* and *taſte* preſent Voltaire, and *ſentiment* plead for Rouſſeau; but *genius* and *humanity* cry out for De l'Epée, and him I call the *beſt* and *greateſt of all.*" Dram. of "Deaf and Dumb."

It remains that we ſay a few words reſpecting the method employed by the Abbé de l'Epée, in teaching articulation and utterance to his deaf and dumb pupils. The principle on which this inſtruction is conducted, is, the obſervation on the part of the pupils of the different poſitions and motions of the tongue, lips, &c. in the ſpeaker, which are connected in his mind with the words uttered, by ſeeing them written down at the ſame time on the table: the Abbé began his attempts to make a deaf and dumb perſon pronounce, by cauſing him to waſh his hands thoroughly clean. This done, the Abbé traced an *a* upon the table, and taking his pupil's hand, introduced it into his mouth, as far as the ſecond articulation; he then pronounced ſtrongly *a*, making the ſcholar obſerve, that his tongue lay ſtill, without riſing to touch his finger; he next follows the ſame courſe, pronouncing *e*. After theſe two operations, he put his finger into the pupil's mouth, making him underſtand that he is to do with his tongue, what the Abbé had done with his. The pronunciation of *a* is commonly effected without difficulty: that of *e* alſo ſucceeds for the moſt part; but the mechaniſm of it ſometimes requires two or three explanations. He proceeds in a ſimilar way with the remaining vowels; and then to the ſimple combinations of a conſonant with each, as *pa, pe, pi*, &c. firſt writing each ſyllable, and then teaching the pupil to obſerve and to imitate the movement and mechaniſm of the organs of articulation.

It is unneceſſary to detail the varieties of this proceſs through the different combinations of vowels and conſonants.

The principle is obvious. It ſometimes happens, however, in the firſt leſſons, that the pupils, having diſpoſed their organs for the pronunciation of a particular letter, remain, nevertheleſs, without utterance, becauſe they make no internal motion to expel air from the lungs. The Abbé pointed out the difference in the ſtate of his organs, when he did and did not utter ſound, by placing the pupil's hand upon his throat, by making him feel the concuſſion of air on the back of his hand, &c.; and if all this proved unſucceſsful, a pretty ſharp ſqueeze of the little finger would draw ſound from him by way of lamentation.

In the commencement of this kind of inſtruction, it is neceſſary, 1ſt, for the deaf and dumb ſcholar to be directly facing his teacher, in order that he may loſe none of the impreſſions given by the different modifications of the organs of ſpeech in the labial alphabet; 2dly, for the teacher to render theſe modifications as ſtrong as poſſible, that they may be the more perceptible; 3dly, for his mouth to be ſufficiently open, to leave the different movements of the tongue viſible; 4thly, for a ſlight pauſe to be made between the ſyllables of each word that the pupil is to write or pronounce. There is no neceſſity for the leaſt emiſſion of voice.

The deaf and dumb acquire very early a facility in comprehending the words uttered, from obſerving the motions of the ſpeaker's mouth, lips, and tongue; and "being, moreover, to the full as curious as other folks to know what is ſaid," the Abbé obſerves, "eſpecially if they ſuppoſe themſelves, or any thing intereſting to them, the ſubject, they devour us with their eyes, (an expreſſion hardly metaphorical here,) and, if not prevented by the precaution of turning from them to ſpeak, eaſily diſcover all we ſay. This is a poſitive fact, evidenced every day in the three houſes which are receptacles for theſe children, inſomuch that I always think it expedient to hint to perſons honouring us with viſits, to be cautious of uttering any thing before them not proper for them to underſtand. I confeſs, indeed, that they conjecture more than they diſtinctly perceive, when pains have not been taken to teach them the art of writing, ſolely by inſpection of the movement of the lips, without the help of any ſign.

"Before I had to inſtruct the multitude of deaf and dumb that have been ſucceſſively preſſed upon me," the Abbé adds, "my own application to the rules here laid down proved ſo effective, as to enable Lewis Francis Gabriel de Clement de la Prejade to pronounce, in public, a Latin diſcourſe of five pages and a half; and, in the enſuing year, to lay down a definition of philoſophy, detail proofs of its accuracy, and defend it in regular diſputation, anſwering, in all ſcholaſtic forms, the objections offered againſt it by Francis Elizabeth John de Didier, one of his fellow ſtudents: (the arguments were communicated.) I alſo enabled another deaf and dumb ſcholar to repeat aloud to his miſtreſs the twenty-eight chapters of the goſpel according to St. Matthew, and to recite the morning ſervice along with her every Sunday. Theſe two examples muſt be ſufficient."

But this is impracticable, he ſays, where there is a number of ſcholars to inſtruct: and the Abbé Sicard, his ſucceſſor, for the reaſon already ſtated, has ceaſed to teach articulation, contenting himſelf with the inſtruction by writing and ſigns.

DUMDAH, in *Geography*, a town of Hindooſtan, in the Ruttunpour country; 66 miles W. of Ruttunpour, and 112 E. of Nagpour.

DUMEE, Guillaume, in *Biography*, a French painter, who was one of thoſe who aſſiſted in executing the works in the Louvre, in the latter part of the 16th century.

DUMEIDSJ, in *Geography*, a town of Arabia, in the country of Yemen; 36 miles N.N.E. of Chamir.

DUMFRIES, a town in the ſouth of Scotland, ſituated on the river Nith, not far from where that river falls into the Solway frith. The town of Dumfries is airy and well built, and the country round it fertile and well cultivated. Upon the Nith are many beautiful and pictureſque views, and many elegant manſions, the chief of which, perhaps, is the caſtle of Drumlanrig, the ſeat of the duke of Queenſbury. Dumfries, although not properly a commercial or manufacturing town, poſſeſſes ſome coaſting trade with the weſtern ports of Scotland, and thoſe ſituated in the north-weſt part of England. In general, its principal traffic conſiſts in articles of proviſion, and thoſe of common uſe, with which the inhabitants of the town and cultivators of the ſoil, reciprocally ſupply each other for mutual accommodation. Many woods in the neighbourhood of Dumfries have been felled of late, (chiefly thoſe of his grace of Queenſbury,) and this has occaſioned a conſiderable trade in timber. But this ſeems rather a tranſient than a permanent traffic.

Dumfries is governed like the other royal boroughs of Scotland, and along with the boroughs of Sanquhar, Annan, Lochmaben, and Kircudbright, returns a member to parliament. The preſent is ſir J. S. H. Maxwell, bart. For Dumfriesſhire, the member is the Hon. W. J. Hope.

Dumfriesſhire is fertile in the ſouth, and towards its northern extremity, which is barren and mountainous, abounds in iron ſtone and lead ore.

Dumfries, a port of entry, and poſt town of America, in Virginia, and chief town of Prince William county. It lies on the north ſide of Quamtico creek, 4 miles above its entrance into the Potowmack, and 10 miles from Colcheſter. Its public edifices are an epiſcopal church, a court-houſe, and a gaol; diſtant 23 miles N. by E. from Frederickſburg, and 185 S.W. from Philadelphia.

DUMFRIESHIRE, a county of Scotland, ſituated on the ſouthern border of that province, where it unites with England: and is environed with the ſhires of Kircudbright, and Ayr to the weſt, Lanark, Peebles, and Selkirk to the north; Roxborough to the eaſt, and Cumberland and Solway-frith to the ſouth. This area of land meaſures about 60 miles from N.W. to S.E., and 30 in a tranverſe direction. It comprehends three diſtricts, or ſtewartries, *viz.* Annandale, Eſhdale, or Wauchopedale, and Nithſdale, which diviſions derive their reſpective names from the principal rivers in each. The chief part of this county is mountainous, particularly near the middle, and on its eaſtern borders, where the eminences are lofty, and aſſume a barren, ſterile appearance. They are moſtly covered with wild heath, and abound with game. Numerous flocks of ſheep and black cattle feed on them. The vallies are, however, fertile and pleaſant, and in theſe the chief towns, villages, and ſeats are ſituated.

In ancient times, this diſtrict is ſaid to have been inhabited by a tribe of the Cimbri, called *Selgovæ*, who were found here by the Romans when they eſtabliſhed the province of Valentia, which extended from Adrian's wall, between the rivers Tyne and Solway, to the wall of Antoninus, between the rivers Clyde and Forth. After the departure of the Romans, a new kingdom was eſtabliſhed by Ida, and the Angles in 547, and extended its government over the ſouthern and weſtern parts of Valentia. About the beginning of the ninth century, this was ſubjugated by the Picts and Scots, who eſtabliſhed themſelves here for a conſiderable length of time. Hence they made frequent irruptions into England. The ſituation of this county, on the immediate borders of each, rendered it a ſcene of perpetual hoſtility in the wars between the two kingdoms, and in the "Border Hiſtory," we find, that the inhabitants of this county and of Cumberland were ſubjected to repeated depredations, maſſacres, and all the horrors of ſavage cruelty, by their neighbouring enemies. See "Beauties of England," vol. iii. in the General Hiſtory of Cumberland, and more fully in Ridpath's "Border Hiſtory." In the notes to Walter Scott's poems are many particulars relating to theſe deplorable conflicts.

This county contains four royal boroughs, Dumfries, Annan, Sanquhar, and Lochmaben, ſeveral ſmall towns and villages, and is divided into 42 parochial diſtricts, containing in all 52,329 inhabitants. Dumfriesſhire contains many elegant ſeats, of which Drumlanrig, the ſeat of the duke of Queenſbury, is the chief: Comlongan-caſtle, the ſeat of the earl of Mansfield; Barjarg, the reſidence of Mr. Hunter; and Amisfield, the ſeat of the earl of Wemyſs; are alſo fine manſions. Few counties in Scotland poſſeſs more valuable, or more numerous minerals than Dumfriesſhire. The hills, which border on Clydeſdale, contain valuable lead mines, ſome of which are very rich in ſilver; and many other parts of the county poſſeſs mines of the ſame metal. Coal and lime-ſtone are found in ſeveral pariſhes: excellent free-ſtone is alſo abundant. In the pariſhes of Penpont, Kirkmichael, and Canoby, are indications of iron; in Langholm copper is wrought; and in Weſterkirk, on the eſtate of ſir James Johnſtone, a valuable mine of antimony has been lately diſcovered. Much of the lime-ſtone receives a poliſh equal to the fineſt marble, and many of the ſprings contain a ſmall quantity of lime, giving them a petrifying quality. Beſides the mineral ſprings of Moffat and Hartſell Spaw, there are many wells, which contain metallic or mineral impregnation. The rivers abound with trout and ſalmon, and on the ſhores of the Solway Frith the polype or animal flower is frequently found. In addition to the animals common to other parts of Scotland, it may be mentioned, that at Drumlanrig are ſtill to be ſeen a few of the wild cattle which anciently inhabited the woods of Scotland. Sinclair's Statiſtical Account of Scotland.

DUMME, a river of Germany, in the circle of Upper Saxony, and marquiſate of Brandenburg, which runs into the Jetze at Wuſtro.

DUMMER, a townſhip of America uninhabited, in Grafton county, New Hampſhire, incorporated in 1773, S.W. of lake Umbagog, on the waters of Upper Amonooſuck.

Dummer See, *the*, or *Dummer Lake*, is a lake of Germany, in the former biſhopric of Munſter, which at preſent conſtitutes a part of the new kingdom of Weſtphalia. It is five miles in length, and two miles and a half in breadth, and adjoins the county of Dipholtz, and the former biſhopric of Oſnabruck.

DUMMERSTOWN, a townſhip of America, in Windham county, Vermont, N. of Brattleborough, containing 1692 inhabitants.

DUMMOODA, a river of Hindooſtan, which runs into the Hoogly; 28 miles below Calcutta.

DUMNA, in *Ancient Geography*, an iſland placed by Ptolemy and Pliny in the northern ocean. Ortelius conjectures, that it is either the preſent iſle of Hoy, or that of Ways.

DUMNII. See Damnii.

DUMNONII. See Damnonii.

DUMONT, John, in *Biography*, baron Carleſcroon, an hiſtorical and political writer, flouriſhed at the end of the 17th and beginning of the 18th centuries. After various changes in life, in France and in Holland, he became hiſtoriographer to his imperial majeſty. He died about the year 1726. His principal works are, "Memoires Politiques pour ſervir a l'Intelligence de la Paix de Ryſwick," 4 tom. 12mo. "Voyages en France," &c. 4 tom. 12mo. "Corps univerſal diplomatique du Droit des Gens," 8 tom. folio. This contains all the treaties of alliance, peace, and commerce, from the peace of Munſter to 1709. "Lettres Hiſtorique depuis 1652," juſqu'en 1710.

Dumont, N., a French painter of ſome merit; ſurnamed *the Roman*. He died at Paris, in a very advanced age, in 1781.

DUMOSÆ, in *Botany*, the nineteenth natural order in the Philoſophia Botanica of Linnæus, and the forty-third of the Prelections. In the Philoſophia Botanica it conſiſts of the following genera, Viburnum, Tinus, Opulus, Sambucus, Rondeletia, Bellonia, Maurocenia, Caſſine, Rhus, Cotinus, Celaſtrus, Euonymus, Ilex, Tomex, Prinos, Callicarpa, Lawſonia. In the ſynoptic table of the Prelections, p. 499, the genera ſtand thus. Sideroxylon, * Bumelia *Swartz*, Rhamnus, Phylica, Ceanothus, Büttneria, Chryſophyllum, Achras, Prinos, Ilex, Callicarpa, Euonymus, * Rochefortia *Swartz*, Celaſtrus, Caſſine, Viburnum? β. Sambucus? γ. Rhus, Schinus, Fagara. Thoſe marked with an aſteriſk are inſerted by the editor Dr. Giſeke. The reſt agree with Gen. Plant. except that Büttneria is added and Tomex omitted. By comparing theſe two liſts we find a ſtrong confirmation of Linnæus's own declaration in Gen. Plant. that he was not ſatisfied with this order, and that it required further examination. The name was taken from *dumus*, a thicket, becauſe the plants are chiefly ſhrubs, or low buſhy trees, ſuch as form thickets. They are generally of a purgative, dangerous, or highly virulent nature, particularly ſome ſpecies of Rhus. The order having been confeſſedly left in ſo uncertain a ſtate by its author, it is in vain to ſeek for any technical characters by which to define it, and unneceſſary to ſhew how ill, in ſome points, it is aſſorted.

DUN, in *Geography*, a ſmall town or France, in the department of the Creuſe, chief place of a canton, in the diſtrict of Guéret, with a population of 1057 individuals; its canton has a territorial extent of 295 kiliometres, 13 communes, and 13,176 inhabitants.—Alſo, a ſmall town of France, in the department of the Meuſe, chief place of a canton, in the diſtrict of Montmedy, ſituated on the river Meuſe, 9 miles S. of Stenay. It has only 988 inhabitants; but its canton contains 18 communes, and a population of 8388 individuals upon a territorial extent of 192½ kiliometres.

Dun *ſur Auron*, a ſmall town of France, in the department of the Cher, called, till the year 1792, Dun le Roi, Dunum Regis. It is the chief place of a canton, in the diſtrict of St. Amand, on the river Auron, 21 miles S. E. of Bourges, 30 miles S.W. of Nevers, and 192 miles S. of Paris. The number of its inhabitants amounts to 2710; its canton has an extent of 305 kiliometres, and 13 communes, with a population of 7868 individuals.

Dun, in the *Manege*, a colour partaking of brown and black.

DUNA, in *Geography*, a river of Ruſſia, named "Sapadnaia Dvina," and by the Lithuanians Daugava, derives its origin from a lake in the government of Tver, at Biala, not far from the ſources of the Volga, purſues its courſe through this and the government of Pſcove, conſtitutes the boundary between the government of Polotzk and Riga, the republic of Poland, and the duchy of Courland, and falls not far from Riga, at Dunamunde, into the Baltic. In its courſe, it receives ſeveral ſmaller rivers, as the Toroptza, the Eveſt, the Oger, and the Yagel, and from Courland the Bulder-Aa. The Duna is navigable through its whole courſe from the uppermoſt regions, facilitating the commerce from ſeveral governments, and from Poland and Courland, to an uncommon degree. It has, however, one inconvenience, that near Dunamunde, it has many ſhoals, which increaſe every year, and vary their poſitions, and thoſe occaſion much difficulty in the navigation. Beſides, in the Dunaburg circle there are ſeveral falls, the ſhooting of which is attended with great difficulty and danger. Of theſe falls ſome reckon as many as fourteen. The conſtant defection of the water in ſummer renders the voyage ſtill more difficult and dangerous, and on the early acceſs of autumnal froſts utterly impoſſible. At Riga, the Duna is 900 paces broad. Here annually, in April, a bridge of pontoons is thrown acroſs it, and faſtened by poles, except the part that opens to let the ſhips go through, which is fixed to anchors. In November the river is generally covered with ice, which, in March or April, again breaks up. The froſt not unfrequently makes the river paſſable on foot in the ſpace of 48 hours. The bridge is then taken away, and ſafely laid by in a ſmall arm of the river, called the "Soodgraben." Through the whole ſummer, the great number of ſhips of all nations, that lie cloſe to the bridge on both ſides, exhibits a fine ſight. The Duna is the port of Riga. In the ſpring ſeaſon the ice, which drives hither from Lithuania, ſtops the current about the town and towards the ſea; and the outlet being thus ſtopped, and the accumulation continually augmenting, the moſt deſtructive inundations occur. The ſalmon of the Duna are the beſt and deareſt in Livonia. This river has, in general, a ſandy and clayey ſhore, and a diſcoloured water

DUNABURG, or Duneburg, a ſmall town of that part of Poland which fell to the ſhare of Ruſſia, at the final partition of Poland in 1795. It was one of the principal places in the Livonian palatinate, called, in the Poliſh language, Woiewodztwo Inflantſkie. The provincial diets uſed to be held in this town.

DUNAMASE, in the Queen's county, Ireland, about four miles from Maryborough, forms a very conſpicuous object from a great diſtance. Its name, which imports *the fort of the plain*, evinces it to have been conſidered and uſed as a place of ſtrength in the earlieſt ages: the plain is what is called *the great heath*, nearly ſurrounding it. This rock is an elliptical conoid, and inacceſſible on all ſides, except to the eaſt, which, in its improved ſtate, was defended by the Barbican. D. Ledwich gives two plates, and a minute deſcription of this place, in his "Antiquities of Ireland," for the purpoſe of illuſtrating the fortification of that day. It was for a long time a great check on the Iriſh, but from the time of Edward II. when lord Mortimer reſided there, to the final ſubjugation of Ireland, it was often diſmantled and rebuilt. It was effectually deſtroyed by colonels Hewſon and Reynolds in 1650, and has continued in ruins ſince that time. Ledwich.

DUNAMUNDE, a ſmall town of Ruſſia, in the government of Riga, about 10 miles from that place, at the mouth of the river Duna, with a ſtrong caſtle, where the ſhips, which come from the Baltic into the river, pay a toll. It was taken by the Ruſſians from the Swedes in 1710.

DUNAN Point, a cape on the S.W. coaſt of the iſland of Skye. N. lat. 57° 3′. Long. 3° 5′. W. of Edinburgh.

DUNANE, in the Queen's county, province of Leinſter, Ireland, a place where there is an extenſive colliery, the coals of which are preferred to thoſe of Caſtle-comer. The coal is of the kind called Kilkenny coal, the *coal-glance* of Jameſon. Dunane is amongſt the Sliebh-margy mountains, about 6 miles weſt from Carlow, and about 40 miles S. W. from Dublin. Beaufort.

DUNAVEZ, or Dunavitz, *Dunavetz*, *Dunajetz*, a ſmall town of Auſtria, on the limits of Gallicia and Hungary, ſituated on the river Dunavetz, which flows from the Carpathian mountains into the Viſtula. It is on the road from Preſburg to the famous ſalt mines of Wieliczka in Gallicia, and it is the largeſt town in that part of the country. Articles of every kind are expoſed in the ſtreet for ſale on Sundays, and give it the appearance of a fair.

DUNAX, in *Ancient Geography*, a mountain of Thrace, according to Strabo; called Donuca by Livy; it is the moſt elevated part of mount Rhodope.

DUNBAR, William, in *Biography*, an eminent Scottiſh poet, was born, according to Mr. Warton, in 1470, but according to Mr. Pinkerton, in 1465, at Salton, a village on the coaſt of the Forth in Eaſt Lothian. He entered as a travelling noviciate of the Franciſcan order; but he afterwards became diſſatisfied with this condition, and relinquiſhing it, ſettled in Scotland about the year 1490. Here he acquired celebrity as a poet; but he does not appear to have gained any benefice, though he ſeems to have deſired it. The courſe of his life, which is unknown, was terminated in the year 1530. His poetical pieces were numerous; they were partly ſerious and partly comic, and manifeſt readineſs of invention, great energy, and richneſs of deſcription. One of his chief poems is the "Thiſtle and Roſe," which is a kind of viſion, abounding in imagery, and written on occaſion of the marriage of James IV. of Scotland with Margaret, daughter of Henry VII. of England. His "Golden Terge," is a moral allegory, exhibiting the ſhield of reaſon reſiſting the attacks of the amorous paſſion. One of his large pieces is the "Daunce," which is a viſion of heaven and hell in a comic ſtyle. Many more of his pieces are printed in the collection of ancient Scottiſh poems, by ſir David Dalrymple, in 1770. Dunbar is ſaid to have derived his poetic taſte from the works of Chaucer, Gower, and Lydgate, but to have improved upon their manner. His language is the Scots dialect of thoſe times, much reſembling the Engliſh. Biog. Brit.

Dunbar, in *Geography*, a pariſh and royal borough in the county of Haddington or Eaſt-Lothian, Scotland. The former comprehends an area of about nine miles in length from E. to W. by two miles from N. to S. The ground riſes gradually from the ſea coaſt, and the land is eſteemed ſome of the moſt fertile in Scotland, which induced Mr. Pennant to call this diſtrict the Northamptonſhire of North-Britain. It is well cultivated, and produces large crops of wheat, barley, and beans; with ſmaller crops of oats, clover, rye-graſs, turnips, and potatoes. Two large roperies are eſtabliſhed on the coaſt. This pariſh is famous from containing the encampment which was occupied by general Leſlie and the Scots army, who were defeated by Cromwell.

The borough is ſeated on a rock near the ſea, which here forms a ſmall bay or harbour. The eaſt pier of this was begun during the protectorſhip of Oliver Cromwell, who gave 300*l.* towards defraying the expence. Since that time it has been much improved; it is ſafe but ſmall, and its entrance narrow. It is defended by a battery of 12 guns. The chief trade of this place is the exportation of corn, of which there are on an average about 10,000 quarters annually ſhipped off. Here is a ſmall dry-dock; and ſeveral fiſhing boats are annually fitted out from this town. Attached to the port are 18 veſſels of 2180 tons burthen employed in the coaſting trade, beſides 12 fiſhing boats.

The ruins of the caſtle are ſtill conſiderable. It ſtands on an elevated rock impending over the ſea. It has been a fort of great ſtrength, and the ſcene of many important tranſactions. "In 1567 it was in the poſſeſſion," ſays Pennant, "of the infamous earl Bothwell, who here committed the ſimulated outrage on the perſon of the fair Mary Stuart. Here alſo the earl retreated after being given up by his miſtreſs at the capitulation of Carberry-hill." Edward II. took ſhelter within its walls in his flight from Bannockburn. In 1336, it was moſt courageouſly defended by Agnes, counteſs of March; who in the abſence of her huſband was beſieged by lord Monteagle and his troops, but they were obliged to raiſe the ſiege and leave the country. Here are ſtill preſerved ſome of the famous Scotch pikes, ſix ells long.

Between the harbour and caſtle, is a ſurpriſing ſtratum of ſtone, which, in ſome reſpects, reſembles that called the Giant's-cauſeway in Ireland. It conſiſts of great columns of red grit, either triangular, quadrangular, pentangular, or hexangular: their diameter from one to two feet, their length, at low water, thirty feet, and they dip, or incline a little to the ſouth. They are jointed, but not ſo regularly, or ſo plainly, as thoſe of the Giant's cauſeway. This range of columns faces the north and extends about two hundred yards in front. The breadth is inconſiderable; the reſt of the rock conſiſts of ſhapeleſs maſſes of the ſame ſort of ſtone irregularly divided by thick ſepta.

Beneath the caſtle is a vaſt cavern, partly natural and partly artificial; and near it are two "natural arches through which the tide flowed."

Dunbar is now a reſpectable, well built town, and is ſupplied with good water conveyed in pipes from ſprings about two miles diſtant. The borough is governed by a provoſt, three bailiffs, a dean of guild, treaſurer, and 15 counſellors. It joins with Haddington, North-Berwick, Lauder, and Jedburg, in ſending one member to parliament. It is nearly equidiſtant from Edinburgh and Berwick; being 27 miles from each. In the town are two convents; one for Mathurines, and the other for Carmelites. In the church is a magnificent monument, to the memory of ſir George Hume, earl of Dunbar, "the worthieſt and beſt Scotch miniſter of James VI." He died Jan. 29, 1610. Sinclair's Statiſtical account of Scotland, and Pennant's Tour in Scotland, vol. i.

DUNBARTON, a townſhip of America, in Hillſborough county, New Hampſhire, incorporated in 1765, and containing 1222 inhabitants; nine miles S. of Concord, and 36 W. of Portſmouth.

DUNBEATH, a river of Scotland, in the county of Caithneſs, which runs into the German ocean, eight miles N.E. from the end of Caithneſs.

DUNCAN, Daniel, in *Biography*, an eminent phyſician, born at Montauban, in Languedoc, in 1649, was the ſon of Dr. Peter Duncan, profeſſor of phyſic in that city, and grandſon to William Duncan, an Engliſh gentleman, of Scottiſh original, who removed from London to the ſouth of France about the beginning of the 17th century. Having loſt both his parents in his early infancy, he was taken under the protection of his mother's brother, Mr. Daniel Paul, a counſellor of the parliament of Thouloufe, though a firm and profeſſed Proteſtant. Inſtructed in the firſt elements of grammar, polite literature, and philoſophy at Puy Lauren, where the univerſity of Montauban then ſubſiſted, he was removed by his uncle to Montpellier, and placed under the immediate inſtruction of Dr. Charles Barbeyrac, whoſe phyſical lectures and practice were in high reputation. Under this excellent maſter, who diſtinguiſhed him by his eſteem and friendſhip, he purſued his ſtudies for eight years, and at the age of 24 he was admitted to the degree of M. D. in that univerſity. He afterwards reſided ſeven years at Paris; and here he publiſhed his firſt work, upon the principle of motion in the conſtituent parts of animal bodies, entitled, "Explication Nouvelle et Mechanique des Actions Animales," Paris 1678. In the following year he viſited London, for the purpoſe of tranſacting ſome family concerns, and of obtaining information concerning the effects of the plague in London, in 1665. He alſo availed himſelf of this opportunity for collecting vouchers to the reſpectable rank which his family had borne in Scotland and in England; with a view of juſtifying his claim to the letters of nobleſſe, which had been conceded to him in France, at a time, *viz.* in 1677, when, by favour of the great Colbert, he was appointed phyſician general to the army before St. Omer's, commanded by the duke of Orleans. During his ſtay of two years in London, he printed a Latin edition of his "Theory of the Principle of Motion in Animal Bodies." His inclination to ſettle in London was diverted by a ſummons which he received from Paris in 1681, to attend his patron Colbert, whoſe health was then beginning to decline. He does not ſeem, however, to have entertained a very high opinion of the mode in which the practice of medicine was then conducted in London; as we may conclude from a MS. upon "the prevailing abuſes in the eſtabliſhed practice of Phyſicians and Apothecaries in different parts of the World." Soon after his return to France, he publiſhed in three parts a popular work, entitled "Chymie Naturelle, ou Explication Chymique et Mechanique de la Nourriture de l'Animal," a ſecond edition of which appeared at Paris in 1687. In this year he publiſhed alſo his "Hiſtoire de l'Animal, ou la Connoiſſance du Corps; animé par la Mechanique et par la Chymie." Upon the death of Colbert, in 1683, he left Paris, and went to Montauban, in order to ſettle his affairs, and to prepare for taking up his final abode in England. His friends, however, prevailed upon him to continue in his native city. But the perſecution which raged againſt the Proteſtants with great violence in 1690, obliged him to retire firſt to Geneva, and afterwards to ſettle for about eight or nine years at Berne, where his medical practice was conſiderable, and where he had the charge of a profeſſorſhip of anatomy and chemiſtry. In 1699 he was ſent for to Caſſel by Philip, landgrave of Heſſe, and remained as his domeſtic phyſician for three years. Under the hoſpitable roof of this prince, he wrote his treatiſe upon the "Abuſe of hot Liquor," with a particular view to the caſe of the princeſs of Heſſe, who had indulged in the exceſſive uſe of tea, coffee, and chocolate, and who was then in ſo feeble a ſtate as to incline to a conſumption. Although he condemned exceſs, he allowed the prudent uſe of them, particularly to perſons of a phlegmatic conſtitution. This work, which was at firſt circulated in MS., was afterwards, by the perſuaſion of his friend Dr. Boerhaave, printed firſt in French, under the title of "Avis ſalutaire à tout le Monde, contre l'Abus des Liqueurs chaudes, et particulierement du Caffé, du Chocolat, et du Thé," Rotterd. 1705. In the following year it was printed in Engliſh, at London. During his abode at Caſſel he contributed to the relief of thoſe Proteſtants, who were obliged to abandon France on account of the perſecution they ſuffered, and to ſeek an aſylum in Brandenburgh. The fame of his liberality reached the court of Berlin, and he was invited thither by the reigning prince: but though he met with great encouragement as profeſſor of phyſic and phyſician to the royal houſehold, a regard to his health and to economy obliged him to remove, in 1703, to the Hague. He continued here about 12 years, during which period he was induced by Dr. Boerhaave, to publiſh a Latin improved edition of his Natural Chemiſtry, entitled "Chymiæ Naturalis Specimen, quo planè patet nullum in Chymicis officinis proceſſum fieri, cui ſimilis, aut analogus in Animalis Corpore non fiat." Amſtel. 1707. At this time he commenced a correſpondence with Dr. Mead, on a variety of ſubjects immediately connected with his profeſſion. In 1714 he accompliſhed the purpoſe which he had always in contemplation, of ſettling in London: but juſt before he left the Hague, he ſuſtained a ſtroke of the palſy, which alarmed his friends, though it was attended with no permanent injury to himſelf. As it had been his declared intention, if providence extended his life to the age of 70, to devote the remainder of his days to the gratuitous ſervice of thoſe who ſought his advice, he attained that age in 1719, and fulfilled his intention during the laſt 16 years of his life. To the rich who conſulted him, from whom he peremptorily refuſed to take a fee, he uſed to ſay with a ſmile, "The poor are my only paymaſters now; they are the beſt I ever had; their payments are placed in a government fund that can never fail; my ſecurity is the only King that can do no wrong;" alluding to the loſs he ſuſtained in 1721, of a third part of his property by the South-ſea ſcheme. He left behind him a great number of MSS., moſtly phyſical, ſome upon religious ſubjects, and one containing many curious anecdotes of the hiſtory of his own times. Among his phyſical MSS. the moſt conſiderable is a Latin treatiſe upon contagious diſtempers, to which is prefixed a very ample diſſertation upon the plague, &c. which appears to have been written in the year 1679. Dr. Duncan was in his converſation eaſy, cheerful, and intereſting; in his diſpoſition ingenuous and benevolent; and in his religious profeſſion, a ſincere Chriſtian and a zealous proteſtant. He died at London, April 30, 1735, aged 86. His only ſon, the Rev. Dr. Daniel Duncan, was the author of ſome religious tracts, and died in June, 1761, leaving behind him two ſons, both clergymen; one of whom, *viz.* Dr. John Duncan, has "ſuſtained the honour of his family, in the reſpectability of his character, in the liberality of his mind, and in his ingenious and valuable publications, both as a poet and divine." Biog. Brit.

Duncan, William, was born at Aberdeen in the year 1717, where he received the greater part of his education. When he had finiſhed the ordinary courſe of philoſophy and mathematics, he was admitted to the degree of M. A. He now ſtudied very diligently theology under the profeſſors at Aberdeen, with a view, probably, of engaging in the Chriſtian miniſtry, which, upon more mature deliberation, he afterward thought proper to abandon. He then removed to London, and was employed in many literary undertakings, particularly in tranſlations from the French language. He is ſuppoſed likewiſe to have had a large ſhare in the tranſlation of Horace, which was publiſhed under the name of Watſon. His talents as a tranſlator were highly appreciated; and the expectation of the public was fully anſwered in his verſion of the Select Orations of Cicero accompanied with notes. He next publiſhed "The Elements of Logic," which have obtained a high reputation, and which were originally written for Dodſley's Preceptor, publiſhed in 1748. In the year 1752 he publiſhed a tranſlation of Cæſar's Commentaries, which was at firſt given to the public in the folio ſize, but has ſince appeared in 8vo. This work is at once faithful and elegant, and is rendered more valuable by an introductory treatiſe on the Roman art of war. About the ſame time Mr. Duncan was appointed by the king profeſſor of philoſophy in the Mariſchal college of Aberdeen. The duties of this office were confined chiefly to the illuſtration of the principles of natural and experimental philoſophy. In this department, though not the favourite purſuit of his life, he highly diſtinguiſhed himſelf. The labour was, however, more than adequate to his ſtrength, and he began rapidly to decline in health. He died in 1760, in the forty-third year of his age; leaving behind him an excellent character as a man of learning, and exemplary in all the duties of life. Biog. Brit.

DUNCAN's *Bay*, in *Geography*, a bay on the N. coaſt of the iſland of Jamaica. N. lat. 18° 31'. W. long. 77° 31'.

DUNCANNON, a fort in the county of Wexford, near the entrance of Waterford harbour, and 20 miles ſouth from New Roſs. It is at preſent uſed as a barrack.

DUNCANSBOROUGH, a townſhip of America, in Orleans county, Vermont, on the weſt ſide of lake Memphremagog, containing 50 inhabitants.

DUNCANSBY HEAD, a cape of Scotland, at the N.E. extremity of Great Britain, in the county of Caithneſs. N. lat. 58° 33'. E. long. 0° 19'.

DUNCARD's BOTTOM, a tract of fine lands in America, on the E. ſide of Cheat river, in Virginia, about 22 miles from its mouth, and 49 W.S.W. from fort Cumberland.

DUNCHURCH. See DIMCHURCH.

DUNCOMBE, WILLIAM, in *Biography*, was born in London in the year 1690. After the uſual ſchool education, he was entered at the age of ſixteen as a clerk in the navy office. His taſte for polite literature was firſt known to the public by the appearance of a tranſlation of an Ode of Horace. He next publiſhed a verſion of the "Carmen Seculare," which was ſoon followed by one of "Racine's Athaliah." In 1725, he quitted the navy-office, and devoted himſelf wholly to a life of literary leiſure. In the following year, he married the ſiſter of Mr. Hughes, the poet, and ſpent the remainder of a long life in virtuous and innocent purſuits, and in friendly intercourſe with ſome of the moſt reſpectable characters, among whom were the earl of Cork and archbiſhop Herring. He died in 1769. His principal works were the tragedy of "Brutus" altered from Voltaire: and with the aſſiſtance of his ſon, an entire verſion of Horace, with notes, in two volumes, but which came out in 1764 in four volumes, 12mo. Biog. Brit.

DUNCOMBE, JOHN, ſon of the preceding, was born in 1729; and at the age of ſixteen entered himſelf at Corpus Chriſti College, Cambridge, where he was diſtinguiſhed by the regularity of his conduct, and by his great proficiency in polite literature. He became fellow of his college, and afterwards took orders, and obtained valuable preferments in the church. He was a good poet, and was the author of many pieces which have appeared in the collections of Dodſley, Pearch, and Nichols, and ſome in a ſeparate form. Of theſe the beſt known is "The Feminead," a commemoration of feminine excellence. He furniſhed papers and eſſays, in a variety of periodical publications. He publiſhed three Sermons, and ſome antiquarian papers in the Bibliotheca Topographica, and was editor of "Sir Hugh's Correſpondence;" "The earl of Cork's Letters from Italy;" and "Archbiſhop Herring's Letters." He died in 1788. Biog. Brit.

DUNDALK, in *Geography*, a market and poſt town of the county of Louth, in Ireland. It is a large ancient and thriving town, with a wide ſtreet, nearly a mile long, and a good market houſe. It is alſo the county town. In the reign of Edward II. it was, for a ſhort time, the reſidence of Edward Bruce, who was there crowned king of Ireland. It is advantageouſly ſituated for an extenſive inland trade; and the port is very ſafe for ſhipping. The only cambrick manufacture in Ireland is carried on in this town. It returns one member to the Imperial parliament. Dundalk is on the great northern road, 40½ miles N. of Dublin. Long. 6° 23' W. Lat. 53° 59' N.

DUNDAS, a county of Upper Canada, bounded on the E. by the county of Stormont, on the S. by the river St. Lawrence, and on the W. by the eaſternmoſt boundary line of the late townſhip of Edwardſburgh, running N. 24° until it interſects the Ottawa, or Grand river; thence deſcending that river till it meets the north-weſternmoſt boundary of the county of Stormont. This county comprehends all the iſlands near it in the river St. Lawrence. The boundaries were ſettled by proclamation July the 26th, 1792. It ſends one repreſentative to the provincial parliament. Morſe.

DUNDEE, a town in the county of Forfar or Angus, ſituated on the north bank of the Tay, not far from its confluence with the German ocean. The town of Dundee is well built, and, like moſt other Scotch towns, chiefly of freeſtone; it alſo contains ſome handſome public buildings. The etymology of its name has been ſaid to be taken from the Latin words *donum Dei*, an appellation ſaid to have been given by a brother of William I. of Scotland to a church which he erected here upon his return from a cruſade. But this ſeems at leaſt very doubtful, for the Roman names of many towns in Britain, occupied by their legions, while in poſſeſſion of the iſland, terminate in *dunum*, and to this day, whether derived from this ſource or not, the ſyllable *dun*, with which ſo many of the names of the Scottiſh towns commence, means in the Gaelic a fort, caſtle, or town. The diſtinction between theſe, in rude times, was probably not much attended to, as all the towns, during the prevalence of the feudal ſyſtem, were more or leſs fortified. The caſtle of Dunglaſs in Dumbartonſhire, which is generally ſuppoſed to have formed the laſt Roman poſt at the weſtern extremity of the wall of Adrian, ſignifies the *grey caſtle*, and from analogy it is not unreaſonable to ſuppoſe that the fort, town, or caſtle of the Tay, may have been the original meaning of the word Dundee, more eſpecially as the letter D is generally ſounded by the Highlanders, as well as the Germans, like that which the Engliſh give to the letter T. Indeed one of the Roman names of this town is ſaid to have been Tawdunum.

The harbour of Dundee is very good, and capable of containing a great number of veſſels, and a conſiderable tonnage belongs to the town. But Dundee cannot properly be conſidered, either at preſent, or likely to become, an extenſive commercial place. Although the ſituation of the Tay is favourable for the trade of the Baltic and northern part of Europe, it is by no means ſo for that of America, or the Weſt Indies. Beſides this, it has few articles of manufacture to export, excepting ſail-cloth and the coarſe linens, known by the name of Oſnaburghs, and theſe articles are manufactured in the very countries to which it is moſt contiguous. Many of the Oſnaburghs manufactured in Dundee are indeed exported to the Weſt Indies for the purpoſe of cloathing the negroes; but theſe, inſtead of being directly ſent, are generally ſold to the merchants of London, Liverpool, and Glaſgow, who are more immediately intereſted in ſupplying theſe colonies.

Hence the ſhips which have traded from Dundee to the Baltic, have been generally ſent for the purpoſe of importing flax and hemp for the uſe of their manufacture, and as the country produces nothing which ſhe can export in exchange for thoſe articles, the ſhips have moſt commonly been cleared out in ballaſt, and the returning cargoes paid for by bills on London. A conſiderable number of veſſels, however, are employed in the coaſting trade, and five or ſix ſhips are annually diſpatched to the Greenland whale fiſhery. The ſalmon fiſhery in the river Tay forms a conſiderable trade to Dundee. Theſe fiſh were formerly caught by the hauling net, or *ſeine*, conſiderably farther up the river, and nearer to the town of Perth than Dundee, but they are now intercepted in their paſſage up by large nets fixed to ſtakes in convenient ſituations, and ſent to London packed in ice, excepting in very hot weather, when they are pickled to preſerve them.

It has been already ſtated, that the chief manufacture of Dundee conſiſts of coarſe linen goods, as ſail-cloth, Oſnaburghs, and pack ſheet for cotton wool, and other purpoſes. The ſail cloth made at Dundee is chiefly ſold by government contracts for the ſupply of the navy, thoſe for the merchant ſervice being moſtly made in England. Hence this branch of their trade has flouriſhed chiefly in time of war, and during long intervals of peace has frequently experienced a total ſtagnation. The Oſnaburghs are a ſpecies of coarſe linen manufactured in imitation of thoſe made in Germany, and this trade is encouraged, and indeed ſupported by government, partly by heavy duties on the German linens imported into the Britiſh colonies, but chiefly by a bounty of three halfpence *per* yard. As the cloth, which is about 25 inches broad, does not exceed ſixpence *per* yard, average value, the bounty may be eſtimated from 25 to 30 *per cent. ad valorem.*

How far ſuch a premium may be right, or wrong, cannot be diſcuſſed in this article, and, indeed, it cannot be decided by any power, except the legiſlature of the united kingdom.

The ſoil between Dundee and Perth, known by the name of the Carſe, or Kerſe, of Gowrie, has always been eſteemed the moſt fertile in Scotland. The remarks of an intelligent correſpondent will convey an idea of that recent improvement, which fortunately prevails every where in this iſland. "Agriculture has improved, in a prodigious degree, within theſe few years, in this neighbourhood. Heavy wheat-crops are now raiſed upon ſoils, and in ſituations which our forefathers thought ſcarcely fit for any thing. Conſiderable quantities of wheat and barley are now ſent, coaſt-ways, to England. Rents, as the leaſes expire, are doubled, or trebled."

The town of Dundee is governed by a provoſt, baillies, and council, like the other royal boroughs in Scotland, and, in conjunction with Forfar, St. Andrew's, Cupar (of Fife), and Perth, returns a member to parliament. The preſent member for the boroughs is ſir David Wedderburn, and for the county of Forfar is the Hon. William Maule of Paumu, brother to the earl of Dalhouſie.

The population of Dundee, taken under the authority of the act of 1801, is eſtimated at 22,500.

Dundee formerly gave the title of viſcount to the unfortunate and accompliſhed nobleman who fell at the battle of Killecrankie, in 1689. Since his death the title has not been revived.

DUNDIVER, in *Ornithology*, the name of a water-fowl, eſteemed a diſtinct ſpecies of bird, not only by the vulgar, but by the generality of authors; but ſuppoſed by others to be the female merganſer, or gooſander, a ſpecies of the *Mergus*; which ſee.

DUNDRUM, in *Geography*, a village of the county of Down, province of Ulſter, Ireland, that gives name to a very extenſive bay, which is, however, ſhallow and acceſſible only to ſmall veſſels. The outer bay abounds with ſea-trouts and lobſters, and other ſpecies of white and ſhell fiſh, which afford employment to a number of boats. Dundrum is a ſmall pleaſant village, proſpering by this fiſhery. Above the village are the ruins of an old caſtle, once a ſtrong hold of conſiderable importance. It is 68 miles north from Dublin.

DUNDUKOVA, a ſettlement of Ruſſian Siberia, in the government of Tobolſk; 300 miles N.N.E. of Turuchanſk. N. lat. 70° 16′. E. long. 95° 14°.

DUNES, a ſmall town of France, in the department of Lot and Garonne; three miles from the Gironne, between the rivers Giers and Baiſe.

DUNFANAGHY, a ſmall poſt-town in the county of Donegal, province of Ulſter, Ireland. It is not far from the promontory of Hornhead; 133 miles N.W. from Dublin.

DUNFERMLINE, a town in the weſtern part of Fifeſhire, and formerly a place where the parliament of Scotland occaſionally met, previous to the union. The town of Dunfermline is pleaſantly ſituated on the ridge of a hill, and many parts of it command an extenſive view of the frith of Forth. The paſſage from Edinburgh, and the eaſtern diſtrict of Scotland, is the Queen's-Ferry, from which it is about ſix miles diſtant. The town of Queen's-Ferry is ſituated on the ſouthern bank of the Forth, and on the Fifeſhire ſide is a ſmall village, called the North Queen's-Ferry, chiefly inhabited by ferry-men, who ply between the two ſhores, which are much frequented, being the moſt ready acceſs between the northern and ſouthern diſtricts of Scotland upon the eaſtern coaſt. The ſhores of the Forth preſent the appearance of two bold promontories, at the Queen's-Ferry, and the paſſage is about two miles, although the Forth is much broader farther up, oppoſite to the ſea-port town of Borrowſtoneſs, and even at Grange-mouth, where the great canal connecting the Forth and Clyde begins, and terminates at Bowling bay, in the county of Dumbarton. The narrow paſſage at the Queen's-Ferry occaſions a conſiderable current, by the flux and reflux of the tide, which is increaſed by a ſmall iſland, called Inch-Garvie, ſituated in the middle of the channel. Upon this iſland are the ruins of an ancient caſtle, and it has been lately fortified, and batteries of cannon have been placed upon it, as a defence for the upper part of the Forth. The fares for the paſſage at the Queen's-Ferry are regulated by the magiſtrates, like thoſe of the watermen upon the Thames.

Dunfermline was anciently a reſidence of the kings of Scotland. The abbey church is ſtill preſerved in ſuch order, as to ſerve for a place of public worſhip. The palace has been long in ruins; and a few years ago a part of it fell, by which ſeveral horſes, ſtalled in a ſtable built contiguous to the wall of the palace, were killed, but fortunately, as it occurred during the night, no other accident happened.

The church and palace are ſaid to have been built by Malcon Canmore.

The county of Fife, contiguous to Dunfermline, is generally fertile, the ſoil being a rich clay; and the agriculture has rapidly improved of late. Coals are found in great abundance in the immediate vicinity. Of theſe, the works of ſir John Henderſon, of Fordell, bart. are, perhaps, the moſt extenſive. A very curious colliery has lately been executed by ſir Robert Preſton, of Valley-field, bart. The mine is ſituated on a ſmall iſland in the Forth, near the village of Torryburn, about four miles weſt from Dunfermline. The iſland was frequently covered by the tide at high water; but ſir Robert, having formed an embankment, at an immenſe expence, and erected a ſteam-engine to draw the water, actually ſucceeded in ſinking a pit and procuring coal. The ſituation of the iſland certainly affords every conveniency for loading coal, but the quality is ſaid not to be equal to that of many of the neighbouring proprietors. The coal trade here is a matter of conſiderable importance, as many of the northern parts of Scotland, where coal has not been found, are ſupplied either from hence, or from Newcaſtle-upon-Tyne.

The country is alſo plentifully ſupplied with lime, from the works of the earl of Elgin, at Charleſtown, and other lime-works. A conſiderable quantity of lime is alſo carried coaſt-ways, to ſupply the north-eaſt coaſt of Scotland, from Charleſtown.

The chief manufacture at Dunfermline is that of table-linen, although many weavers are alſo employed in the cotton-manufacture. The latter are chiefly employed by the manufacturers of Glaſgow; though that city, by the way of Sterling, is about 50 miles diſtant from Dunfermline.

The damaſk and diaper manufactures have proved very productive ſources of wealth to this town, and the numerous villas, with which its environs are adorned, afford a pleaſing proof of the ſkill of its artizans, and the ſucceſs of their employers.

Dunfermline, like the other royal burghs of Scotland, is governed by a provoſt, magiſtrates, and town-council, and returns a member to parliament, in conjunction with Sterling, Culroſs, Inverkeithing, and the Queen's-Ferry. The election for theſe boroughs has of late been frequently very hotly conteſted. The preſent member is major-general Campbell, of Mouzie. The member for the county of Fife is lieutenant-general Wemyſs, of Wemyſs caſtle.

Not far from Dunfermline are the extenſive diſtilleries of Kennet-Pans and Kilbagie, which are ſaid to pay an annual exciſe duty of not leſs than half a million ſterling.

The population, under the act of 1801, is taken at 5192.

The title of earl of Dunfermline periſhed in the attainder, ſubſequent to the rebellion in 1715, and has ſince been extinct.

DUNG, in *Agriculture*, &c. All kinds of dung contain ſome matter, which, when mixed with the ſoil, ferments therein, and, by that fermentation, diſſolves the texture of the earth, and divides and crumbles its particles very much. This is the real uſe of dung in agriculture; for, as to the pure earthy part of it, the quantity is ſo very ſmall, that after a perfect putrefaction, it bears an extremely inconſiderable proportion to that of the earth it is intended to manure.

The fermenting quality of dung has been ſuppoſed to be principally owing to the ſalt it contains; and yet thoſe, or any other ſalts, applied immediately to the roots of plants, always deſtroy them. This proves that the buſineſs of the dung is not to nouriſh, but to divide and ſeparate the terreſtrial matter, which is to afford the nouriſhment to vegetables through the mouths of their roots. And the acrimony of the ſalts of dung is ſo great, that the niceſt managers of vegetables we have, the floriſts, have wholly baniſhed the uſe of it from their gardens. The uſe of dung ſhould be alſo forbid in kitchen-gardens; for it is poſſible to ſucceed full as well without it; and it gives an ill taſte to all the roots and plants that are to ſtand in the earth, in which it is an ingredient. The water of a cabbage raiſed in a garden manured with dung, if boiled, is of an intolerable ſtink; but this is not ſo much owing to the nature of the plant, as of the manure uſed to it; for a field cabbage being boiled, the water has ſcarce any ſmell, and what it has, is not diſagreeable.

It is alſo a well-known fact in the country, that a carrot raiſed in a garden has nothing of that ſweet flavour, that ſuch as grow in the fields have; but inſtead of this natural reliſh, the garden one has a compound taſte, in which the matter of the manure has no ſmall ſhare. And there is the ſame ſort of difference in the taſte of all roots nouriſhed with ſuch different diet. Dung not only ſpoils the flavour of the eſculent vegetables, but it ſpoils the drinkables into the original compoſition of which it enters: they are obliged to uſe dung to the poor vineyards of Languedoc; and the conſequence is, that the wine is nauſeous. The poor, who only raiſe a few vines for the wine they drink themſelves, and cannot be at the expence of this manure, have the leſs of it, but then it is better, by many degrees, than the other; and it is a general obſervation, which the French expreſs in theſe words, that the poor people's wine in Languedoc is the beſt, becauſe they carry no dung into their vineyards. (Tull's Horſehoeing Huſbandry, p. 20.) Another diſadvantage attending the uſe of dung is, that it gives riſe to worms. It is for this reaſon, that garden carrots are generally worm-eaten, and field carrots ſound; and the ſame obſervation will hold good in other vegetables, in the field and in the garden. Vegetable and animal dung are, in fact, only the putrefaction of earth, after it has been altered, by paſſing through vegetable or animal veſſels. Vegetable dung, unleſs the vegetable be buried alive in the ſoil, makes a much leſs ferment in it than animal dung does: but the dung, or putrid matter of vegetables, is much more eligible and wholeſome for the eſculent roots and plants than that of animals is. Venomous animals are found to be very fond of dung, and are brought into gardens by the ſmell of the dung uſed in them as manure. The ſnakes uſually frequent dung-hills, and lay their eggs in them; and gardens, where dung is much uſed, are always frequented by toads; whereas the fields where roots are planted, are much leſs infeſted by them.

However unneceſſary and prejudicial dung is in gardens, it is, however, very neceſſary in the corn-fields; and little can be done without it in the old method of huſbandry. Dung is not ſo injurious in fields as in gardens, becauſe it is uſed in much ſmaller quantities in proportion to the quantity of ſoil; and cabbages, turnips, potatoes, and other things growing in fields, and intended only for the food of cattle, will not be injured by dung, tillage, and hoeing all together; for the crops will by this means be the greater, and the cattle will like the food never the worſe. Dung is very beneficial in giving very large crops of wheat; and it is found by experience, that the country farmer, at a diſtance from a large town, can never have ſo good crops by all his tillage, as thoſe who live in the neighbourhood of cities, where dung is produced in great plenty, and eaſily had. The dung uſed in fields, beſides its diſſolving and dividing virtue, is of great uſe in the warmth its fermenting gives to the young plants of the corn in their weakeſt ſtate, and in the moſt ſevere ſeaſons; the laſting of this ferment is not eaſily determined, becauſe the degrees of heat are very difficult to be judged of when they become ſmall.

The farmers uſually underſtand by the term dung, not only the excrements of animals, with the litter, but every thing that will ferment with the earth; ſuch as the green ſtalks and leaves of plants buried under ground, and the like, and every thing they add to it, except fire.

The uſes of the dungs of ſeveral animals are ſufficiently proved every day. They are uſed to repair the decays of exhauſted and worn-out land, and to cure the ſeveral defects

fects in different natural bad ſoils; the faults of which are as different as the nature of the different dungs uſed to improve them. Some land is too cold, moiſt, and heavy; and the other too light, and dry; and to improve and meliorate theſe, we have ſome dung hot, and light, as ſheep's, horſe's, pigeon's, &c. and other fat and cooling, as that of oxen, hogs, &c. There are two remarkable qualities in dung; the one is to produce a ſenſible heat, capable of bringing about great efforts; the other is to fatten the ſoil, and render it more fertile. The firſt of theſe is ſeldom found in any but the dung of horſes or mules; the great effects of which, when newly made, and a little moiſt, are ſeen in the kitchen-garden, where it invigorates, and gives a new life to every thing, ſupplying the place of the ſun; and to this, in a great degree, we owe all the vegetable delicacies of the ſpring. Beſides, horſe dung is the richeſt of all improvements that can be had in any quantity for poor hungry lands; yet, when either too new, or when uſed alone, it is very prejudicial to ſome lands; and if ſpread too thin on dry lands in ſummer, it becomes of very little ſervice; the ſun ſoon exhaling all its riches, and leaving it little more than a heap of ſtubble or dry thatch. Horſe dung is always beſt for cold lands, and cow dung for hot ones; but being mixed together, they make a very good manure for moſt ſorts of ſoils, and for ſome they are very properly mixed with mud.

Sheep's dung, and deer's dung, differ very little in their quality, and are eſteemed by ſome the beſt of all dung for cold clays; for this purpoſe ſome recommend the beating them to powder, and ſpreading them thin over the autumn or ſpring crops, at about four or five loads to an acre, after the ſame manner as aſhes, malt-duſt, &c. are ſtrewed. And in Flanders, and ſome other places, they houſe their ſheep at night in places ſpread with clean ſand, laid about five or ſix inches thick, which being laid on freſh every night, is cleared out once a week, and with the dung and urine of the ſheep, is a very rich manure, and ſells at a very conſiderable price. It is principally uſed for ſtubborn lands; but Mr. Quinteny is of opinion, that it is the beſt of all manure for land in general.

Hog's dung is by many recommended as the fatteſt and richeſt of all dung; and is found, by experience, to be better than any other kind for fruit trees, apples, pears, and the like. It is alſo a very rich dung for graſs, and is ſaid to do as much good in one load, as any other dung whatever in two.

The dung of pigeons, hens, and geeſe, are great improvers of meadow and corn land. That of pigeons is unqueſtionably the richeſt that can be laid on corn land; but before it is uſed, it ought to be expoſed for ſome time out of the dove-houſe to the open air, to take off its fiery heat. It is in general very proper for cold clay lands; but then it always ſhould be well dried before it is laid on, becauſe it is apt to clod in the wet. It is beſt alſo to mix it with ſome dry earth, to break its parts that it may be ſpread the more regularly; and it is in itſelf ſo very rich and hot, as to bear ſuch an admixture without greatly impoveriſhing it. This dung is alſo by ſome recommended as better than any other for aſparagus and ſtrawberries, and for the propagation and culture of the tender garden-flowers. The dung of pigeons is alſo particularly recommended by M. Gentil for thoſe trees whoſe leaves are apt to turn yellow, if they grow in cold ſoils; but for this uſe, it ſhould firſt lie three years in a dung-hill, and then be applied ſparingly in autumn, laying about an inch thickneſs of it at the root of the tree, and ſuffering it to remain there till the March following.

The dung of poultry being hot, and full of ſalts, tends much to facilitate vegetation, and is abundantly quicker in its operation than the dung of animals which feed on the leaves of plants. It is an obſervation of ſir Hugh Plat, that one load of grains will enrich ground more than ten loads of common dung; and it is eaſy to infer from hence, that the ſame grain muſt needs be of greatly more virtue, when it has paſſed through an animal body. Human dung is alſo a great improver of all cold and ſour lands, but ſucceeds beſt when mixt with other dungs or earths, to give it a fermentation.

But for all ſtubborn clayey ſoils, there is no manure ſo good as the cleanſing of London ſtreets; the parts of tough land will be more expeditiouſly ſeparated by this than by any other compoſt; and where it is to be had, it is of the greateſt value both for field and garden land. Miller's Gard. Dict.

Dung *Drag*, is a ſort of crooked fork with only two lines or teeth, which is often employed in ſetting out dung in heaps, upon land for drawing out of the cart.

Dung, *Gooſe*. This is a very valuable manure, and as uſeful to the farmer as pigeon's dung, or that of any other fowl. The ancients thought otherwiſe, and condemned it as prejudicial both to corn and graſs; and many are of the ſame opinion ſtill, but without any foundation in fact. Indeed, where corn is high, and when graſs is ready to be mown, theſe birds, if they get among it, will do great damage, by treading it down with their broad feet; but their dung, inſtead of being hurtful to the land, does it great ſervice. Near Sutton, in Nottinghamſhire, there is a barren piece of land given by the town for a gooſe-paſture; the geeſe have been kept in it many years, and their dung has ſo enriched it, that it is one of the moſt fruitful pieces of ground in the whole county. There has been an opinion alſo, that cattle feeding on graſs, where theſe creatures had much dunged the ground, would ſuffer by it; but it appears from trial, that cattle are moſt fond of all of thoſe parts of paſtures where the geeſe have dunged moſt, and that they ſuffer no alteration by it, except the growing fat upon it. The dung of fowls in general is very enriching to land; and Fowley Iſland, in Lancaſhire, a place ſo called from the abundance of wild fowl continually found on it, is ſo enriched with their dung, that it fattens ſheep in a ſurpriſing manner. See Compost and Manuring.

Dung-*meers*, or *dung-hills*, in *Huſbandry*, places where ſoils and dungs are mixed and digeſted together. For this purpoſe, it is uſual to dig a pit ſufficient to hold the ſtock of ſoil the huſbandman is capable of making, and to prepare it at the bottom with ſtone and clay, that it may hold the water and moiſture of the dung; and it ſhould be ſo ſituated that the drips of houſes or barns may run into it. Into this pit they caſt refuſe fodder, litter, dung, weeds, &c., where they lie and rot together till the farmer has occaſion for it. Where ſuch a pit is wanting, it is neceſſary to cover the dung with turf, or other ſtuff, to prevent the ſun and wind from drawing off its virtues. Compoſt dung-hills, which are formed by a mixture of earth with dung, lime, and other manure, are made with leaſt expence on the field for which they are intended.

Dung-*worms*, a ſpecies of fly-worms, of a ſhort and ſomewhat flat body, found in great plenty among the cow-dung in the months of September and October. Theſe have all their metamorphoſes into the fly ſtate performed within a ſhell of their own ſkin.

The fly produced from this worm is one of Reaumur's firſt claſs of the two-winged flies; it has a trunk with lips, and has no teeth; it is of the claſs of thoſe with the ellipſoid bodies; but its body is remarkable long for one of thoſe, and is compoſed of ſix rings: its head is very round, and nearly of a ſpherical form, and is large in proportion to its body; it has antennæ of the lenticular or battledore form; its reticular eyes are of a deep cheſnut brown, and its three ſmall eyes are placed in the common manner. Its corſelet is of a fine gilded green; and its back is not eaſily to be deſcribed as to colour, for it is changeable, and ſeems compoſed of a violet colour, and of a deeper and a paler copper colour. The under part, or belly, is of a pale yellow, and the legs and balancers of a yet paler yellow. Reaumur's Hiſt Inſects, vol. iv. p. 350.

DUNGA, in *Ancient Geography*, a town of India, aſſigned by Ptolemy to the Ariaces Sadinorum.

DUNGALA. See Dongola.

DUNGANNON, a market and poſt-town of the county of Tyrone, province of Ulſter, Ireland. It is an ancient borough, and has a barrack for a troop of horſe. It was formerly the chief ſeat of the O'Neils, kings of Ulſter, and was accordingly the ſcene of many warlike tranſactions, being repeatedly diſmantled and repaired. At a later period, it was made remarkable by the aſſembly of the Ulſter delegates from the volunteers in 1782. This body correſponded with the duke of Richmond, lord Effingham, Dr. Price, and other friends of parliamentary reform, and in conſequence of the reſolutions they entered into, and the diſcuſſion thus occaſioned, a meeting of delegates, from every part of Ireland, met in Dublin, and brought the meaſure before parliament, but without ſucceſs. Dungannon has a good linen market, and in its neighbourhood are good collieries, from which is a canal to the Blackwater. Dungannon is 73 miles N. by W. from Dublin, and 10 weſt from Armagh. Beaufort Wilſon's Directory.

DUNGARVAN, a market, poſt, and ſea-port town of the county of Waterford, in the province of Munſter, Ireland. This is an old town, the ſtreets of which are narrow and dirty, but it is pleaſantly ſituated, the ſea flowing up to the old walls. On the north ſide is a quay, ſufficiently capacious for the loading and diſcharging of ſmall veſſels. Forty or fifty coaſting boats belong to this place, which are principally employed in the fiſhery, which is one of the moſt extenſive in the kingdom. The inhabitants are celebrated as excellent curers of hake. The duke of Devonſhire, who, as heir of the oldeſt branch of the Boyle family, is the chief proprietor, is taking meaſures to improve it, by building ſeveral new houſes; and a bridge is alſo to be built over the arm of the ſea, which ſeparates it from the part of the country towards the city of Waterford, and which has hitherto been croſſed by a ferry, or, at low water, by a ford. Here are a good market and ſeſſion-houſe, and a barrack for two companies, ſituated within the walls of an ancient caſtle, now in ruins, which was built by king John, and afterwards repaired and poſſeſſed by the Deſmond family. There are ruins of an Auguſtinian priory on the other ſide of the water, oppoſite to the town. Dungarvan is much frequented in the ſummer ſeaſon for the purpoſe of ſea bathing. It is a borough which returns a member to the imperial parliament, and is 100 miles S. by W. from Dublin. Long. 7° 39′ W. Lat. 52° 5′ N.

DUNGENESS Point, a cape in the eaſtern entrance of the ſtraits of Magellan. S. lat. 52° 28′. W. long. 68° 28′.

Dungeness, a cape of England, on the coaſt of Kent, in the Engliſh channel. N. lat. 50° 52′ 20″. E. long. 0° 50′ 45″.

DUNGEON, Donjon, in *Fortification*, the higheſt rampart of a caſtle built after the ancient mode, ſerving as a watch-tower, or place of obſervation; and alſo for the retreat of a garriſon, in caſe of neceſſity, ſo that they may capitulate with greater advantage.

The word comes from the French *donjon*, which ſignifies the ſame, and which Faucet derives from *domicilium*, becauſe the dungeon, being the ſtrongeſt part of the caſtle, was uſually the lord's apartment. Menage derives it from *dominione*, or *dominionus*, which in ſome ancient writings we find uſed in the ſame ſenſe. Du Cange derives the appellation from *duno aut colle ædificatum*, *dun* in Celtic denoting hill, which the barbarous writers have altered into *dunjo*, *dungeo*, *dongio*, *dangio*, *domgio*, and *domnio*.

In ſome caſtles, as that of Vincennes, &c. the donjon ſerves as a priſon for perſons they would have the moſt ſecurely kept; whence the general uſe of our word dungeon for a dark cloſe priſon under ground.

DUNGING, in *Dyeing*. See Rinsing.

DUNGIVEN, in *Geography*, is a market and poſt town in the county of Londonderry, province of Ulſter, Ireland, on the road from Armagh to Londonderry, at the foot of the Cairntogher mountains; 99 miles N. by W. from Dublin, and 16 from Londonderry.

DUNGLO, in the county of Donegal, province of Ulſter, Ireland, is a ſmall village on the weſtern coaſt oppoſite to the iſle of Arran, which is of no ſmall relative importance on account of its ſituation. It is on an arm of the ſea, and is the place from which the inhabitants of the iſlands are ſupplied with all neceſſaries. It has a pariſh church, a mill, &c. It is 135 miles N. W. from Dublin, and 36 W. from Lifford.

DUNI, Egidio Rimualdo, in *Biography*, a natural, graceful, and facile Italian compoſer, long ſettled in France. He was one of the firſt who a little reconciled the French to Italian melody at the comic opera, by applying it to French words, previous to the arrival and ſubſequent feuds concerning the merit of Gluck and Piccini.

Duni was born near Ottranto, in the kingdom of Naples, 1709: his father was a maeſtro di cappella, and had ſix ſons and three daughters. At nine years old he was ſent, much againſt his will, to a conſervatrio at Naples, where he ſtudied under the celebrated Durante.

It will appear, in the article Pergolesi, that Duni engaged at Rome to compoſe the opera of Nero, had great ſucceſs, while the Olimpiade of Pergoleſi was almoſt hiſſed. This ſucceſs by no means flattered the vanity of the young Duni, who, aſhamed of his victory, ſaid to Pergoleſi: "O my friend! *neſciunt qui faciunt!*"

Intruſted with an intereſting negociation at Vienna, by cardinal C...., Duni availed himſelf of this opportunity of diſplaying his talents, and acquired ſome reputation there. On his return to Naples, he was nominated by the king maeſtro di cappella to the church of St. Nicolo di Bari. Some years after his return to Naples he compoſed an opera for S. Carlo, which had great ſucceſs. He compoſed one likewiſe for Venice, and went again to Paris in 1733 to ſeek relief for perpetual palpitation, with which he was tormented; when he became ſo pleaſed with France, that he reſolved to ſpend there the reſt of his days; he however went into England to compoſe ſome operas requeſted of him, (rather ſongs, we never heard of his operas in England,) but he was in ſo bad a ſtate of health, that the Engliſh phyſicians adviſed him to go to Holland, in order to conſult Boerhaave.

The new regimen which he preſcribed to him was to ride every day, and in a few years he found himſelf quite recovered; but, ſoon after, he was in ſo perilous a ſituation that he loſt his health for ever.

Having returned to Italy to viſit his mother, whom he tenderly loved, he was attacked by robbers near Milan, and upon the point of being murdered. The revolution in his health, occaſioned by this fright, renewed the hæmorrhage to which he was ſubject, and the conſtant ſuffering with which he was afflicted to the end of his days.

While marſhal Richelereu commanded at Genoa, Duni, in ſpite of his ſufferings, compoſed an opera, which was ſo fortunate as to pleaſe the French, Italians, and Spaniards, who engaged him to compoſe another, which was equally ſucceſsful. This good fortune occaſioned his being noticed by the infant, Don Philip, who carried him to Parma, and appointed him muſic-maſter to princeſs Elizabeth, his daughter, firſt wife of the emperor Joſeph. It was at Parma that he firſt compoſed to French words, and he ſucceeded ſo well there that they ſent him, from Paris, the comic opera "Le Peintre Amoureux" to ſet.

The education of the princeſs being finiſhed, he obtained leave to go to Paris, and retired thither on a penſion, where he was preſent at the ſucceſsful performance of his drama, "The Amorous Painter," in 1757, which finally determined him to remain in France.

He reſided at Paris till 1775, when a malignant fever bereaved his wife and ſon of a kind huſband and affectionate father.

Duni compoſed for the theatre Italian at Paris, beſides "The Amorous Painter," in 1757; "The Irreſolute Widow," in 1758; "La Fille Malgardéc," in 1759; "Nina & Lindor," in 1761, and "L'Iſle des Foux;" in 1762, "Le Milicien;" in 1763, "Les Chaſſeurs & La Laitiere," "Le Rendezvous;" in 1765, "L'Ecoli de la Jeuniſſe," "La Fée Urgelle;" in 1766, "La Clochette;" in 1768, "Les Moiſonnuers, les Sabots;" in 1770, "Thémize;" and, the ſame year, "L'Heureuſe Eſpiéglerie." All theſe had a certain degree of ſucceſs, and many of them remained ſeveral years in favour. Laborde.

DUNIUM, in *Ancient Geography*, a town of Britain, belonging to the Durotriges, ſuppoſed by Camden to have ſtood where Dorchester now ſtands. Mr. Baxter places it on the ſummit of an adjacent hill, where are a ditch and bulwarks, now called Maiden caſtle; while Mr. Horſley thinks it was ſituated at Eggerton hill.

DUNK, in *Geography*, an iſland on the N.E. coaſt of New Holland, which forms a boundary of Rockingham bay, and lies ſo near the ſhore as not to be eaſily diſtinguiſhed from it. S. lat. 17° 20′. E. long. 145° 30′.

DUNKARD'S Town. See Ephrata.

DUNKELD, a ſmall town in the county of Perth, Scotland, has been a place of great note in the annals of Scottiſh hiſtory, and is now noted for the ſalubrity of its climate, and the pictureſque features of the neighbourhood. The latter have been greatly improved by the numerous plantations raiſed by the duke of Athol, who has a ſeat in the town. This town is ſaid to have been the capital of ancient Caledonia; and about the dawn of Chriſtianity, a Pictiſh king made it the ſeat of religion, by eſtabliſhing a monaſtery of Culdees. This was converted by king David I., A. D. 1130, into a biſhopric, and was then ranked the firſt in Scotland. The cathedral, though formerly a large handſome building, is much dilapidated; but its choir is uſed as the pariſh church. It was erected in 1350 by biſhop Sinclair, whoſe corpſe was interred within its walls. On the north ſide of the choir is the chapter-houſe, built by biſhop Lauder in 1469; the vault of which is now uſed for interment of the Athol family. At the weſt end of the north aiſle is a very elegant tower, which has a crack from top to bottom, nearly two inches wide.

The poet Gray viſited this place in 1766, and has given an intereſting deſcription of the ſcenery, &c. in a letter to the earl of Oxford. (See his works publiſhed by Maſon.) In the town are two tan-yards, two diſtilleries, and four linen manufactories. Dunkeld is 15 miles N.W. of Perth, and contains 1016 inhabitants. It is ſeated on the north ſide of the river Tay, the banks of which are bold, rocky, and romantic. Near the duke's ſeat is a fine caſcade, called the *Rumbling brigg*, which falls about 150 feet. Sinclair's Statiſtical Account of Scotland.

DUNKELSPUHL. See Dinkelsbuhl.

DUNKERS, or Tunkers, in *Eccleſiaſtical Hiſtory*, a religious ſect at Ephrata or Dunker-town, near Lancaſter, in Pennſylvania, which took their riſe about the year 1719, and conſiſting moſtly of Germans. They ſprung from about 20 families, who in that year landed in Philadelphia, and diſperſed themſelves through various parts of Pennſylvania. They are of the denomination, called General Baptiſts, and maintain the doctrine of general redemption. Beſides the congregation at Ephrata, there were, in 1770, 14 others in various parts of Pennſylvania, and ſome in Maryland. The whole number, excluſively of the latter, amounted to upwards of 2000 perſons. Their name is ſaid to be derived from their mode of baptizing new converts, which is by dipping, after the manner of the Baptiſts. Others ſay, the appellation of *Tunkers* is derived from *tunken*, to put a morſel in ſauce, and was firſt applied to this ſect by way of deriſion. Their habit is a kind of long coat or tunic, made of linen, for the ſummer, and woollen for the winter, reaching down to the heels, with a ſaſh or girdle round the waiſt; and a cap, or hood, hanging from the ſhoulders, reſembling the dreſs of the Dominican friars. The men ſhave neither the head nor beard. The men and women have diſtinct habitations and governments: they have for this purpoſe erected two wooden buildings; in each of which there is a banqueting-room, and an apartment for public worſhip; ſo that they never meet together even at their devotions. They live chiefly on roots and vegetables, and eat no fleſh, except on occaſion of their love-feaſts, when the brethren and ſiſters dine together. The Dunkers allow of no intercourſe between the brethren and ſiſters, not even by marriage; a regulation not very favourable to their ſubſiſtence and increaſe: and if any break through this reſtraint, and marry, they are removed from communion with the unmarried, to a place about a mile diſtant, called Mount Sion. The principal tenet is ſaid to be, that future happineſs is only to be obtained by penance and mortification in this life; and that, as Jeſus Chriſt, by his meritorious ſufferings, became the Redeemer of mankind in general, ſo each individual of the human race, by a life of abſtinence and reſtraint, may work out his own ſalvation.

DUNKESFIELD, in *Geography*, a ſmall town of the kingdom of Wirtemberg, on the river Wernitz; 45 miles S.W. of Nuremberg; with a thriving manufacture of woollen cloth and hardware.

DUNKIRK, or Dunquerque, in Flemiſh and Engliſh *Dunkirk*, in Latin *Dunikerka*, *Dunkerka*, *Dunekerca*, in German *Dunkirch*, a conſiderable maritime town of France, in the department of the North, chief place of a canton, in the diſtrict of Bergues; 18 miles N.E. of Gravelines, 30 miles N.E. of Calais, 27 miles S.W. of Oſtend, and 227 miles, or 316 kiliometres, N. of Paris. E. long. 2° 7′. N. lat. 51° 2′ 4″. The temperature of Dunkirk, on a mean of 10 years, as given by Pere la Cotte (Meteorol. p. 360.), was 54° 9′. It was originally a hamlet of a few fiſhermen's huts: but a church having been built, as it is ſaid, by St. Eloi, who firſt preached Chriſtianity among the inhabitants of Flanders, on the Sand-hills, Dunes, Downs, in its neighbourhood, the place increaſed and derived its name from the ſituation of its church, Dunkirk, the church on the Downs.

In the tenth century, Baldwin earl of Flanders ſurrounded Dunkirk with a wall. Being commodiouſly ſituated for trade, it engaged in a profitable commerce, which ſoon enabled it to build even ſhips of war. In the twelfth century, Dunkirk fitted out a ſmall fleet againſt the Norman pirates, who infeſted the Channel and the North ſea: the ſervices which this fleet rendered were conſidered ſo important, that Philip earl of Flanders granted the town ſeveral privileges.

In the thirteenth century, Dunkirk was ſold to Godfrey of Condé, biſhop of Cambray, who enlarged the town and improved the harbour. His heirs reſtored Dunkirk, in the year 1288, to Guy earl of Flanders; whoſe ſon, Robert de Béthune, diſmembered it from the earldom of Flanders, and in the year 1320, conferred it as a particular lordſhip on his ſon Robert de Caſſel. The latter built, in 1322, a caſtle for the defence of the town; but this caſtle was afterwards demoliſhed, during a rebellion of the Flemiſh people. In the year 1343, Jolanda, daughter of Robert de Caſſel, brought Dunkirk as her marriage portion to her huſband, Henry IV. count of Bar. It devolved, in 1395, to her couſin, Robert of Bar, earl of Marle, who, in the year 1400, raiſed round the town a ſtrong wall; the remains of which are reported to be ſtill traced on the ſide next the harbour.

In 1435, Dunkirk came by marriage from the houſe of Bar to that of Luxembourg; and in 1487, from the latter to the houſe of Bourbon, on the marriage of Mary of Luxembourg with Francis of Bourbon, count of Vendôme. But Dunkirk being only a fief, the ſovereignty of which belonged to the houſe of Auſtria, the emperor Charles V. erected a ſtrong caſtle, in the year 1538, for the defence of the harbour.

The French, under marſhal de Thermes, took Dunkirk by ſtorm in 1558; but it was ſoon retaken by the Spaniards. At the peace of Cateau-Cambréſis, Anthony of Bourbon, king of Navarre, couſin and heir to Mary of Luxembourg, obtained Dunkirk, and ſome other places, as a fief, of Philip II. king of Spain and earl of Flanders. The town was rebuilt, and improved in wealth, chiefly by fitting out privateers againſt the Dutch. The fortifications of the harbour were ſtrengthened, 15 ſhips of war built, and a canal of communication opened with the town of Bergues.

This ſtate of proſperity ſuffered, however, ſome interruption, from frequent diſturbances in the Netherlands. In 1646, Dunkirk was beſieged and taken by the French, under the prince of Condé. In 1652, it was retaken by the archduke Leopold, governor of the Netherlands.

In 1655, the alliance of England and France induced the inhabitants of Dunkirk to fit out privateers againſt both theſe powers: but the French, aſſiſted by Cromwell, attacked and took Dunkirk, which was put into the hands of the Engliſh, to recompenſe them for the loſs of 250 ſhips, that had been carried into Dunkirk by its privateers during the war.

The Engliſh immediately improved the fortifications of Dunkirk, and ſtrengthened it by the addition of a citadel; but they did not keep poſſeſſion of it above four years.

In 1662, Charles II. of England, two years after his unexpected reſtoration to the throne of his father, not conſidering the value of ſuch an acquiſition to his country, or unable to judge of its importance, ſold Dunkirk to France for the paltry ſum of five millions of French livres, or about 209,000*l.* ſterling. On the 29th of November, 1662, the comte d'Eſtrades, in the name of Louis XIV., took poſſeſſion of the town, and of the villages in its diſtrict, *viz.* Mardyk, Great and Little Saintes, Arenbont's Chapel, Coudekerk, Teteghem, Uxem, Ghyveld, Leſſerinchouke, and Zuytcote.

Under the ſuperintendance of the celebrated Vauban, Dunkirk was rendered an almoſt impregnable fortreſs. The harbour was improved with two jetties, and defended by two caſtles, le Chateau Verd and le Château de bonne Eſpérance. Other fortifications were ſucceſſively added. In 1689, the fort called Cornichon, or Batterie de Revers, and ſome other works, were finiſhed; and in 1701, the whole was completed by the erection of fort Blanc. Every ſhip that entered the harbour had to paſs between theſe forts; and at the entrance of the baſon was a ſluice of 45 feet in width, that the ſhips within might conſtantly be afloat.

Thus protected and ſtrengthened, Dunkirk enjoyed again a moſt flouriſhing trade. In 1706, it contained 1639 houſes, and 14,274 inhabitants. During the war which terminated in the peace of Utrecht, its privateers took 1614 Engliſh prizes, valued at 1,334,375*l.* ſterling. This loſs was of ſuch a magnitude, that England would not conſent to enter into any treaty with France, unleſs it ſhould contain, as one of its principal ſtipulations, that the fortifications, harbour, baſon, ſluices, and canal of Dunkirk were to be immediately deſtroyed, demoliſhed, and filled up, at the expence of France; and that the latter power ſhould ſolemnly engage never to attempt the repairing of thoſe works. In conſequence of this declaration, a clauſe to this effect was inſerted in one of the articles of the treaty of Utrecht, which was ſigned on the 28th of April, 1713.

But the demolition of the forts and harbour of Dunkirk did not take place before the month of September, 1713, when two Engliſh commiſſaries, colonels Armſtrong and Clayton, were ſent from England to Dunkirk, to watch over the execution of the treaty. They witneſſed the deſtruction of the fortifications, the levelling of the jetties with the ſtrand, the filling up of the harbour and canal, and the building of a large dam or bar acroſs the entrance of the baſon. Yet all this was no ſooner accompliſhed, than Louis XIV. conſtructed a new canal at Mardyk, by which the harbour was rendered nearly as commodious as it had been before.

However, in the year 1717, France was once more compelled, by a treaty concluded at the Hague between England, Holland, and France, to render the new canal of Mardyk unſerviceable; and it was expreſsly ſtipulated, that no harbour, ſluice, or baſon, ſhould ever be made either at Mardyk or Dunkirk, or within two French leagues round the town. But in 1720, a violent ſtorm, during which the ſea broke up the bar built acroſs the old harbour, reſtored its uſe in ſome degree. This advantage was improved upon by Louis XV. in the year 1740, whilſt England was engaged in a war with Spain. The jetties were rebuilt, and new forts erected in the place of thoſe which had been deſtroyed in 1713.

In the mean time, Louis XV. joined the Spaniards; and at the concluſion of the war with England, it was for the third time agreed upon, in the treaty of Aix la Chapelle, ſigned in 1748, that all the works near Dunkirk towards the ſea ſhould be deſtroyed. France, however, not only never completed this demolition, but even commenced ſome new works under-hand, notwithſtanding the repeated remonſtrances of the Engliſh court. At the beginning of the ſeven years' war, Dunkirk was in as good a ſtate of defence towards the ſea as it had been at any time during the war, which was concluded by the treaty of Aix la Chapelle.

The ſame ſtipulations were renewed at the peace of Paris, in 1762, but with no better effect. The trade of Dunkirk continued to flouriſh: its principal commerce, during the interval of peace from 1762 till the beginning of the American war, was with England, Ireland, and Scotland, Spain, Portugal, Sweden, Holland, and Denmark. In 1766, Dunkirk had 46 ſhips, or a tonnage of 2300 tons in the herring fiſhery. In 1767, it had in all 170 merchant veſſels, manned by 2348 ſailors; and beſides its own veſſels, there entered the harbour of Dunkirk,

	228	French ſhips
	176	Engliſh
	115	Dutch
	34	Swediſh and Daniſh
	21	Spaniſh
	8	Hambro' veſſels, and
	300	Smugglers
In all	882	Veſſels.

And during the American war, it fitted out ſeveral privateers. Before the French revolution of 1789, Dunkirk had alſo five ſhips in the ſlave trade. It is the native city of the famous Jean Bart.

In the year 1801, or rather during the ſhort ſuſpenſion of hoſtilities which took place between England and France, in conſequence of the peace of Amiens, Dunkirk had 20 ſhips in the trade with America and the French colonies. In ancient times, it had been in alliance with the Hanſeatic towns, and its commerce in French wines and brandies was always conſiderable. It has been rated at 12,328 hogſheads of wine, and 8580 pipes of brandy annually. From the year 1170 till 1794, or, more exactly, till the ſeventh Ventoſe of the third year of the French republic, Dunkirk had been a free port.

The road of Dunkirk lies at the diſtance of 1½ mile northwards of the town, within the Brak, a ſand-bank which extends parallel to the ſhore near 5 miles in length, and has from three fathoms to one foot of water at low water. There is a ſafe anchorage about three-fourths of a mile N.N.E. from the jetty, in ſix or eight fathoms of good clay ground, mixed with ſand. The tide at Dunkirk riſes 12 feet.

Dunkirk is one of the ſix maritime diſtricts into which all France is divided. It ſuperintends all the ports and coaſts of the Channel and North ſea, from the laſt Dutch port to Dunkirk included. As chief place of this maritime diſtrict, Dunkirk has a maritime prefect, who ſuperintends the maritime quarters of Antwerp, Malines, Bruſſels, Gand, l'Ecluſe, le Sas de Gand, Oſtend, Bruges, and Nieuport; each of which has its ſubdiviſions, called ſyndicates.

With reſpect to the temperature of Dunkirk, its greateſt heat commonly is 23° 2′, the leaſt 6° 6′; medium 8° 7′. The higheſt elevation of the mercury in the barometer is 28 inches 8.3 lines, the loweſt 27 inches 1.4 lines; medium 28 inches 1.1 line. There are annually 126 rainy days, and the prevailing wind is the ſouth-eaſt wind.

The whole population of Dunkirk amounts to 21,158 individuals: but the town is divided into two parts, Eaſt and Weſt, each of which is a ſeparate canton; the former having 9792 inhabitants, and compriſing 6 communes, with a population of 13,761 individuals; the latter having 11,366 inhabitants, and containing 5 communes, with a population of 13,742 individuals. The two cantons together have a territorial extent of 155 kiliometres.

Conſidered as a town, there is nothing particularly remarkable at Dunkirk, excepting the quay, the principal ſtreet, the roperies, and the ſailors' barracks. The houſes have only one or two ſtories; the lower claſſes live in cellars, which opening into the ſtreet, are rather a nuiſance: however, it is aſſerted, that theſe vaults are not unhealthy, being dug in a very dry ſand.

The principal manufactures of Dunkirk are thoſe of tobacco, ſtarch, glaſs, and leather, beſides ſeveral rope-walks, diſtilleries, and ſugar-houſes. Herbin. Statiſtique de la France.

DUNKIRK, a poſt-town of America, in King and Queen county, Virginia; 116 miles from Waſhington.

DUNLAVIN, a market town of the county of Wicklow, Ireland, on the road from Bleaſington to Timolin, in which are a good inn, a handſome market-houſe, &c. It is 10 miles S. from Naas, and about 22 S. by W. from Dublin.

DUNLEER, a market and poſt-town of the county of Louth, Ireland, on the great northern road from Dublin. It is 30 miles N. from Dublin, and 7 from Drogheda.

DUNLIN, in *Ornithology*, the Engliſh name of the SCOLOPAX *puſilla*; which ſee.

DUNLOPE, in *Geography*, a fort of America, on the weſt bank of little Miama river, about 12 miles above Columbia, in the ſtate of Ohio.

DUNLUCE, on the northern coaſt of Ireland, in the county of Antrim, is the ruins of an old caſtle, formerly belonging to the Antrim family, near Buſhmills. The only paſſage into the caſtle lies along the top of a narrow wall, built in the form of a rude arch, from the main land to the rock on which the caſtle ſtands; an approach to which is attended with much terror to perſons of weak nerves. Underneath is a curious cave in the rock. It is 120 miles N.W. from Dublin.

DUNMANUS-BAY, a bay of the Atlantic, on the ſouth-weſt coaſt of Ireland, in the county of Cork. It is about 14 miles in length, and from one to three broad, and is ſeparated from Bantry bay by a narrow mountainous diſtrict which terminates in the promontory of *Sheep's head.* This is a ſafe harbour, but is one of the many on the weſtern coaſt which have yet been applied to no uſe. At preſent there does not appear to be even a fiſhing village on its ſhores. W. long. 9° 40′. N. lat. 51° 30′, at its mouth.

DUNMANWAY, a town of Ireland, in the county of Cork. It is a cheerful thriving town, where ſir Richard Cox, formerly lord chancellor of Ireland, eſtabliſhed the linen manufacture. It is on the Bandon river; and the country from it to Bandon is a fine well-improved vale, conſiſting of a light gravelly ſoil. The country on every other ſide is rocky. Dunmanway is 151 miles S.W. from Dublin, and 27 miles W. from Cork, on the road to Bantry.

DUNMORE, a ſmall poſt-town in the northern part of the county of Galway, Ireland, which contains 86 houſes, a market-houſe, and a pariſh church, built on the ſite of an old abbey. Near it is Dunmore caſtle, a large venerable ruin, pleaſantly ſituated on the banks of the river Dunmore. It is 91 miles W. from Dublin, and 7 miles from Tuam. Wilſon's Directory.

DUNMORE-*Bay*, a bay of the Atlantic, on the weſt coaſt of Ireland, in the county of Clare. It is not a good harbour, but is frequented for ſea-bathing. W. long. 9° 35′. N. lat. 52° 44′.

DUNMORE-*Head*, a cape on the weſt coaſt of Ireland, in the county of Kerry. W. long. 10° 20′. N. lat. 52° 6′.

DUNMOW, GREAT, a market-town and pariſh in the hundred of Dunmow, in the county of Eſſex, England, is ſituated on an eminence near the river Chelmer, and conſiſts principally of two ſtreets. The town is of great antiquity, and is ſuppoſed to have been the ſite of the Roman ſtation *Cæſaromagus;* which opinion has originated from the diſcovery of various Roman coins in the town and its vicinity, and alſo by its ſituation on a Roman road to Colcheſter. The pariſh is very extenſive, comprehending ſeven manors. The church, dedicated to the Virgin Mary, is a large ancient ſtructure, conſiſting of a nave, chancel, and aiſles, with an embattled tower at the weſt end. Over the entrance into the latter are various ſhields of arms, carved in ſtone; among which are thoſe of the noble families of Mortimer, Bohun, Bourchier, and Braybrooke, who are ſuppoſed to have contributed towards the erection or repairs of the edifice. Dunmow was incorporated under a charter granted in the reign of Philip and Mary, and afterwards confirmed by Elizabeth. The government is veſted in a bailiff and twelve burgeſſes. The number of houſes, in the return of 1801, was 392; of inhabitants, 1828. The poorer claſſes derive their chief employment from the manufacture of baize and blankets. Dunmow is 37 miles N.E. from London; has a weekly market on Saturdays (by grant from Henry III. A D. 1253); and two annual fairs.

Dunmow, *Little*, a village about two miles diſtant from Great Dunmow, in the ſame hundred, is noted for an ancient priory of Auguſtine canons, and alſo for a ſingular cuſtom or tenure annexed to the manor. The priory was founded in the year 1104, by lady Juga, ſiſter of Ralph Baynard, who held the manor at the time of the Domeſday ſurvey; and from whoſe family Baynard's caſtle in London obtained its name. On the ſuppreſſion, Henry VIII. granted the ſite of the priory, and the manor to Robert earl of Suſſex. The monaſtic buildings were ſituated on a riſing ground, ſouth-weſt of the church, but are now entirely razed; and ſome part of the ſite is occupied by the preſent manor houſe. Under an arch in the ſouth wall of the preſent church is an ancient tomb, ſuppoſed to contain the body of the foundreſs, lady Juga. Near this ſpot are ſome well executed monuments of the Fitz Walters, by whom this lordſhip was poſſeſſed for eleven generations. To one of this family is attributed the well known cuſtom of giving a *flitch of bacon* to any married couple, who had not repented of their marriage for a year and a day. The earlieſt delivery of the bacon on record was in the 23d of Henry VI.; two other inſtances occurred previous to the ſuppreſſion of religious houſes; and three times it has been delivered ſince that period. The laſt perſons who received it were John Shakeſhanks, woolcomber of Wethersfield, and Anne his wife, who eſtabliſhed their right on the 20th of June, 1751. Morant's Hiſtory of Eſſex, 2 vols. folio.

DUNNAGE, in *Sea Language*, a quantity of faggots, boughs of trees, or other looſe wood, laid in the bottom of a ſhip, either to raiſe the heavy goods which might make her too ſtiff, or to keep the cargo ſufficiently above the bottom, that it may receive no damage from the water, if the ſhip ſhould prove leaky.

DUNNET, in *Geography*, a town of Scotland, in the county of Caithneſs, ſituated on the eaſt ſide of a bay to which it gives name. The number of inhabitants, in 1791, was about 1400. The bay affords excellent flounders and haddocks, and is ſometimes frequented by ſhoals of herrings in July and Auguſt; 5 miles E. of Thurſo. N. lat. 58° 32′. Long. 0° 1′ W. of Edinburgh.

Dunnet *Head*, a cape on the north coaſt of Scotland, and county of Caithneſs. It conſiſts of ſeveral hills, with ſome bold rocks towards the ſea, from 100 to 400 feet in height; 3½ miles N. of Dunnet.

DUNNOSE, a cape or promontory on the S.E. coaſt of the Iſle of Wight, in the Engliſh channel; about 17 leagues W. from Beachy-head. N. lat. 50° 33′. W. long. 1° 14′.

DUNOIS, John D'Orleans, *Count of*, in *Biography*, the natural ſon of Louis duke of Orleans, was born in 1403. His father being aſſaſſinated by the duke of Burgundy, his ducheſs declared that he alone of the ſons of the duke was capable of avenging his death. He was from an early age a youth of high martial ſpirit, and of great ſervice to his country. When France was almoſt reduced to the ſtate of conqueſt by England, he began to change its fortune by a victory in 1427, of which the conſequence was raiſing the ſiege of Montargis. He afterwards threw himſelf into the city of Orleans, which he defended with ſo much valour and intrepidity, when it was beſieged by the duke of Bedford, that he even reſolved, rather than ſurrender, to ſet fire to the city, and make his way through the enemy. At this critical moment appeared the celebrated Joan of Arc, by whoſe means the ſiege was raiſed. Dunois directed with prudence the enthuſiaſm which ſhe inſpired; and after her unhappy death, rendered the handſomeſt teſtimony to her memory. After this he atchieved many glorious deeds for his country; and from the title of "Baſtard of Orleans," by which he had been known, he was permitted to take the title of count de Dunois. In addition to this, the king, ſenſible of the obligations he was under to him, cauſed him to be legitimated, and to be entitled "The Reſtorer of his Country;" and, to maintain his rank, lands were preſented him, and the office of great chamberlain was beſtowed. In the following reign, Dunois joined the inſurrection called the "League for the public Good;" and was afterwards placed at the head of thirty-ſix notables, appointed to reform the ſtate. He died in 1468. Moreri. Hiſt. of France.

DUNRODUNUM, in *Ancient Geography*, a town ſituated in the northern part of the iſle of Albion, and belonging to the Carnovaces.

DUNROSSNESS, in *Geography*, a town of Scotland, ſituated in the ſouthern part of the iſle of Shetland; 28 miles S. of Lerwick.

DUNS, in *Antiquities*, are the remains of a peculiar kind of buildings, which abound in the northern parts of Scotland, and in the Orkney and Shetland iſles; though not excluſively ſo, as it has been generally ſtated. They are of two kinds: the firſt, which are moſt prominent in their appearance, are circular caſtles, ſuch as the caſtles of Moura and Glenbeg, in the ſhire of Inverneſs; or circular pyramids, like the ſpires of Brechin and Abernethy. Theſe towers, which generally ſtand upon ſome eminence, vary as to their internal ſtructure, but bear a great ſimilarity in their external appearance; though ſome of them have additional works of defence. Thus the burg of Moura was ſurrounded by a wall, which now forms round it an heap of ſtones. Others are guarded by foſſæ, both wet and dry ditches of conſiderable magnitude. The ſecond kind conſiſts of numerous ſubterraneous buildings, either entirely under ground, or nearly ſo: in the latter caſe, they exhibit the external appearance of numerous tumuli, or what in the highlands are called *Here-cairns, i. e.* long burrows. Some of them are much larger than others; and a dun of this kind conſiſts of ſtrong circular walls without cement, ſurrounding a large oval area, which appears to have been divided into ſeveral diviſions, leaving a large internal ſpace in the centre, round which the other apartments ranged. The incumbent roof of earth appears to have been ſupported by one or more wooden columns, with croſs beams, reſting upon the walls. The interior ſpace was probably the dwelling, while the ſurrounding rooms ſerved for the purpoſe of laying up proviſions, and other neceſſary ſtores. The hillock over the upper flooring was raiſed to keep the habitation dry; and with the ſame view, many of them were ſurrounded with a deep ditch, over which the entrance was made

made by a ridge of earth, left unexcavated; and in ſome inſtances, flanked by two dry walls.

They are not confined to one particular part, but are found in the lowlands, as well as the highlands; in the interior parts of the country, as well as in the iſles. Nor are they peculiar to Scotland. Specimens of both kinds exiſt in Ireland, Wales, and Cornwall; a fact which certainly goes far towards demonſtrating their Celtic origin. Although it has been confidently aſſerted, that "they are confined to the countries once ſubject to the crown of Norway," and out of our own kingdom, obſerves a Scottiſh writer, no buildings ſimilar to theſe are to be found, except in Scandinavia. On the mountain Swalburg in Norway is one, the Stirbiſkop at Upſal in Sweden is another, and Umeſborg in the ſame kingdom is another.

The names, fabricators, and deſignation of theſe ſingular buildings have equally claimed the attention of antiquaries. They are called in the Orkneys *burgs*, or *brughs*, evidently a Saxon term for a fortification. On the main land, they have divers appellations, as *caſteil*, *howie*, Celtic terms for cavernous fortreſſes; and *Picts houſes*, as the ſuppoſed habitations of that ancient people. The general term, *duns*, is from *dun* or *din*, a Celtic word, ſimply ſignifying ſmall hills, or fortified mounds of earth; and here applied to deſignate the ſhape of the ſmaller, and ſituation of the larger kind. When the highlanders in the ſhire of Inverneſs are aſked to whom they belonged? the conſtant anſwer is, that they were the houſes of the *Drinnich* or *Trinnich*, the Gaelic name for *labourers;* a term which they invariably apply to the Picts.

By ſome writers they have had a Daniſh or Norwegian origin aſſigned to them. Ware and Ledwich, in treating of Iriſh antiquities, contend for their Daniſh origin; and Dr. Borlaſe, in treating of *Caſtell Chun*, in the pariſh of Morvah, is of opinion, that ſuch kind of buildings muſt be attributed to the Danes. But this mode of denomination is directly contrary to the analogy of tradition: for not only in Scotland, but in England, it is almoſt univerſally found, that the works of an early age are not uſually attributed to the people to whom of right they belong, but ſucceſſively to the different bodies of victorious armies, who have occaſionally figured on the page of hiſtory. Thus it has been common for tradition, and thoſe hiſtorians who implicitly believe, without having made previous inquiry, to deſcribe camps as Daniſh or Saxon, which originally were the fortified heights of Britons; and ſubſequently, the ſtrong holds occupied by the Roman legions. But ſetting aſide the fabulous ſtory of Kenneth Macalpin, which has been the foundation of much unprofitable controverſy, it would be very difficult to counteract the force of arguments, adduced by the learned and profound adept in the ſchool of antiquarian reſearch, whoſe name alone is itſelf an hoſt, the late erudite Mr. King; one of which is, "They are to be ſeen in parts of the kingdom, where the Danes never penetrated." And that he might not make an aſſertion without advancing proof, which has been hapleſs too common a caſe in this national contention, he refers to what is called *Black caſtle*, in the Pariſh of Mouline, Perthſhire; to one of theſe buildings in the hill of Drummin; and to ſeveral others in different parts of the Glen Lion; which ſhew how numerous theſe ſtructures were in what was denominated the country of the Picts. Mr. Chalmers, in his hiſtory of Caledonia, obſerves, that many of theſe edifices "in the Orkney and Shetland iſlands, and in Caithneſs, have been erroneouſly called Pictiſh caſtles, Pictiſh towers, and Picts houſes, from a fabulous ſtory which attributes to Kenneth Macalpin the impolicy of driving many of the Picts into the northern extremity of our iſland; whence they fled to the Orkney and Shetland iſles." But the learned author himſelf does away the force of this reaſon for the denomination, by ſtating in another part of his work, that "it was aſſerted by ignorance, and believed by credulity, that Kenneth made ſo bad an uſe of the power which he had adroitly acquired, as to deſtroy the whole Pictiſh people in the wantonneſs of his cruelty." Caled. p. 333. And he is confident enough to infer, from conſimilarity in the appearance of many of theſe buildings with others, which have generally been attributed to the northern nations, that their origin muſt be acknowledged Scandinavian. And in addition, he urges, that "not one of theſe *ſtrengths* bears any appellation from the Pictiſh or Britiſh language; and that they have no ſimilarity to any of the *ſtrengths* of the genuine Picts, or Britiſh tribes of North Britain." Ibid. p. 343, 344.

For their *Scandinavian* origin, there is a degree of feaſibility; becauſe, from the accounts given by travellers of undoubted intelligence and veracity, it appears that, even at the preſent period, the houſes of the Icelanders, allowed to be the leaſt unmingled Gothic colony, exhibit a ſtriking reſemblance to theſe buildings. But the ground on which Mr. King reſts his judgment, and with a much greater degree of probability, is, that "the Pictiſh buildings, or thoſe ſo called, reſemble the Britiſh remains in Cornwall and South Wales." And the writer of this article has ſeen a variety of remains of circular buildings, of a ſimilar deſcription, in different parts of North Wales, particularly in Caernarvonſhire, of the origin of which the inhabitants are almoſt traditionally unacquainted. They are in ſome places called "round-abouts," and in others "Arthur's round tables;" *Buarth caedeu*, *Buarth Arthur*, &c.

It is a curious circumſtance attached to theſe monuments of antiquity, that they have been made the criterion of ſyſtematic inquiries diametrically oppoſite. While Mr. King and Mr. Chalmers lay down the ſame general principle, as a powerful argument of the Celtic derivation of the Picts; it is ſingular that the one ſhould attempt to prove they are of Celtic, and the other as ſtrenuouſly contend that they are of Scandinavian origin. Upon a review of the arguments adduced by both, the hypotheſis of Mr. King appears to ſtand the beſt ſupported, from ſimilar ſtructures acknowledged the retreats of the ancient inhabitants of the iſland, from the etymons of their names, and from the traditions and comparative hiſtory of the country.

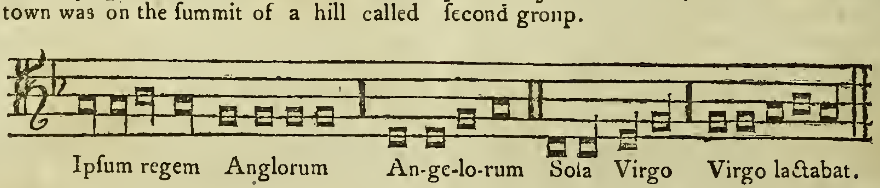
Of their deſignation and uſe equally different opinions have been advanced. Of the firſt kind, or circular buildings, which appear above ground, no doubt can be entertained. They were evidently *watch towers*, and occaſional fortreſſes for defenſive warfare. Of the ſecond ſort, a latitude is afforded for variance in judgment. Theſe have been conſidered as fortified receſſes. But reaſoning from analogy, they are evidently the remains of the *hybernacula*, or winter habitations of the aboriginal inhabitants; who, principally employed with their flocks on the hills, or cultivating the open fields in the plains, during the ſummer months, there erected their æſtival tabernacles; and when the ungenial ſeaſon arrived, they retired with their ingatherings to their brumal habitations. Thus, like the other Britiſh tribes, they had their *hucfodlys* and *gafen*, their ſummer and winter reſidences; and ſimilarity of cuſtoms is a powerful argument for affinity of origin. See Pennant's Tour in Scotland. Statiſtical Account of the Highlands. King's Munimenta Antiqua. Chalmers's Hiſtory of Caledonia.

DUNS, JOHN, commonly called *Duns Scotus*, in *Biography*, one of the ſcholaſtics who flouriſhed about the cloſe of the 13th and commencement of the 14th centuries. He was born, probably, at Dunſtance, near Alnwick in Northumberland. In his youth he was admitted to an inſtitution belonging to the Franciſcan friars at Newcaſtle, and ſent by them to complete his education at Merton college in the univerſity of Oxford, where he became a fellow, and diſtinguiſhed himſelf by his proficiency in ſcholaſtic theology, civil and canon law, logic, metaphyſics, mathematics, and aſtronomy. About the year 1301, he occupied the chair of theology in this univerſity; and his fame drew together a great number of ſcholars to attend upon his lectures. About the year 1304, he was admitted to the higheſt honours in the univerſity of Paris, whither he was ſent by his ſuperiors; and appointed profeſſor and regent in the theological ſchool. Having in this ſituation acquired ſingular reputation by his ſubtlety in diſputation, he was denominated "the moſt ſubtle doctor;" but his ingenuity was principally diſplayed in embarraſſing, with chimerical abſtraction and puzzling diſtinctions, ſubjects already ſufficiently perplexed. Thus, inſtead of promoting the knowledge of important and uſeful truth, he applied his talents and learning to purpoſes that were injurious to rational inveſtigation and inquiry. In the commencement of his literary career, he was a follower of Thomas Aquinas; but differing from this "angelical doctor," in his opinion concerning the efficacy of divine grace, he formed a diſtinct ſect; and hence proceeded the two denominations of *Thomiſts* and *Scotiſts*, which ſee. Duns Scotus was a zealous advocate for the immaculate conception of the Virgin Mary; a notion which ſome ſay was firſt propounded by him; and which, however, was ſtrenuouſly maintained by him and his ſect, in conjunction with the Franciſcans, and as vehemently oppoſed by the Thomiſts and the Dominicans. In the year 1308, Duns Scotus was deputed by the fraternity of Minors, of which he was a member, to teach theology at Cologne; where he was received with great pomp and ſanguine expectations; but a ſudden death, probably by an apoplexy, diſappointed the views and hopes of his adherents. This event took place, as ſome ſay, in the 43d, but according to others, in the 34th year of his age. But the preciſe time both of his birth and death has not been aſcertained. His works in dialectics and ſcholaſtic theology are numerous; moſt of them were printed ſeparately, and the moſt complete collection of the whole, together with the life of the author, was publiſhed by Lucas Waddingus, at Lyons, in 1639, in 12 vols. folio. Cave's Hiſt. Lit. vol. ii. ſub. ſæc. Wicklev. Moſh. Eccl. Hiſt. ſæc. 14. Brucker's Hiſt. Phil. Enfield, vol. ii. p. 379. See SCHOLASTICS and SCOTISTS.

DUNSE, in *Geography*, a conſiderable town and pariſh in the county of Berwick, Scotland; is encompaſſed on the weſt, north, and eaſt by the Lammermuir hills, a plain of twenty-five miles extent lying towards the ſouth. The ancient ſite of the town was on the ſummit of a hill called Dunſe-Law, which riſes, from a baſe of about two miles and a half in circumference, to an elevation of 630 feet above the level of the ſea. The town was afterwards rebuilt at the foot of the hill. About half a mile diſtant is Dunſe-caſtle, a large, venerable building, commanding an extenſive proſpect ſouthward as far as the Cheviot hills, and ſurrounded by ſeveral hundred acres of thriving plantations; it is now the family reſidence of Hay of Drummelzier. In the year 1747 the celebrated mineral well, called Dunſe-ſpa, was diſcovered; it affords a ſtrong chalybeate water, ſimilar to that of Tunbridge in England. In the vicinity is an extenſive bleach-field, a tan-yard, and a very conſiderable woollen manufactory. The population of the town is about 2400; it has a weekly market; and four annual fairs, chiefly for horſes, ſheep, and black cattle. The pariſh extends eight miles in length and five in width: improvements in agriculture proceed here with great rapidity. The river Whittader, which riſes in Lammermuir, runs through the pariſh, and contains excellent ſalmon. Cockburn Law is a uſeful land mark for ſhips navigating the German ocean, as it riſes 900 feet above the ſea. On this hill are the ruins of a very ancient ſtructure called Woden's or Eden's Hall. The celebrated theologiſt and metaphyſician Johannes Duns Scotus, as ſome ſay, was born in Dunſe A.D. 1274. The houſe in which he was born is ſaid ſtill to remain. Sinclair's Statiſtical account of Scotland.

DUNSKERRY, a ſmall iſland near the north coaſt of Scotland; 4 miles E.S.E. of Farout Head.

DUNSTABLE, JOHN, in *Biography*, an Engliſh muſician, who at an early ſtage of counterpoint, acquired on the continent the reputation of being its inventor. He was the muſician whom the Germans, from a ſimilarity of name, have miſtaken for ſaint Dunſtan, and to whom, as erroneouſly, they have joined iſſue with others in aſcribing to him the invention of counterpoint in four parts. He was author of the muſical treatiſe "De Menſurabili Muſicâ," which is cited by Franchinus, Morley, and Ravenſcroft. But though this work is loſt, there is ſtill extant in the Bodleian library, a Geographical Tract by this author; and, if we may believe his epitaph, which is preſerved by Weaver, he was not only a muſician, but a mathematician, and an eminent aſtrologer. Of his muſical compoſitions nothing remains but two or three fragments in Franchinus, and Morley. He is very unjuſtly accuſed by this laſt writer of ſeparating the ſyllables of the ſame word by *reſts*. But I believe maſter Morley was ſo eager to make a wretched pun on the name of Dunſtable, that he did not ſufficiently conſider the paſſages which he cenſured; the errors in which ſeem to be only thoſe of the tranſcriber or printer: for the laſt ſyllable of Angelorum belongs to the laſt note of the firſt muſical phraſe, *before* the reſts, and not to the firſt note of the ſecond group.



The words and ſyllables in this manner fall on the right notes.

Dunſtable ſeems to have acquired a great reputation on the continent; for he is not only cited by Franchinus, but John Tinctor, a writer ſomewhat more ancient, who gives to the Engliſh the invention of the new art of counterpoint, and places John Dunſtable at their head. Speaking of counterpoint he ſays, "Cujus ut ita dicam novæ artis fons et origo, apud Anglos, quorum Caput Dunſtable exiſtit fuiſſe perhibetur." It was in a MS. Latin tract, in the poſſeſſion of Padre Martini, that I ſaw this curious paſſage, which probably has done us ſome credit with thoſe who have believed and tranſcribed it; but he could not have been the inventor of that art concerning which ſeveral treatiſes were written before he was born. However this is but one proof more of what has been already remarked, that when a miſtake or a falſehood has once had admiſſion into a book, it is not eaſily eradicated; and this aſſertion concerning John of Dunſtable's invention of counterpoint, as if it were not ſufficiently falſe in itſelf, has been aggravated by the additional blunder of miſtaking his name for that of St. Dunſtan. Not only M. Marpurg, but the editors of the Supplement to the Encyclopedie, art. Contrepoint, have lately copied this error unexamined.

Dunſtable, whom Stow calls "a maſter of aſtronomie and muſic," was buried in the church of St. Stephen, Walbrook, 1458.

Dunstable, in *Geography*, a poſt town of America, in the ſtate of New Hampſhire and county of Hillſborough, on the weſt ſide of Merrimack river, below the town of Merrimack, and ſeparated by the ſtate line from Pepperel and Dunſtable in Middleſex county, Maſſachuſetts: incorporated in 1746, containing 862 inhabitants, and lying about 40 miles N.W. of Boſton.—Alſo, a townſhip of Maſſachuſetts, in the northern part of Middleſex county, on the ſouthern bank of Merrimack river; containing 485 inhabitants, and ſituated 37 miles north weſterly of Boſton.

Dunstable. See Dunstaple.

DUNSTAN, St. in *Biography*, was born of noble parents at Glaſtonbury in Somerſetſhire in the year 925. Under the patronage of his uncle Aldhelm, archbiſhop of Canterbury, he was well inſtructed in the literature and accompliſhments of thoſe times, and in conſequence of his recommendation invited by king Athelſtan to court. By his own addreſs and the intereſt of his uncle the king preſented him with ſome lands near Glaſtonbury, where he is ſaid to have ſpent ſome years in retirement. Edmund, the ſucceſſor of Athelſtan, appointed him abbot of a monaſtery, which he founded in that place. To this prince, however, he was repreſented as a man of licentious manners; and dreading the ruin of his fortune, by ſuſpicions of this nature, he determined to repair paſt indiſcretions by exchanging the extreme of ſuperſtition for that of licentiouſneſs. Accordingly he ſecluded himſelf altogether from the world; and he framed a cell ſo ſmall, that he could neither ſtand erect in it nor ſtretch out his limbs during his repoſe; and here he employed himſelf perpetually in devotion or manual labour. In this retreat his mind was probably ſomewhat deranged, and he indulged chimeras, which, believed by himſelf and announced to the credulous multitude, eſtabliſhed a character of ſanctity among the people. He is ſaid to have fancied that the devil, among the frequent viſits which he paid him, was one day more earneſt than uſual in his temptations; till Dunſtan, provoked by his importunity, ſeized him by the noſe with a pair of red-hot pincers as he put his head into the cell; and he held him there, till the malignant ſpirit made the whole neighbourhood reſound with his bellowings. The people credited and extolled this notable exploit; and it enſured to Dunſtan a degree of reputation, which no real piety, much leſs virtue, could, even in the moſt enlightened period, have ever procured for him. Supported by the character gained in his retreat, Dunſtan appeared again in the world; and gained ſuch an aſcendant over Edred, who had ſucceeded to the crown, as made him not only the director of that prince's conſcience, but his counſellor in the moſt important affairs of government. The prince, deluded by an appearance of ſanctity, which covered the moſt violent and moſt inſolent ambition, gratified him by re-building Glaſtonbury church and monaſtery in a very ſumptuous and magnificent ſtyle. He was placed at the head of the treaſury; and being poſſeſſed of power at court, and of credit with the populace, he was enabled to attempt with ſucceſs the moſt arduous enterprizes. Taking advantage of the implicit confidence repoſed in him by the king, Dunſtan imported into England a new order of monks, who, by changing the ſtate of eccleſiaſtical affairs, excited, on their firſt eſtabliſhment, the moſt violent commotions. Finding alſo that his advancement had been owing to the opinion of his auſterity, he profeſſed himſelf a partizan of the rigid monaſtic rules; and after introducing that reformation into the convents of Glaſtonbury and Abingdon, he endeavoured to render it univerſal in the kingdom. (See Celibacy.) This conduct, however, incurred the reſentment of the ſecular clergy; and theſe exaſperated the indignation of many courtiers, which had been already excited by the haughty and over-bearing demeanour which Dunſtan aſſumed. Upon the death of Edred, who had ſupported his prime miniſter and favourite in all his meaſures, and the ſubſequent ſucceſſion of Edwy, Dunſtan was accuſed of malverſation in his office and baniſhed the kingdom. But his cabal had obtained an influence over the minds of the populace which it was not eaſy to ſupplant, and during his abſence his ſanctity was extolled and ſerved to excite inſurrections againſt the government of Edwy. The moral and religious character of the king and queen was attacked, chiefly on the ground of their mutual attachment and endearment, and pretences of various kinds were directed for collecting together a great number of malcontents, who placed Edgar at their head and determined to exclude the reigning family. Edgar ſoon made himſelf maſter of the kingdom, and the death of Edwy made way for his acceſſion to the throne. As ſoon as Edgar's power was eſtabliſhed, Dunſtan was recalled and promoted firſt to the ſee of Worceſter, then to that of London; and about the year 959 to the archiepiſcopal ſee of Canterbury. For this laſt advancement it was requiſite to obtain the ſanction of the pope; and for this purpoſe Dunſtan was ſent to Rome, where he ſoon obtained the object of his wiſhes and the appointment of legate in England, with very extenſive authority. Upon his return to England, ſo abſolute was his influence over the king, he was enabled to give to the Romiſh ſee an authority and juriſdiction, of which the Engliſh clergy had been before in a conſiderable degree independent. In order the more effectually and completely to accompliſh this object, the ſecular clergy were excluded from their livings and diſgraced; and the monks were appointed to ſupply their places. The ſcandalous lives of the ſecular clergy furniſhed one plea for this meaſure, and it was not altogether groundleſs; but the principal motive was that of rendering the papal power abſolute in the Engliſh church, for, at this period, the Engliſh clergy had not yielded implicit ſubmiſſion to the pretended ſucceſſors of St. Peter, as they refuſed to comply with the decrees of the popes, which enjoined celibacy on the clergy. Dunſtan was active and perſevering, and ſupported by the authority of the crown, he conquered the ſtruggles which the country had long maintained againſt papal dominion, and gave to the monks an influence, the baneful effects of which were experienced in England until the era of the reformation. Hence Dunſtan has been highly extolled by the monks and partizans of the Romiſh church; and his character has been celebrated in a variety of ways, and particularly by the miracles, which have been wrought either by himſelf or by others in his favour. During the whole reign of Edgar, Dunſtan maintained his intereſt at court; and upon his death, in 975, his influence ſerved to raiſe his ſon Edward to the throne, in oppoſition to Ethelred. Whilſt Edward was in his minority, Dunſtan ruled with abſolute ſway both in the church and ſtate, but on the murder of the king in 979, and after the acceſſion of Ethelred, his credit and influence declined; and the contempt with which his threatenings of divine vengeance were regarded by the king are ſaid to have mortified him to ſuch a degree, that he returned to his archbiſhopric, and died of grief and vexation in the year 988. Cave's Hiſt. Lit. vol. ii. p. 102. Rapin's Hiſt. Engl. vol. i. Hume's Hiſt. vol. i.

Dunſtan is mentioned by ſeveral German writers not only as a great muſician, but as the inventor of muſic in four parts: a miſtake that has ariſen from the ſimilarity of his name with that of Dunſtable, one of the earlieſt writers on counterpoint in this country; at leaſt it is certain, that muſic in four parts was not only unknown here, but throughout Europe, in the tenth century, during which Dunſtan flouriſhed. Dunſtan died 988, aged 64. Indeed, almoſt all the Monkiſh writers thought it neceſſary to make a conjurer of this turbulent prelate. Fuller, (Church Hiſtory, 1666,) who has conſulted them all, tells us, that he was an excellent muſician, which, according to this writer, was a qualification very requiſite to eccleſiaſtical preferment; for, he informs us, that, "preaching, in thoſe days, could not be heard for ſinging in churches." However, the ſuperior knowledge of Dunſtan in muſic was numbered among his crimes; for being accuſed of magic to the king, it was urged againſt him, that he had conſtructed, by the help of the devil, (probably before he had taken him by the noſe,) a harp, that not only moved of itſelf, but played without any human aſſiſtance. With all his violence and ambition, it may be ſuppoſed, that he was a man of genius and talents; ſince it is allowed, by the leaſt monkiſh among his hiſtorians, that he was not only an excellent muſician, but a notable painter and ſtatuary, which, ſays Fuller, "were two very uſeful accompliſhments for the furtherance of ſaint-worſhip either in pictures or in ſtatues."

Indeed, it is expreſsly ſaid, in a MS. life of this prelate, (Vit. St. Dunſtan. MSS. Cott. Brit. Muſ. Fauſtin. b. xiii.) that among his ſacred ſtudies, he cultivated the arts of writing, harping, and painting. It is likewiſe upon record, that he caſt two of the bells of Abingdon abbey with his own hands. (Monaſt. Anglic. tom. i. p. 104.) And according to William of Malmeſbury, who wrote about the year 1120, the Saxons had organs in their churches before the conqueſt. He ſays, that Dunſtan, in the reign of king Edgar, gave an organ to the abbey of Malmeſbury; which, by his deſcription, very much reſembled that in preſent uſe. "Organa, ubi per æreas fiſtulas muſicis menſuris elaboratas, dudum conceptas follis vomit anxius auras." William, who was a monk of this abbey, adds, that this benefaction of Dunſtan was inſcribed in a Latin diſtich, which he quotes, on the organ-pipes. Vit. Aldhem. Whart. Ang. Sacr. ii. p. 33. Oſb. Vit. S. Dunſt.

DUNSTANG, in *Geography*, a town of Lithuania, in the palatinate of Wilna; 28 miles N. E. of Wilkomierz.

DUNSTAPLE, a market town and pariſh in the hundred of Manſhead and county of Bedford, England, is ſituated on a chalky ſoil at the entrance of the Chiltern hills, where the Roman Watling ſtreet is croſſed by the Ickneild-ſtreet. It was conſtituted a borough and market town by king Henry I. who, to defeat the depredations of robbers who infeſted that part of the country, encouraged a ſettlement here, and built a royal manſion for himſelf. The name of the town is by ſome ſuppoſed to be derived from Dun, a chief of the robbers, but is with greater probability attributed to the market or ſtaple on the downs. In the year 1131, the king beſtowed the town with all its rights and privileges on a priory of Black Canons which he had founded near his palace. The town and priory were the ſcenes of many royal viſits and ſolemnities in that and ſeveral ſucceeding reigns. In 1290 the corpſe of Eleanor, Edward I.'s queen, was depoſited here one night, which was commemorated by the erection of a croſs in the market place. This remained till 1643, when it was deſtroyed by the parliamentary forces. The priors of Dunſtaple enjoyed very conſiderable rights and liberties; having the power of life and death veſted in them. At the diſſolution in 1554 the ſite of the priory was granted to Dr. Leonard Chamberlayne; it is now the property of Col. Maddiſon. The only remains of the conventual buildings, except what is now the pariſh church, are a few rooms roofed with vaulted and groined ſtone. In the preſent pariſh church, which contains only the nave of that of the old priory, different ſtyles of architecture are diſplayed. The inſide is part of the original ſtructure. At the weſt end is a ſtone gallery, which has pointed arches; the windows are more modern. The decorations of the weſt front externally are of the early pointed ſtyle. The great weſtern door has a ſemicircular arch, richly ornamented, but is now in a mutilated ſtate. The town conſiſts of four principal ſtreets, anſwering to the cardinal points. At the ſouth end are a reſpectable charity ſchool endowed in 1712, and ſeveral alms-houſes. But few of the privileges conferred by Henry I. are now retained by the townſmen; the government is veſted in four conſtables. The chief manufacture is that of various articles, uſeful and ornamental, in ſtraw, particularly hats, which are known throughout the kingdom by the name of *Dunſtaples*, the making of which affords ſubſiſtence to a great number of women and girls. King Henry I. granted two markets, held on Sundays (no unuſual thing in ancient times) and Wedneſdays; the latter only is now in uſe, with four annual fairs. Dunſtaple is 33 miles N.W. from London; and contains, according to the returns under the late population act, 243 houſes and 1296 inhabitants. Among the natives of this town, was Elkanah Settle, well known for his dramatic and political writings, which were publiſhed towards the cloſe of the 17th century. The firſt attempt at theatrical repreſentations in this kingdom is ſuppoſed to have been made in this town.

About a mile weſt of Dunſtaple are the remains of an ancient fortification, called *Maiden Bower*. It is a circular earth-work, about 2500 feet in circumference, conſiſting of a ſingle vallum and ditch.

Two miles north-weſt of the town, on the brow of a hill, is ſituated Totternhoe-caſtle, a work of great ſtrength, conſiſting of a lofty circular mount, with a ſlight vallum round its baſe, and a larger one of an irregular form at ſome diſtance. On the ſouth-eaſt ſide is an encampment about 500 feet long and 250 wide; of which three ſides are guarded by a vallum and ditch; the fourth being on the edge of a precipice has no vallum. Lyſons's Magna Britannia, vol. i. Britton's Architectural Antiquities, vol. i.

DUNSTER, a town of England, in the county of Somerſet, having a weekly market on Friday; 20½ miles W. of Bridgewater, and 158½ W. of London.

DUNTER GOOSE, a ſpecies of the wild gooſe, found in Zeatland. Phil. Tranſ. N° 473. § 8. See *Cuthbert* DUCK.

DUNUM, BAY *of*, in *Ancient Geography*, is ſuppoſed to have been the mouth of the river Tees.

DUNWICH, in *Geography*, now a ſmall borough and market town, in the hundred of Blything, in the county of Suffolk, England, was, during part of the Anglo-Saxon dynaſty, a biſhop's ſee, in which eleven prelates preſided. In the year 955, this biſhopric was united with that of Elmhem in Norfolk, and both were ſoon afterwards transferred to Thetford, and thence, in 1088, to Norwich. Spelman ſtates, that the town at one time contained 52 churches; but he muſt certainly mean the ſee. Dunwich, at preſent, conſiſts of 42 houſes, and 184 inhabitants. It ſends two members to parliament; who are elected by a few freemen reſiding within the borough, and who do not receive alms. The corporation conſiſts of two bailiffs and 12 capital burgeſſes. In the town are the remains of an old church, which ſome antiquaries endeavour to prove was the Saxon cathedral. Here are alſo ſome remains of an ancient chapel, and a building called the palace. Here is a ſmall market on Monday, and one annual fair. See Gardner's Hiſtory of Dunwich.

DUNWICH, a townſhip of America, in the county of Suffolk, in Upper Canada, W. of Southwold, having the river Thames for its north, and lake Erie for its ſouth boundary.

DUNZ, or DUNS, JOHN, in *Biography*, painter of portraits and flowers. He was born at Berne, in Switzerland. Poſſeſſing an affluent fortune, he never painted for money; but was, nevertheleſs, indefatigable in his art. He was a great encourager of the arts and artiſts of his own time, and was much reſpected for his virtues. Died 1736. Vie des Peintres Flamands, &c.

DUO, in *Muſic*, a ſong, or compoſition, to be performed in two parts only; the one ſung, and the other played on an inſtrument; or by two voices alone. See DUET.

DUO is alſo when two voices ſing different parts, accompanied with a third, which is a thorough baſe. Uniſons and octaves are rarely to be uſed in *duos*, except at the beginning and end.

DUOBUS, *Pilulæ ex*, in *Medicine*. See PILLS.

DUOBUS, *Sal de*. See SULPHAT *of Potaſh*.

DUODENALIS, in *Anatomy*, a term applied to ſuch parts as belong to the duodenum; as the arteries, veins, &c.

DUODENUM, the firſt portion of the ſmall inteſtine which communicates at its origin with the ſtomach, through the pylorus, and is continuous, at its termination with the jejunum, or ſecond diviſion. See INTESTINE.

DUPAGE, in *Geography*, a circular lake on the S. E. ſide of Plein river in America, or rather an enlargement of that river; 5 miles from its mouth. Plein and Theakiki there form the Illinois.

DUPATY, in *Biography*, a diſtinguiſhed magiſtrate, and man of letters, was born at Rochelle, and became advocate-general to the parliament at Bourdeaux, and afterwards preſident *à mortier*. He acquired great honour by his firmneſs and eloquence at the revolution in the magiſtracy which took place in 1771, and ſucceſsfully defended three perſons of Chaumont, who had been condemned to be broken on the wheel. He publiſhed "Hiſtorical Reflections upon the Criminal Laws," which diſplay an humane and enlightened mind, and was long occupied in promoting a reform on this ſubject, contending with a zeal worthy the cauſe againſt the obſtacles, which prejudice and powerful influence threw in his way. He ſpent the latter part of his life at Paris, and made himſelf known, as a man of letters, by "Academical Diſcourſes," and "Letters on Italy." He was thought too cloſe an imitator of the manner of Diderot, by which his ſtyle did not appear to advantage. He died in 1788. Gen. Biog.

DUPHLY, a muſical profeſſor on the harpſichord, who compoſed ſome agreeable pieces in the French ſtyle of the time, (30 or 40 years ago,) which were printed in England by Walſh, and which, as well as their author at Paris, were in high favour here, and thought well calculated to form the hand. Duphly was employed by Rouſſeau in drawing up the article *Doigter*, fingering; but his method is not what would be called good now, nor did it agree with the method of Couperin, good at the beginning of the laſt century, and in many particulars ſtill excellent.

DUPIN, LOUIS ELLIS, a celebrated eccleſiaſtical hiſtorian, was born at Paris in 1657, where he was educated. In the year 1672, he was admitted to his degree, on which occaſion he particularly recommended himſelf to notice, by the able manner in which he performed the cuſtomary exerciſes. Having fixed upon theology as a profeſſion, he ſtudied at the Sorbonne, and then applied himſelf with the utmoſt diligence to the hiſtory of the councils, and the works of the fathers. In the year 1680, he was licenſed to officiate as a prieſt, and, in 1684, he received the bonnet of doctor of the Sorbonne, and then employed his time and talents on his great work, entitled "Bibliothêque univerſelle des Auteurs Eccleſiaſtiques," &c. or, "Hiſtory of Eccleſiaſtical Writers, containing an Account of the Authors of the ſeveral Books of the Old and New Teſtament; and the Lives and Writings of the primitive Fathers," &c. &c. This work was well received, and has maintained a high reputation to the preſent time, as well for the information which it conveys, as for its impartiality. It has gone through many editions in France, Holland, and this country. He next publiſhed, "An Account of the Writers of the firſt Three Centuries." This work appeared in 1686, and was followed by a ſucceſſion of volumes, publiſhed at different periods, from that time to 1719. Before M. Dupin had completed his "Account of the Writers of the firſt Eight Centuries," the freedom of his opinions called forth the remarks of ſome monks, which obliged him to juſtify what he had written. Theſe were not the only enemies with whom he had to ſtruggle; the celebrated Boſſuet, in his zeal for the catholic faith, collected a number of propoſitions from the volumes of Dupin, which he aſſerted were of a highly dangerous tendency. The hiſtorian retracted, and was allowed to proceed without farther interruption. Notwithſtanding the labour of reſearch which this work required, the author, during the time of publiſhing it, preſented to the world many other volumes on different ſubjects, and he ſuſtained at the ſame time the office of commiſſary in the concerns of the faculty of the Sorbonne; diſcharged the duties of profeſſor of philoſophy in the college royal; furniſhed important contributions to the "Journal des Scavans;" ſupplied numerous applicants with memoirs, prefaces, advice on literary and other ſubjects; and yet, by his induſtry, and a methodical diſtribution of his time, found leiſure to indulge in the ſociety, and converſation of his friends. In the diſpute concerning the opinions of Janſenius, he took that ſide which expoſed him to the reſentment of the pope, and of the court of France, and was, accordingly, deprived of his profeſſorſhip in the year 1703, and likewiſe baniſhed: nor was he permitted to return to Paris before he retracted the meaſures which he had taken; and even then he was not reinſtated in his profeſſorſhip. This was not his only trouble; he was harraſſed under the regency, on account of the correſpondence which he held with Dr. Wake, archbiſhop of Canterbury, relative to a project for uniting the churches of England and France. In the beginning of the year 1719, his papers were ſeized, by order of government, and innumerable calumnies propagated to his prejudice; but as no charge could be made out againſt him, he was permitted to ſpend his few remaining days in peace. He died in a very ſhort time after at Paris, in the 62d year of his age, regretted by his friends, and by his enemies, who were now aſhamed of their conduct towards him. His works were very numerous, of which an account will be found in Moreri, and alſo in the Gen. Biography.

DUPINO, or DUBLIN, in *Geography*, a town of Poland, in the palatinate of Poſnania; 44 miles ſouth of Poſen.

DUPLA, DUPLE *Ratio*, is where the antecedent term is double the conſequent; or, where the exponent of the ratio is 2 :—thus 6 : 3 is in a duple ratio. See Ratio.

Duple, *Sub, Ratio,* is where the conſequent term is double the antecedent; or, the exponent of the ratio is ½: Thus, 3 : 6 is in a ſub-duple ratio.

Dupla *Seſquialtera* } *Ratio.* See Ratio.
Dupla *Superbipartiens tertias* }

Duple *Time.* See Time.

DUPLEIX, Scipio, in *Biography,* a French hiſtorian, was born at Condom in 1569. Queen Margaret of Navarre brought him to Paris in 1605, and made him her maſter of requeſts. After this he was appointed hiſtoriographer of France, and laudably employed many years in reſearches into the ancient records of his country. Hence he publiſhed "Memoirs of the Gauls," 1619, 4to., which, on account of the facts contained in them, were highly eſteemed. It might alſo be regarded as the firſt part of his "Hiſtory of France," which is brought down to the year 1645. The laſt two reigns were reviſed by cardinal Richlieu, which will account for the adulation paid to that miniſter. He intended to have re-written a part of the work after the death of the cardinal, but did not live to effect it. He was author of a "Roman Hiſtory," and a "Courſe of Philoſophy," and other pieces of no great note. In the decline of life he compoſed a work on the liberties of the Gallican church, which he preſented in MS. to the chancellor Seguier, requeſting permiſſion to print it, but the chancellor unfeelingly threw it in the fire before his face. The poor old man was ſo affected with this circumſtance that he never again looked up, and died ſoon after, in 1661, at the age of 92. Moreri.

Dupleix, Joseph, a celebrated French naval commander in the Eaſt Indies, was brought up to a mercantile life, and ſent out in the year 1730 to direct and ſupport the declining ſettlement of Chandernagore, which, by his activity and great addreſs, he reſtored to a moſt proſperous condition. He extended his country's commerce through the great mogul's territories as far as Tibet, and eſtabliſhed a maritime trade with the Red ſea, the Perſian gulf, the Maldives, and Manilla. And in 1742 his great ſervices were recompenſed with the government of Pondicherry. In 1746 La Bourdonnais aſſerted the honour of the French flag, by diſpoſſeſſing the Engliſh of Madras: this excited the jealouſy of Dupleix, who broke the capitulation, and ſent charges againſt Bourdonnais to the French court, which cauſed him to be confined in the Baſtile. In 1748 the Engliſh attacked Pondicherry, but Dupleix was ſucceſsful in its defence, and exhibited ſo much ſkill and heroiſm on the occaſion, that he was rewarded with the title of marquis, and the red ribbon. From this time his ambition was almoſt boundleſs, and to him is to be aſcribed the ſyſtem of entering into the quarrels of the native powers, and aſſiſting them alternately againſt each other, ſo as to render them at length tributaries and ſubjects, and almoſt the ſlaves of European ſettlers. He was at firſt very ſucceſsful in his projects, and procured for himſelf the nabobſhip of the Carnatic, of which he was extremely proud, and indulged his vanity in aſſuming the ſtate of a ſovereign prince. But fortune ſoon turned againſt him: the Engliſh under Lawrence and Clive became triumphant, and expelled the French from their uſurpations. Dupleix was recalled in 1754, and the mortifications which he experienced at home preyed ſo much upon his mind, that he died ſoon after his return. Hiſt. of France. Modern Univ. Hiſt.

DUPLICATE, a ſecond inſtrument, or act in writing; or a tranſcript, or copy of another.

The word is formed from the Latin *duploma,* or *duplum,* double.

It is uſual to ſend a duplicate, when it is apprehended the firſt diſpatch, &c. is loſt.

Duplicate, in *Chancery,* is particularly uſed for a ſecond letter patent granted by the lord chancellor, in a caſe where he had formerly done the ſame. See Patent.

Duplicate *Ratio,* the ratio between the ſquares of two quantities. Thus the duplicate ratio of a to b is the ratio of aa to bb, or of the ſquare of a to the ſquare of b.

In a ſeries of geometrical proportions, the firſt term to the third is ſaid to be in a duplicate ratio of the firſt to the ſecond; or as its ſquare is to the ſquare of the ſecond: thus in 2, 4, 8, 16, the ratio of 2 to 8, is duplicate of that of 2 to 4, or as the ſquare of 2 to the ſquare of 4: wherefore, duplicate ratio is the proportion of ſquares; as triplicate is of cubes, &c. and the ratio of 2 to 8, is ſaid to be compounded of that of 2 to 4, and of 4 to 8.

Duplicate *Root,* among *Batanifts,* one compoſed of two coats. See Root.

DUPLICATION, Doubling, in *Arithmetic,* and *Geometry,* the multiplying of a quantity, either diſcrete, or continued, by two.

Duplication *of a Cube,* is the finding of the ſide of a cube that ſhall be double in ſolidity to a given cube; which is a famous problem cultivated by the geometricians two thouſand years ago.

It was firſt propoſed by the oracle of Apollo at Delphos; which, being conſulted about the manner of ſtopping a plague then raging at Athens, returned for anſwer, that the plague ſhould ceaſe when Apollo's altar, which was cubical, ſhould be doubled. Upon this, they applied themſelves in good earneſt, to ſeek the duplicature of the cube, which henceforward was called the *Delian problem.* The problem is only to be ſolved by finding two mean proportionals between the ſide of the cube, and double that ſide; the firſt whereof will be the ſide of the cube doubled, as was firſt obſerved by Hippocrates Chius.

Thus let x and z be two mean proportionals between a and $2a$: then $a : x :: x : z = \frac{x^2}{a}$; and $x : \frac{x^2}{a} :: \frac{x^2}{a} : 2a$; therefore $x^3 = 2a^3$. Suppoſing the ſide of the given altar a to be 10, then the cube root of $2a^3$, or 2000, found by approximation, will be the ſide of the altar required, nearly.

Eutochius, in his comments on Archimedes, gives ſeveral ways of performing this by the meſolabe. Pappus Alexandrinus, and his commentator, Commandine, give three ways: the firſt, according to Archimedes; the ſecond, according to Hero; and the third, by an inſtrument invented by Pappus, which gives all the proportions required.

The ſieur de Comiers has likewiſe publiſhed an elegant demonſtration of the ſame problem, by means of a compaſs with three legs; but theſe methods are all only mechanical.

Re-Duplication. See Reduplication.

Duplication, a term in the French plain-chant. An intonation by duplication is made by a kind of pericleſis, or leading notes, doubling the penultima note of the word which terminates the intonation; and which can only happen when this penultima is below the terminating note. The duplication then ſerves to prepare and mark the cloſe in the manner of a *note ſenſible,* or ſharp 7th of the key. See Periclesis.

DUPLICATUM Arcanum. See Arcanum.

DUPLICATURE, in *Anatomy,* a term applied to the folds of membranes or other ſoft parts, in which other organs are contained. Hence all duplicatures conſiſt of two layers. Thus the lips and eyelids conſiſt of duplicatures of the ſkin; the cartilage of the ear is encloſed in a duplicature of the ſame part; the inteſtines, with the meſenteric veſſels, &c. are incloſed in a duplicature of the peritoneum, &c.

DUPLIN, in *Geography*, a county of America, in the ſtate of North Carolina and diſtrict of Wilmington, bounded E. by Onſlow, and S.W. by Sampſon. The number of inhabitants is 6790, of whom 1364 are ſlaves. The farmers generally cultivate wheat and rice, but more commonly eat bread made of Indian corn Cotton and ſweet potatoes are raiſed in conſiderable quantities. The court-houſe is 55 miles N. of Wilmington, and 566 from Philadelphia.

DUPLODES. See Gambezon.

DUPONDIUS, in *Antiquity*, a weight of two pounds; or a money of the value of two aſſes. See As.

As the as, at firſt, weighed a juſt pondo, or libra, the dupondius then weighed two. And hence the name.

And though the weight of the as was afterwards diminiſhed, and of conſequence that of the dupondius alſo, yet they ſtill retained the denomination. See Pound and Libra.

Dupondii, or double aſſes, were coined both in the former and later period of the commonwealth. The dupondius was half the *Seſtertius* (which ſee), and worth one penny ſterling. Prior to Auguſtus, and before the Orichalcus, or yellow braſs, appeared in the Roman coinage ſo generally as it did afterwards, this coin was ſtruck in copper juſt double the ſize of the as. There are indeed dupondii of Julius in yellow braſs, weighing half an ounce, with a head of Venus Victrix on one ſide, and Cæsar Dict. Ter. reverſe a female figure, with ſerpents at her feet, C. Clovi. Præf.; others have a victory on the reverſe, with Q. Oppius Pr. From the time of Auguſtus the dupondius was ſtruck in yellow braſs; as Pliny informs us it was in his time: and it is known that no change took place between that and the Auguſtan age. When this mode firſt began, the dupondiarius, uſed by Pliny, ſeems to have been adopted, expreſſing that the coin was not dupondius, or double the weight of the as, but of a dupondiary value. The word dupondius, however, was never confined, in its literal acceptation, to *double weight*, for Vitruvius and Varro uſe it as *double length* or *meaſure*, in the inſtance of *dupondius pes*, that is two feet, and the like. Hence, in the imperial times, it did not mean a coin of double the weight of the as, but of double the value. The ſeſtertius weighed an ounce, and the dupondius was the half of it; the as being of copper, as Pliny informs us; and it is inferred from him and from the whole coins that remain, that it ſtood at half an ounce, till the gradual decline of the ſeſtertius, hardly perceivable before the time of Alexander Severus, brought the as along with it. The dupondius, being the half of the ſeſtertius, kept pace with it through all its ſtages. (See Sestertius.) It was one of the moſt common coins in the Roman empire, and it was alſo common in the Byzantine empire. Although the dupondius was of the ſame ſize with the as, it was commonly of much finer workmanſhip, as its metal was eſteemed ſuperior in value. The ſeſtertius and the dupondius continued to be of yellow braſs to the termination of the ſeſtertius under Gallienus; and the as was always of copper. Pinkerton's Eſſay on Medals, vol. i.

DUPORT, in *Biography*, a powerful performer on the violoncello. Till our *Croſdil*, ſtimulated, perhaps, by his example, had vanquiſhed all the difficulties of finger-board and bow, incident to the inſtrument, we ſhould readily have joined with M. Laborde, in calling him the moſt admirable performer on the violoncello that has ever been heard. When in England with his younger brother, it was thought that he could only be excelled by the elder.

DUPPA, Brian, a reſpectable Engliſh prelate, who flouriſhed in the 17th century, was born at Lewiſham, in Kent, in the year 1588. The firſt part of his education he had at Weſtminſter ſchool, from whence he was removed to Chriſt-church, Oxford, in the year 1605. Here he took his firſt degree; and in 1612, he was choſen fellow of All-Souls college. Two years after, he took his degree of M. A.; and having entered into orders, he travelled on the continent for farther improvement. In 1619, he was made a proctor to the univerſity of Oxford; and in 1625, he took the degree of doctor in divinity. At this time he was chaplain to the prince Palatine, and likewiſe to the earl of Dorſet; by the intereſt of the latter, he was appointed to the deanery of Chriſt-church, in the year 1629. He was, in the year 1632, choſen to the office of vice-chancellor of the univerſity of Oxford; and in 1634, he was appointed chancellor of the church of Sarum, and chaplain to king Charles I., who, in 1638, gave him the office of tutor to Charles, prince of Wales, and his brother, the duke of York: in the ſame year he was nominated to the biſhopric of Chicheſter, and in 1640 tranſlated to the ſee of Saliſbury, though, owing to the confuſion of the times, he drew no emolument from it. He was a great favourite with the king, attended him cloſely in the ſcenes of his affliction, and is ſaid to have aſſiſted him in the compoſition of the "Eikon Baſilike." After the death of his royal maſter, biſhop Duppa retired to Richmond, in Surrey, where he ſpent the greater part of his time in ſolitude, until the reſtoration opened to him brighter proſpects. On the accompliſhment of that event, the loyalty of the biſhop was rewarded by a tranſlation to the rich biſhopric of Wincheſter, to which he was nominated in 1660; he was alſo made lord almoner, and received other marks of royal diſtinction. In the following year, he began to build, at his own expence, an hoſpital for the poor of Richmond, and projected other works of piety and benevolence; but death, in 1662, ſtopped his hand. Charles II. ſo much reſpected his faithful tutor and ſteady friend, that he paid him a viſit only a few hours before his deceaſe, and, it is ſaid, knelt down by his bed-ſide, and ſought the bleſſing of the dying prelate, which he, no doubt, beſtowed with true zeal and devotion. The biſhop died, as he had ever lived, honoured and beloved by all who knew him, and leaving behind him a character exemplary for piety, candour, humility, meekneſs, generoſity, and every uſeful virtue. He was author only of a few occaſional ſermons. Burnet, in his hiſtory, aſſumes, that biſhop Duppa was unequal to the taſk of educating the young princes; but the biographers of the prelate have given good reaſon to believe he was admirably qualified for the office, as well by his talents as his ſtrict integrity. Biog. Britan.

DUPRE, De St. Maur, Nicholas, was born at Paris about the cloſe of the 17th century; by his education, he was intended for the law, and obtained a place of maſter of the accounts. He acquired great reputation as a man of letters, and was one of the firſt of his countrymen who poſſeſſed a taſte for Engliſh literature, and who endeavoured to promote it among his countrymen. He tranſlated Milton's Paradiſe Loſt, which, perhaps, was as well done as the nature of the thing would allow, and on account of it, he was admitted into the French academy, in 1733. He wrote alſo an "Eſſay on the Monies of France," 1746, 4to.; "Inquiries into the Value of Monies, and the Price of Corn," 1761, 12mo. And he communicated to Buffon "Tables on the Duration of Human Life," which are to be found in his Natural Hiſtory of Man. M. Duprè died in 1775, at a very advanced age, leaving behind him a number of MSS. on the ſame kind of topics as thoſe which he had diſcuſſed during his life. Gen. Biog.

DUPUIS, Dr. Thomas Saunders, late one of the organiſts and compoſers of the king's chapel. He was a correct harmoniſt in his compoſitions, and a good performer on the organ, with a fancy not very rich or original; but his finger was lively, and he knew the inſtrument well. He died in 1796, and was ſucceeded in the chapel-royal by Dr. Arnold.

Dupuis, Ericius. Cardinal Bona pretended, that ever ſince the eleventh century (which was that of Guido), Ericius Dupuis had added a note to the hexachord of Guido, to avoid the difficulties of the mutations in ſolmiſation, and facilitate the ſtudy of plain-chant. This aſſertion cannot be ſupported, as there remains not the leaſt veſtige of any ſuch addition. No one doubts at preſent of this 7th ſyllable *ſi* having been added to the other ſix by Le Maire, about the end of the 17th century.

All his merit, however, conſiſts in giving the ſyllable *ſi* to the 7th note, for its utility had long been demonſtrated. See the works of Pere Merſenne. Laborde. The uſe of this ſyllable, however, is not yet general in any part of Europe, except France; nor in any other country do they agree to call *c* ut, except when it is the key note.

DUQUE Cornejo, Pedro, ſculptor, painter, and architect, born at Seville in 1677; diſciple of Pedro Roldan, but inferior to his maſter. His works are very numerous at Seville, and particularly in the cathedral. He was already in high eſtimation in that city, when Philip V., paſſing through it, carried the artiſt with him to Madrid. He there executed ſeveral works; but, his royal patron dying, he returned to Seville, where he maintained, and even increaſed his former reputation. Thence, he accepted an invitation to Granada, to make the ſtatues for the chapel of Nueſtra Senora de las Anguſtias, and afterwards proceeded, on a ſimilar invitation from the chapter of the cathedral at Cordova, to undertake the works of that church, which he had ſcarcely completed, when he died, at the age of 80, and was ſumptuouſly interred in the cathedral, at the expence of the chapter.

He poſſeſſed a ready invention, and great facility in all the arts of deſign; but his public works are chiefly on ſculpture. Diccionario Hiſtorico de las Bellas Artes en Eſpana.

DUQUELLA, in *Geography*, a province of Africa, in the empire of Morocco, which extends to the walls of Saffi. This province is bounded on the north by that of Temſena; to the eaſt by thoſe of Eſcura, Ramna, and Morocco; to the ſouth by the province of Abda, and to the weſt by the ocean. It is populous, rich, and commercial, abounds in corn, and produces a great quantity of wool, part of which is ſold unwrought, and the reſt employed in the manufactures, with which it ſupplies the ſouthern provinces. This province formerly extended to the river Tanſif; but that of Abda has been taken out of it, in order to divide it between two brothers who diſputed the government. The inhabitants of Duquella are, in general, of a large ſize, and robuſt; they are a trading people, and all more affable and engaging than thoſe of the other ſouthern provinces. The province of Abda, which once made a part of that of Duquella, begins at the city of Saffi, and extends to the river of Tanſif: its form is triangular. The inhabitants are addicted to the profeſſion of arms, and many of them are in the ſervice of the court.

DUQUESNE, a river of the iſland of Grenada, which runs into the ſea, in a bay to which it gives name. N. lat. 12° 18'. W. long. 61° 27'.

Duquesne *Point*, a cape on the W. coaſt of the iſland of Grenada. N. lat. 12° 17'. W. long. 61° 29'.

DUR, Fr. harſh, in *Muſic*. Every ſound is called *dur* that is ſhrill, piercing, and diſagreeable. There are coarſe voices, harſh inſtruments, rough harmony. The harſhneſs of B quadrum, made it at firſt be called *durum*. There are harſh intervals in melody; ſuch are the tritonus and ſharp 5th; and, in general, all the major diſcords. The harſhneſs of extraneous modulation renders the harmony diſagreeable, and offends the ear.

DURA, or Duris, in *Ancient Geography*, a river of Hibernia, according to Ptolemy.—Alſo, a town of Aſia, in Meſopotamia, according to Steph. Byz. and Polybius.—Alſo, a river of Greece, in Trachinia, a canton of Theſſaly.—Alſo, an epiſcopal town of Africa, in the Byzacene territory.—Alſo, a town of Aſia, in Cœleſyria, according to Polybius; who ſays, that it was well fortified, and unſucceſsfully beſieged by Antiochus, king of Syria. It is thought to be the *Dor* of Scripture, ſituated between Ptolemais and Cæſarea.—Alſo, *Imam-Mohammed-Dour*, a town of Aſia, on the left bank of the Tigris, E.S.E. of Birtha.—Alſo, a town of Aſia, in Meſopotamia, on the banks of the Euphrates, called alſo *Nicanoris*, and ſituated S.E. of Circeſium.

DURA-MATER, or Meninx, in *Anatomy*, is the membrane which lines the inner ſurface of the cranium. See Brain.

Dura-mater, *tumours of*. Moſt writers have not underſtood the diſeaſes, which are now well known by the appellation of fungous tumours of the dura-mater, or outer membrane of the brain. Theſe ſwellings make their appearance ſuddenly under the integuments of the head; but they can only protrude externally in this manner, after they have made their way through the bones of the ſkull, which, one might ſuppoſe, would be capable of impeding their progreſs outward.

M. Louis, one of the greateſt of the French ſurgeons, has written a very intereſting memoir on the preſent ſubject. It is obſerved by this gentleman, that the kind of relation, which unintelligent perſons generally diſcern between cauſes and effects, creates a prejudice, which prevents them from ſeeing the poſſibility of the cranium being perforated by a ſubjacent, ſoft, fungous excreſcence, formed by the veſſels of the dura-mater. But the comparative denſity of the bones, and ſoftneſs of the tumour, which preſent, on one hand, a cauſe to all appearances very weak, and on the other, a reſiſtance which might be thought invincible, can only deceive ſuch perſons as are inattentive to the ordinary actions of nature. Numerous phenomena of a ſimilar kind might be pointed out. But, not to quit the human body, do we not frequently ſee aneuriſms of the arch of the aorta occaſion an abſorption of the ſternum and ribs, while the aneuriſmal ſac, on the ſide towards theſe bones, ſuffers the leaſt degree of attenuation?

The ſymptoms and complaints, which fungous tumours of the dura mater have in common with ſome other diſeaſes, have been too ſuperficially attended to by many practitioners, who have, therefore, imbibed erroneous opinions concerning the true character of theſe ſwellings. M. Louis alſo very juſtly imputes ſome of the ſlowneſs, with which ſurgeons became acquainted with the real nature of the preſent diſeaſe, to thoſe few obſervers who did know ſomething about it, not extending their inveſtigations beyond one particular fact, which was the excluſive object of their conſideration. Their views of the ſubject being circumſcribed, they regarded the caſe only in the light of a very ſingular and extraordinary affection; and every one will be of opinion with M. Louis, that our knowledge, which is always too confined, muſt neceſſarily be very imperfect, when not drawn from a due number of facts relating to one object, which facts ought to be moſt ſcrupulouſly examined in every poſſible point of view.

We think the beſt way of making the reader acquainted with the nature of fungous tumours of the dura-mater is, to preſent him with the particulars of a caſe recorded by M. Louis.

This eminent ſurgeon was requeſted by M. Pibra to examine the head of a man, 35 years of age, who had died of a diſeaſe which had for ſome time been the ſubject of converſation among profeſſional men. The patient had had an excellent conſtitution, and was born of very healthy parents. Towards the end of December, 1761, he ſlipped, and fell with conſiderable force on the tuberoſities of the iſchium, which alone ſuſtained all the violence of the ſhock. The latter circumſtance was aſcertained beyond the poſſibility of doubt. It is alſo highly deſerving of notice, that the perſon felt ſo ſtunned at the inſtant of the fall, that he could ſcarcely manage to get up again. The accident was attended with no degree of pain. The ſenſation of ſtunning in the head laſted inceſſantly for four months, and then gradually went off.

After four months eaſe, a barber, who was ſhaving the man's head, perceived an odd ſenſation under the razor, on the right ſide of the top of the head. It was a ſort of crepitation, like that occaſioned by the handling of a piece of dry parchment, which lay under the integuments. The hair-dreſſer expreſſed his ſurpriſe to the patient, who felt his head, and experienced the ſame ſenſation. At this period there was no elevation nor depreſſion at the part. The next day, a tumour, about as large as a ſhilling, made its appearance; it was not very prominent, but it had a pulſatory motion. It is obvious, that the crepitation previouſly felt had been occaſioned by the compreſſion of the razor and fingers on the ſurface of the parietal bone, which was exceedingly attenuated by the fungus, the upper part of the tumour being merely covered with a plate of bone, ſo very thin as to be flexible.

The tumour, which was always of an indolent nature, made conſiderable progreſs in a few days, and this circumſtance led the patient to conſult ſeveral perſons about it. The firſt one, whoſe opinion was requeſted, thought that the ſwelling was an aneuriſm, and, conſequently, adviſed the employment of a bandage, for the purpoſe of making preſſure on it. The patient, however, could not endure this plan. The tumour, when compreſſed, was eaſily reduced to a level with the opening in the parietal bone; but when this was done, very alarming numbneſſes were produced, and it was abſolutely neceſſary to leave off the uſe of the bandage. The ſwelling continued to grow larger, and the opening in the parietal bone acquired an increaſe of ſize in proportion. Several phyſicians and ſurgeons met to give their opinions concerning the diſeaſe; only one of them thought the caſe an aneuriſm. Some ſuppoſed it was a hernia of the brain; but moſt of them ſuſpended their judgment, not wiſhing to hazard an opinion on a diſeaſe which they regarded as altogether extraordinary. The patient was exempt from all ſuſpicion of having any venereal complaints; but, when he was about 18, he had had ſome appearances of ſcurvy, and this circumſtance led to the trial of antiſcorbutic remedies.

Theſe, however, only impaired the conſtitution, and, far from retarding the growth of the tumour, it increaſed more rapidly in ſize during the exhibition of ſuch medicines than before. It made its appearance externally, being as large as a turkey's egg, painful, and remarkable for this ſingularity, that when the tumour was compreſſed the pain ceaſed. The ſtupefaction, which was the immediate effect of ſuch compreſſion, made the method intolerable, ſo that the patient preferred an habitual pain to the means of getting relieved of it. M. Louis thought this circumſtance eaſily admitted of explanation: the ſenſe of pain was not a part of the character of the diſeaſe, but only aroſe from the irritation which the tumour ſuffered from the irregular points and inequalities of the edges of the opening in the parietal bone. Gently puſhing back the prominent part of the fungus kept the tumour at the inſtant from being hurt by the inequalities and ſharp edges of the preternatural opening in the parietal bone. The patient for the four or five laſt months of his exiſtence gave himſelf up to empirics: he died April 17th, 1763.

For the purpoſe of examining the diſeaſe with the utmoſt care, and not doing miſchief with the knife, M. Louis made a circular inciſion in the ſoft parts at the baſe of the ſkull-cap, ſo as to be able to ſaw it and take it away, together with the dura-mater and integuments, while theſe parts retained the ſame relations which they had to the tumour, both internally and externally. The tumour aroſe from the convex ſurface of the dura-mater, was as large as the fiſt, and was very regularly circumſcribed, being rather leſs prominent under the cranium than above it. The baſe of the ſwelling was more extenſive than its upper part; the protuberant part under the cranium was occaſioned by a kind of thickening of the dura-mater, and was lodged in a depreſſion, which it had formed for itſelf in the correſponding portion of the brain. The inner layer of the dura-mater, in the ſituation of the tumour, was a little thicker than elſewhere, and its veſſels were more conſiderable and large.

The tumour was not at all adherent to the cranium; the preternatural opening in the ſkull was exceedingly irregular; and on the outſide of the parietal bone, round the aperture, there were ſome bony eminences. Between the two anterior angles of the parietal bone, near the coronal ſuture, an unequal piece of bone was found, as wide as a quill, and about an inch long, which roſe almoſt perpendicularly from a baſe very little larger than the reſt of this portion of bone. The inner table of the parietal bone was irregularly deſtroyed around the opening, and to an extent proportioned to the baſe of the ſwelling, which the inceſſant pulſations of the brain tended to force entirely out of the cranium, by beginning to deſtroy the bony parts, which covered the diſeaſe.

Both externally and internally there were numerous inequalities on the ſurface of the adjacent bones for ſome way from the opening. The fungous ſubſtance of the dura-mater was covered with a membrane which accurately circumſcribed its extent. Its conſiſtence was ſuch as common ſarcomatous ſwellings uſually have, being attended at no point with either elaſticity or fluctuation. The blood, which flowed out when an inciſion was made, was dark coloured, like what the veins of the above kind of ſwelling commonly contain.

Paré has recorded a caſe, which M. Louis concludes was certainly a fungous tumour of the dura-mater; although Paré himſelf was informed by two ſurgeons, who examined the head after death, that it was a tumour compoſed of the ſubſtance of the brain itſelf. M. Louis ſays, that this muſt certainly have been a miſtake; for, while the cerebrum is covered by the dura-mater and cranium, it cannot overcome the reſiſtance which theſe parts preſent. For a hernia cerebri to have taken place the bone muſt have been previouſly deſtroyed in ſome way or another, and there muſt have been at the ſame time a ſolution of continuity in the dura-mater. Experience has frequently proved, that in wounds of the head, attended with great deſtruction of the cranium, no hernia, nor fungus cerebri ever occurs as long as the dura-mater covers this viſcus. In the ſame caſes, when this membrane has been torn or cut, a protruſion of the brain does not happen, except from a peculiar alteration of the very ſubſtance of this organ, in conſequence of the injury it has ſuſtained.

M. Petit, in his "Traité des Maladies des Os," takes notice of certain tumours, attended with a pulſation on the ſurface of the cranium, and with caries of the bone. Theſe were obviouſly, according to M. Louis, fungous ſwellings of the dura-mater; they alſo had been miſtaken by ſeveral practitioners for aneuriſms. Petit ſhews how wrong this opinion was, and explains that the pulſation of the tumours in queſtion was only communicated to them by the brain.

M. Louis, in his valuble diſſertation on the preſent ſubject, cites a vaſt number of caſes, from which it appears, that fungous tumours of the dura-mater are uſually preceded by external violence done to the head. Some examples are alſo adduced, which were ſuppoſed to have proceeded from internal ſyphilitic cauſes. However, M. Louis himſelf was well aware, that the tumours in queſtion might only be an accidental complication, and not at all connected with the venereal diſeaſe. Of this fact, we think there can be little donbt.

Fungous tumours of the dura-mater may originate at any part of this membrane; but they are ſaid to be particularly apt to grow on the ſurface, which is adherent either to the upper part of the inſide of the ſkull, or to its baſis. They are firm, indolent, and chronic, ſeeming as if they were the conſequence of a ſlow inflammation, affecting the veſſels which ſupply the dura-mater, and inoſculate with thoſe of the diploe. It is very difficult, one might ſay impoſſible, to determine, whether an affection of this kind always begins in the dura-mater, or the ſubſtance of the bone itſelf. The patient, whoſe caſe is above quoted from the memoir of M. Louis, had received no blow upon the head, and could only impute his complaint to a fall, in which the head had not ſtruck againſt any thing. Although this caſe may tend to ſhew that fungous tumours of the dura-mater may form ſpontaneouſly, yet, it is confirmed by the examination of a vaſt number of caſes, that the diſeaſe more frequently follows blows, than any other cauſe. Hence, a ſlow kind of thickening of the dura-mater is produced, which ends in a ſarcomatous excreſcence, the formation of which always precedes the deſtruction of the bone.

In the memoir, publiſhed by M. Louis in the 5th volume of thoſe of the Royal Academy of Surgery, there is a very intereſting caſe, illuſtrating to what an extent this diſeaſe may proceed. The ſubject is a young man, aged 21, who had on the left ſide of his head a conſiderable tumour, which was ſuppoſed to be a hernia cerebri. The ſwelling had begun in the region of the temple, and had gradually acquired the magnitude of a ſecond head. The external ear was diſplaced by it, and puſhed down as low as the angle of the jaw. At the upper part of the circumference of the baſe of the tumour, the inequalities of the perforated bone, and the pulſations of the brain, could be diſtinctly felt. Some parts of the maſs were elaſtic and hard; others were ſoft and fluctuating. A plaſter, which had been applied, brought on a ſuppuration at ſome points, from which an ichorous diſcharge took place. Shiverings, and febrile ſyptoms enſued, and the man died in leſs than four months. On diſſection, a ſarcomatous tumour of the dura-mater was detected, together with a deſtruction of the whole portion of the ſkull, correſponding to the extent of the diſeaſe.

When a fungous tumour of the dura-mater has once formed, it makes its way outward, through all the parts, ſoft, or hard, which are in its way. Such portion of the ſkull, as oppoſes its progreſs outward, is abſorbed, and then the ſwelling, all on a ſudden, and, in general, very unexpectedly, riſes up externally, confounds itſelf with the ſcalp, and preſents itſelf outwardly in the form of a preternatural, ſoft, yielding ſwelling, which even ſometimes betrays an appearance of a decided fluctuation, or a pulſation; which latter ſymptom, as we have remarked above, has very frequently led former practitioners to ſuppoſe the caſe an aneuriſm. When once the ſwelling has made its exit from the cavity of the cranium, it ſpreads out on every ſide under the integuments, which readily make way for its growth. The ſcalp becomes diſtended, ſmooth, and œdematous over the extent of the tumour, and, laſtly, it ulcerates. The matter which is diſcharged from ſuch ulcerations, is thin and ſanious. The outer part of the tumour is confounded with the integuments and edges of the ſkull on which it reſts, ſo that, in this ſtate, it is eaſy to miſtake the tumour for one whoſe baſe is altogether external. While the ſwelling thus increaſes in ſize externally, it alſo enlarges internally. The latter change takes place, in particular, while the opening in the cranium is not large enough to admit the whole maſs of the tumour, which then depreſſes the brain, and lodges in an excavation which it forms for itſelf. But this cavity quickly diminiſhes, and becomes reduced almoſt to nothing, as ſoon as the tumour has formed an external protruſion. In order to make way for the progreſs of the ſwelling outward, a portion of both tables of the ſkull is abſorbed; but, it is remarked, that the internal, or vitreous table, is always found much more extenſively deſtroyed than the external one. Sometimes, as is mentioned in the preceding caſe, new bony matter is found depoſited around the opening in the cranium.

The exiſtence of a fungous tumour of the dura-mater cannot be aſcertained, as long as there is no external change. The effects produced may originate from ſo many cauſes, that there would be great riſk of a groſs miſtake in referring them to any particular ones. This is not the caſe when there is an opening in the ſkull. Then a hardneſs, which is always perceptible from the very firſt, at the circumference of the tumour, denotes, that it comes from within. When the part of the ſkull, immediately over the diſeaſe, has become exceedingly attenuated, and the outward ſwelling is juſt commencing, a crackling ſenſation is perceived, on handling the part, juſt ſuch as one may ſuppoſe would ariſe from touching ſome dry parchment ſtretched under the ſkin. When much preſſure is made on the diſeaſe, conſiderable pain is excited, and ſometimes a numbneſs in all the limbs, ſtupefaction, and other more or leſs alarming ſymptoms. Preſſure makes the tumour recede inward, in a certain degree, eſpecially when the ſwelling is not very large. However, as ſoon as the compreſſion is diſcontinued, it gradually riſes up again. In ſome inſtances, the diſeaſe is attended with pain; in others, this effect is not produced; which circumſtances may depend on the manner in which the tumour is affected by the edges of the bone, through which it paſſes. The pain often admits of being relieved by compreſſion; but recurs as ſoon as this is diſcontinued. The tumour has a pulſatory motion, which is communicated to it by the brain, and which, as we have above related, has led many practitioners into an erroneous ſuppoſition, that the caſe was an aneuriſm. When the tumour is puſhed ſideways, and the finger is put between it and the edge of the bone through which the diſeaſe protrudes, the bony margin may be felt preſſing againſt the baſe of the ſwelling, ſo as to cauſe a certain conſtriction of it. When this ſymptom is diſtinguiſhable, and conjoined with a certain degree of firmneſs and elaſticity, and occaſionally with a facility of reducing the ſwelling, it ſerves as a criterion for diſcriminating a fungous tumour of the dura-mater, from a hernia of the brain, external fleſhy tumours, abſceſſes, exoſtoſes, and other diſeaſes, which ſometimes exhibit ſomewhat ſimilar appearances to thoſe of the preſent affection.

Fungous tumours of the dura-mater are generally attended with a vaſt deal of danger, as well on account of their nature, as of the difficulty of curing them in any certain manner, and of the dreadful ſymptoms which they are apt to induce. Thoſe fungous ſwellings of the dura-mater which have a ſmall baſe, which are firm in their texture, which are unattended with much diſeaſe of the ſurrounding bone, which are moveable, and not very painful, and which alſo affect perſons who are, in other reſpects, quite well, afford moſt room for hope. However, though it is our duty to make ſome effort to cure the diſeaſe, when thus circumſtanced, the event muſt always be regarded as very uncertain.

Our expectations of ſucceſs muſt be very inconſiderable, indeed, when the diſeaſe has exiſted a great while, and the functions of the brain are ſeriouſly impaired by it.

The moſt ſimple mode of attempting a cure is compreſſion. It was this which naturally preſented itſelf to the minds of all thoſe former ſurgeons, who fell into the error of miſtaking the diſeaſe for an aneuriſm, or a hernia cerebri. Erroneous opinions have alſo ariſen, concerning the efficacy of compreſſion, in conſequence of the tumour, while below a certain ſize, ſometimes admitting of being reduced into the cranium, without any bad effects. However, as any one, at all acquainted with the nature of the diſeaſe, might expect, the reduction was only attended with a very temporary appearance of good being done. It had no effect whatever on the original cauſe of the affection, the ſymptoms returned, and the ſwelling roſe up again, immediately when the preſſure was diſcontinued.

M. Louis records, in his diſſertation on the preſent ſubject, a fact, which tends to ſhew, that a certain degree of relief may ſometimes be derived from a prudent employment of preſſure. A woman, who had been brought to death's door by the alarming ſymptoms ariſing from a fungous tumour of the dura-mater, reſted, for ſome time, on the ſame ſide of her head on which the diſeaſe was ſituated, the conſequence of which act was, that all her appearances of diſſolution ſuddenly vaniſhed, and the ſwelling diſappeared in ſo inſtantaneous a way, that ſhe conceived her cure was the effect of a miracle. The tumour was afterwards kept from protruding again, by means of a piece of tin, faſtened to the inſide of her cap. The preſſure, however, was not always maintained in an equal and regular manner, ſo that the bad ſymptoms occaſionally recurred. They then ceaſed, after the ſwelling was reduced, and had got into a certain poſition. There cannot be the ſmalleſt doubt, that the bad ſymptoms were produced by the irritation which the tumour ſuffered in paſſing the inequalities of the edges of the opening in the cranium. The patient lived in this ſtate nine years, ſubject to occaſional fits, in one of which, attended with hiccough and vomiting, ſhe periſhed.

The compreſſion being a very uncertain means of relief, it is, perhaps, better to expoſe the tumour with a knife. This plan of bringing the ſwelling into view is infinitely preferable to that of applying cauſtic for the ſame purpoſe. Every one knows, that the action of cauſtic can never be regulated with ſufficient preciſion, beſides being conſiderably more painful than an inciſion, and attended with an unneceſſary deſtruction of parts. The beſt way is to make a crucial diviſion of the ſcalp, immediately over the tumour, and then diſſect up the flaps, and reflect them, ſo as to expoſe all the bony circumference of the opening, through which the fungous tumour projects. The ſurgeon ſhould next cautiouſly remove all the part of the ſkull immediately ſurrounding the baſe of the fungus. This object has uſually been effected by applying the trephine as often as neceſſary; but, perhaps, the beſt inſtruments for the accompliſhment of the object in view, would be the ſaws deſcribed by Mr. Hey, and now ſold by all the makers of ſurgical inſtruments.

The fungous ſwelling having been diſengaged on all ſides, is next to be cut off with a ſcalpel. Some adviſe the ſurface, from which the tumour grew, to be next ſprinkled with ſome of the pulv. hydrarg. nitrat. rub. However, the latter meaſure ſeems by no means certainly proper; for, applying eſcharotics to one of the membranes of the brain cannot be free from danger. Were we to offer our ſentiments on this part of the ſubject, they would be in favour of cutting away the very root of the diſeaſe, in preference to uſing eſcharotic applications.

Cutting away fungous tumours of the dura-mater is always a more adviſable plan than tying their roots with a ligature, which cannot be executed, without dragging and ſeriouſly injuring the dura-mater, ſo as to occaſion the dangerous effects always attending any conſiderable inflammation of this membrane. The employment of the knife is alſo preferable to that of cauſtics, which are productive of much more pain and irritation, are apt to bring on fatal convulſions, and can never be accurately made to deſtroy a certain quantity of ſubſtance, and no more.

In whatever way the ſurgeon chooſes to operate, the root of the fungus muſt be deſtroyed, or elſe the excreſcence will ſhoot up again, and, by its injurious effects on the brain, at length prove fatal. When the knife is uſed, the practitioner muſt not be afraid of removing a piece of the inner layer of the dura-mater, if there is any likelihood that the whole of the diſeaſe cannot be taken away without this proceeding. Cutting the dura-mater is certainly by no means a thing unattended with riſk; but the diſeaſe, if not ſuppreſſed, is ſurely fatal; and of the plans which hold forth the chance of a cure, none ſeem leſs dangerous and objectionable than that attempted with the knife. The effort to extirpate the diſeaſe at its very origin is leſs perilous, and leſs certainly fatal, than the unchecked progreſs of the fungus, and, upon this principle, is obviouſly right, and, indeed, the only rational alternative.

Another circumſtance, which we wiſh to urge, is, that the attempt to extirpate fungous tumours of the dura-mater be always made as ſoon as the nature of the diſeaſe is known. In the early period of the diſorder, the proſpect of a cure muſt be more hopeful, as it would not be neceſſary to expoſe ſo much of the dura-mater, as afterwards becomes unavoidable.

Writers have deſcribed other tumours of the dura-mater, which chiefly differ from the preceding ones, in only occurring after a perforation has been made in the cranium. They ſhould be diſcriminated from a hernia of the brain. See Fungus.

The inflammation of the dura-mater will be ſpoken of in another place. See *Injuries of the* Head.

Every one who is deſirous of being well acquainted with the ſubject we have juſt quitted, ſhould read the diſſertation written by M. Louis, entitled, "Memoire ſur les tumeurs fongeuſes de la Dure-mere," and inſerted in the fifth vol. of the Mem. de l'Acad. de Chirurgie. 4to.

Dura-*portio*, is that part of the ſeventh pair of nerves, which ſupplies the face, and is more properly termed the facial nerve. See Nerves.

DURADE, or Duro, in the *Italian Muſic*, ſignifies hard, harſh, or, more properly, ſharp. This name is given to B natural,

tural, becauſe its ſound is ſharp, when compared with B mol, or flat.

DURAKA, in *Geography*, a ſmall iſland of Arabia, in the Red ſea, about four leagues from the coaſt. N. lat. 16° 48′. E. long. 41° 31′.

DURAKOVA, a town of Ruſſia, in the government of Archangel, on the coaſt of the White ſea; 48 miles W. of Archangel.

DURAMPOUR, a town of Hindooſtan, in the country of Guzerat; 45 miles S.S.E. of Surat, and 96 N.N.E. of Bombay. N. lat. 20° 32′. E. long. 73° 14′.

DURANCE, *The*, a river of France, which has its ſource in the mountains north of Briançon, near the high road over Mont Genèvre, in the department of the Upper Alps. It runs to Briançon, Vailand, and Embrun; thence flowing to the weſt, and taking up the river Ubaye, it paſſes by Talard, near Gap, divides the department of the Upper from that of the Lower Alps, the latter of which it croſſes from north to ſouth; paſſes by Siſteron, where it receives the river Buêche, by Manoſque and Saint Paul; after which, ſhaping its courſe to the weſt, it divides the department of Vaucluſe from that of the Bouches du Rhône, flows to Pertuis, in the neighbourhood of which place it takes up the Verdon, and a little lower down the Cavallon, and at laſt falls into the Rhône, three miles below Avignon. Its whole courſe is about 180 miles.

The current of the Durance is ſo rapid, that this river can be croſſed only in barks; hitherto, at leaſt, it has been found impracticable to throw a bridge over it below Siſteron. Its frequent inundations make a dreadful havoc; it even alters its bed, and cannot be navigated on account of the many iſlets and ſand-banks by which its courſe is obſtructed. A company or aſſociation of Jews offered ſeveral years ago to embank the Durance at their own charge, provided all the land ſaved ſhould be declared their property; to this the land owners objected, but it would now be conſidered as a very advantageous bargain. The Durance generally overflows its banks in July, after the melting of the ſnow in the Alps, and after the heavy rains of the month of November. It abounds, however, in fiſh, chiefly eels and trout. Its numerous iſlets, abounding with rabbits, are the haunts of ſnipes and wild ducks.

DURAND De St. Pourrain, William, in *Biography*, a learned ſcholaſtic divine in the 14th century, was born in the town annexed to his name, in the dioceſe of Clermont, and educated as a preaching monk of the Dominican order. In conſequence of his eminent attainments in philoſophical and theological ſtudies, he was admitted to the degree of doctor in divinity, in the univerſity of Paris, in the year 1313; and he afterwards delivered public lectures on ſacred literature as maſter of the ſacred palace at Rome. In 1318 he was nominated biſhop of Rey, and, in 1326, tranſlated to the biſhopric of Meaux, by pope John XXII. By his indefatigable perſeverance in the diſcuſſion of difficulties in ſcholaſtic theology, he obtained the appellation of the "Moſt reſolute Doctor." He was at firſt a follower of Thomas Aquinas, but afterwards attached himſelf to the ſect of Scotiſts, and defended their tenets with ſo much acuteneſs and zeal, that he offended the Thomiſts, and incurred their diſpleaſure to ſuch a degree, as to induce one of them, after his death, which happened in 1332, to degrade his memory by the following epitaph:

> "Durus Durandus jacet hic ſub marmore duro,
> An ſit ſalvandus ego neſcio, nec quoque curo."

He was the author of "Commentaria ſuper libros 4. Sententiarum," the beſt edition of which was publiſhed in 1571; alſo, "Liber de origine Juriſdictionum, ſeu de eccleſiaſtica Juriſdictione, et Tractatus de legibus," printed in 4to. in 1571; and other treatiſes, one of which was never publiſhed, and others enumerated in a collection of his works edited under the care of Dr. Merlin in 1515. Cave's Hiſt. Lit. vol. ii. Sæc. Wicklev. p. 22. Brucker's Hiſt. Philoſ. by Enfield, vol. ii. p. 381.

DURANGO, in *Geography*, a town of Spain, in the province of Biſcay, about three leagues from the ſea-coaſt, and four eaſt of Bilboa.

Durango, the capital of the kingdom of New Biſcay, in the Spaniſh dominions of North America, and the fartheſt town of any note towards the north. This city is more remarkable for the extent of its biſhopric, than for its population, which only conſiſts of 5000 perſons, including the companies of militia appointed to defend it againſt the Indians. The climate is mild and healthy, and the ſoil extremely fertile in wheat, maize, and fruits, whilſt the paſtures abound with excellent cattle. It contains four convents and three churches, one of which is ſituated on a hill without the city. It has an office of the royal treaſury, for collecting the duties on the numerous mines in New Biſcay. The biſhopric was founded in 1620, and extends over all the provinces of New Biſcay, *viz.* Tepeguana, Taraumara, Topia, Batopilas, Culiacan, Cinaloa, Oſtimuri, Senora, and Pimeria. The amount of the tythes in the biſhopric of Durango for ten years is 1,080,313 peſos. Durango is ſituated on an inland river, which is loſt in a lake. This river ſeems to be the Guadiana, (another name of Durango,) or the Sauceda of D'Anville. N. lat. 23° 30′. W. long. 103°.

DURANTA, in *Botany*, in honour of Caſtor Durante, phyſician to pope Sixtus V., who publiſhed ſeveral medico-botanical works, amongſt others an Italian herbal, which paſſed through many editions in folio, and ſome in quarto, illuſtrated with the ſmaller wooden cuts uſed by Matthiolus. Plumier, who founded this genus, called it *Caſtorea*, but Linnæus rightly changed it, to accord with the family name of the perſon commemorated, as in other caſes. Linn. Gen. 324. Schreb. 424. Willd. Sp. Pl. v. 3. 380. Mart. Mill. Dict. v. 2. Juſſ. 109. Gærtn. t. 57. (Caſtorea; Plum. Gen. 30. t. 17. Elliſia; Browne Jam. 262. Loefl. It. 194.) Claſs and order. *Didynamia Angioſpermia.* Nat. Ord. *Perſonatæ*, Linn. *Vitices*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, tubular, ſomewhat abrupt, five-cleft. *Cor.* of one petal. Tube longer than the calyx, a little curved; limb ſpreading, rounded, in five deep, nearly equal, ſegments. *Stam.* Filaments four, encloſed within the tube, two longer than the reſt; anthers roundiſh. *Piſt.* Germen inferior, roundiſh; ſtyle thread-ſhaped, ſhorter than the tube; ſtigma a little ſwelling. *Peric.* Berry roundiſh, clothed with the calyx, and crowned with its teeth, of one cell. *Nuts* four, convex on one ſide, angular on the other, each of two cells. *Seeds* ſolitary.

Eſſ. Ch. Calyx inferior, tubular, with five teeth. Corolla tubular, curved, its limb five-cleft, nearly equal. Stamens in the tube. Berry with four nuts, of two cells each.

1. D. *Plumieri.* Linn. Sp. Pl. 888. Jacq. Amer. 186. t. 176. f. 76. Ic. Rar. v. 3. t. 502. Leaves ovato-lanceolate, ſlightly ſerrated. Calyx-teeth of the fruit ſpirally twiſted together.—Gathered by Plumier, probably, and certainly by Jacquin, in Hiſpaniola. The *ſtem* forms a ſmall tree, about fifteen feet high, with alternate, erect or drooping, ſquare leafy branches. *Leaves* oppoſite, ſtalked, an inch and half long, lanceolate, inclining to ovate or elliptic, more or leſs acute, uſually with a few ſhallow ſerratures towards the upper part, ſometimes nearly entire, ſmooth on both ſides,

paler and opaque beneath, veiny. In the boſom of each leaf is a ſmall tuft of other leaves, or a downy bud, above which ſtands a horizontal awl ſhaped *thorn*, various in length, and ſometimes wanting. *Cluſters* of flowers ſituated in the place of theſe thorns, in great abundance towards the upper part of each branch, ſolitary, ſimple, many-flowered, three or four inches long, their common ſtalks, and eſpecially their partial ones, ſilky, as are likewiſe the awl-ſhaped bracteas. *Calyx* ſomewhat bell-ſhaped, rather ſilky, with five angles, and five ſmall, acute, incurved teeth. *Corolla* bluiſh or lilac, its two uppermoſt ſegments rather narroweſt, and each marked with a dark longitudinal line. *Fruit* inveſted with the permanent baſe of the calyx, which becomes united to it, and orange-coloured, while the teeth are ſpirally twiſted together and crown the top. Such is the plant of the Linnæan herbarium, in which are very perfect ſpecimens in flower and fruit. The figure in Plumier's Icones, t. 79, is probably the ſame plant, but its leaves are much too ſtrongly ſerrated, and there are no thorns; the latter circumſtance is, however, ſaid to be variable. We cannot but rely on the repeated aſſurances of the learned Jacquin, that this ſpecies is different from the following, and that the character taken from the calyx-teeth is permanent, eſpecially as there is a difference in the leaves alſo. Swartz appears to have known but one ſpecies.

2. D. *Elliſia.* Linn. Sp. Pl. 888. Jacq. Amer. 187. t. 176. f. 77. Hort. Vind. v. 3. 51. t. 99. Sm. Tour on the Continent, ed. 2. v. 3. 97. (Elliſia fruteſcens, quandoque ſpinoſa, foliis ovatis utrinque acutis ad apicem ſerratis, ſpicis alaribus; Browne Jam. 262. t. 29. f. 1.) Leaves ovato-lanceolate, ſharply ſerrated. Calyx-teeth of the fruit erect.—Native of Jamaica. Very like the foregoing in general aſpect and characters, except the calyx-teeth, and the deeper ſerratures of the leaves, which are conſtant, as repreſented by Jacquin, in all the ſpecimens that have fallen in our way. We have ſeen this ſpecies cultivated in the open ground near Genoa, ſo that it ſeems leſs tender than moſt Jamaica ſhrubs. Its beautiful flowers rival thoſe of our *Veronica Chamædrys.* Jacquin's plate is excellent.

3. D. *Mutiſiana.* Sm. Intr. to Bot. 381. (D. Mutiſii; Linn. Suppl. 291. Willd. Sp. Pl. v. 3. 380.) Leaves elliptical, obtuſe, entire, ſhining on both ſides. Sent from New Granada by Mutis to Linnæus. This has the general habit of the two preceding, but is ſtronger, and, notwithſtanding the ſuggeſtion of the younger Linnæus in the Supplementum Plantarum, we cannot but think it clearly and abundantly diſtinct. The *leaves* are of an elliptical figure, ſcarcely above an inch long, and above half as broad, very obtuſe, perfectly entire, ſomewhat revolute, ſhining on both ſides, and very little paler beneath. *Cluſters* about as long as the leaves, only ſtronger, but in other reſpects much like the laſt. The *branches* alſo are ſpinous. The *fruit* we have not ſeen. S.

DURANTE, FRANCISCO, in *Biography.* This illuſtrious diſciple of Aleſſandro Scarlatti, whom he ſucceeded as principal maſter of the conſervatorio of Sant' Onofrio in Naples, deſervedly merited the character of the beſt and moſt judicious contrapuntiſt that Italy can boaſt; not ſo much for the fugues, canons, or maſſes which he has compoſed, as for the number of illuſtrious ſcholars which his inſtruction and example have produced. No better proofs need be inſtanced than Pergoleſi, Terradeglias, Piccini, Sacchini, Guglielmi, Traetta, Anfoſſi, and Paeſiello, with whoſe admirable productions all Europe is well acquainted. Though Durante can hardly be called a ſecular compoſer, having pointed his labours to ſacred muſic, in which no very light or gay melodies can occur with propriety: yet his maſſes and motets abound with elegant movements ingeniouſly and richly accompanied; in which there is learning without pedantry, and gravity without dulneſs. Theſe are treaſured up in the conſervatorio, for which they were produced, and where, in 1770, they were ſtill in conſtant uſe.

But the cantatas of his maſter Aleſſ. Scarlatti for a ſingle voice, which, after his deceaſe, Durante formed into duets, of the moſt learned, graceful, and expreſſive kind, are what the greateſt maſters now living continue to ſtudy, and teach to their favourite and moſt accompliſhed ſcholars.

Several muſicians have doubted whether the ground-work of theſe very elaborate *ſtudj* was Scarlatti's, among whom was Pacchierotti; but in turning over different volumes of his cantatas in the preſence of this admirable ſinger, while he reſided in London, we found, and ſhewed him in Scarlatti's own hand-writing, the beautiful movements and recitatives upon which Durante worked with much felicity.

DURANTI, JOHN STEPHEN, was born at Toulouſe, and deſigned in early life for the bar, at which he afterwards diſtinguiſhed himſelf for his eloquence. In the year 1563, he was made firſt magiſtrate; afterwards he became advocate-general, and, in 1581, was nominated by the king preſident of the parliament of Toulouſe. He was ſtrongly attached to the royal cauſe, and when the maſſacre of the duke and cardinal of Guiſe, in 1589, had inflamed the rage of the leaguers, eſpecially at Toulouſe, he employed all the force of his eloquence to appeaſe the people. He afterwards prevented the parliament from throwing off their obedience to Henry III., and narrowly eſcaped with his life. His papers were ſeized and ſearched, but nothing was found to criminate him; ſome letters however written by his brother-in-law, Daffis, to the king's commandant at Bourdeaux, imploring aſſiſtance, being intercepted, the crime was imputed to Duranti, and the mob went in a body to the Jacobin convent. where he had ſought protection, and demanded him to be given up. Taking leave of his wife and children, and commending his ſoul to God, he went forth, and aſked with a tranquil mind of what he had been guilty. For a moment a profound ſilence enſued, at length a villain fired a muſket which brought him to the ground, and immediately he was oppreſſed by a thouſand bloody hands, which inſtantly put an end to his life. They treated the dead body with every indignity, and, at length, tied it to the pillory, with the king's picture hung at its back. This maſſacre of an excellent man, who had, in a hundred inſtances, been beneficial to his country, was perpetrated in February 1589. He was a friend and patron to letters, and had collected a fine library which was diſperſed after his death. He is ſuppoſed to have been the author of a learned and excellent work, "De ritibus Eccleſiæ," which was given to Peter Danes, biſhop of Lavaur. Moreri.

DURAS, in *Geography*, a ſmall town of France, in the department of Lot and Garonne, chief place of a canton, in the diſtrict of Marmande, with a population of 1576 individuals. It is ſeated on a ſmall river which flows into the Drot, 40 miles N.W. of Agen. Its diſtrict was erected into a dukedom in the year 1688, but loſt its title with the French revolution of 1789. The canton has an extent of 222½ kiliometres, and contains 18 communes and 11,907 inhabitants.

DURAS, in *Ancient Geography*, a river of Vindelicia, which ran into the Iſter, according to Strabo, ſuppoſed to be the preſent *Draum*.

DURASTANTE, LA MARGARITA, in *Biography*, the firſt capital female ſinger imported for the Italian opera in England. When Handel was commiſſioned by the directors of the Royal Academy of Muſic to engage vocal performers in the year 1720, he brought over from Dreſden the Duraſtante at the ſame time as Seneſino, Borenſtadt and Boſchi. The figure of the Duraſtante was ſomewhat maſculine; but ſhe was thought a good actreſs, and more admired in male than female parts. She ſeems to have been in great favour at our court; for his majeſty, Geo. I., honoured her ſo far as to command an opera, and be preſent at her benefit, July 5, 1722; and in the Evening Poſt, N° 1810, from Saturday the 4th to Tueſday the 7th of March 1721, we find the following paragraph: "Laſt Thurſday his majeſty was pleaſed to ſtand godfather, and the princeſs and the lady Bruce, godmothers, to a daugh- of Mrs. Duraſtante, chief ſinger in the opera-houſe. The marquis Viſconti for the king, and the lady Litchfield for the princeſs."

In the Britiſh Muſeum, among the Harleian MSS. there are verſes written by Pope on the Duraſtante leaving England.

"Generous, gay, and galant nation," &c. which are parodied by Arbuthnot, "Puppies, whom I now am leaving," &c.

DURATION, an idea we get by attending to the fleeting, and perpetual periſhing parts of ſucceſſion.

The idea of ſucceſſion we get by reflecting on that train of ideas, which continually follow one another in our minds, while awake. The diſtance between any parts of this ſucceſſion is what we call duration; and the continuation of the exiſtence of ourſelves, or any thing elſe commenſurate to the ſucceſſion of ideas in the mind, is called our own duration, or that of the thing co-exiſting with our thinking. So that we have no perception of duration when that ſucceſſion of ideas ceaſes.

Duration, in Mr. Locke's philoſophy, is a mode, or modification of ſpace.

The ſimple modes of duration are any lengths, or parts thereof, of which we have diſtant ideas; as hours, days, weeks, months, years, time, eternity, &c.

Duration, as marked by certain periods and meaſures, is what we call properly call *time*.

1. By obſerving certain appearances at regular and ſeemingly equidiſtant periods, we get the ideas of certain lengths and meaſures of duration, as minutes, hours, &c. 2. By being able to repeat thoſe meaſures of time, as often as we will, we come to imagine duration where nothing really endures, or exiſts: thus we imagine to-morrow, next year, yeſterday, &c. 3. By being able to repeat ſuch ideas of any length of time, as of a minute, year, &c. as often as we will, and add them to one another, without ever coming to an end, we get the idea of eternity.

Time is to duration, as place is to ſpace, or expanſion. They are ſo much of thoſe boundleſs oceans of eternity, and immenſity, as is ſet out, and diſtinguiſhed, from the reſt; and thus they ſerve to denote the poſition of finite real beings, in reſpect of each other, in thoſe infinite oceans of duration and ſpace.

DURATION *of action*. See ACTION.

DURATION *of an Eclipſe*. See ECLIPSE.

DURATION, *ſcruples of half*. See SCRUPLE.

DURATION *of a ſolar eclipſe*. See ECLIPSE.

DURATION *of ſound*, in *Muſic*. See SOUND.

DURATION, in *Vegetable Phyſiology*, means the determinate period of exiſtence appropriated to each ſpecies of plant, whether annual, biennial, or perennial. Annual plants are ſuch as ſpring up from ſeed, arrive at perfection, ripen their ſeed, and totally periſh, in the ſpace of one year, or rather one ſeaſon, as Muſtard, Radiſhes, Barley, and various garden flowers. In ſome inſtances the exiſtence of ſuch plants is limited to a very few months or even weeks, and is dormant in their ſeed the greater part of the year. Truly aunual plants can never be propagated by cuttings or layers, except indeed ſome whoſe decumbent branches of themſelves take root, and may therefore be ſeparated from the parent root for that ſeaſon only, as the common annual meadow-graſs, *Poa annua*. The roots of ſome alſo are capable of diviſion, and may therefore be increaſed artificially to a great extent, as is ſometimes practiſed by curious perſons on corn by way of experiment.

Biennial plants arrive at only a certain degree of perfection the firſt ſeaſon, ſhewing no ſigns of flowering, and continuing ſtationary through the winter. In the following ſeaſon they bear flowers, perfect their ſeed, and then periſh like annuals. Of this nature are many ſpecies of mullein or *Verbaſcum*, the Fox-glove, *Digitalis purpurea*, the Canterbury Bell, *Campanula Medium*, &c. The tree mallow *Lavatera arborea* is juſtly eſteemed biennial, becauſe though it may ſurvive ſeveral winters, if circumſtances do not favour its flowering, it ſoon dies after ripening ſeed. A biennial plant therefore never fructifies more than once, how long ſoever its previous exiſtence may be. Wheat is perhaps rather to be reckoned annual than biennial; for though with us it is found moſt convenient to commit it to the ground in autumn, it may be raiſed in one ſeaſon, and does not require one ſummer to bring its herbage to perfection, and another to form fructification.

Perennial plants live and fructify through many ſucceſſive ſeaſons, like the generality of trees and ſhrubs, as well as many herbaceous plants, and may be increaſed by dividing their roots, or by cuttings, layers, or grafts. Their propagation however by ſuch methods, does not appear to be unlimited. Several herbaceous perennial plants are well known to require frequent renewal from ſeed, in order to flouriſh in perfection, and ſome late experiments and obſervations on fruit-trees ſeem to prove that each variety, or, in other words, each individual plant, originally raiſed from ſeed, is limited to a certain period, in ſome kinds longer, in others ſhorter, beyond which the offspring of their buds or cuttings drag on but a ſickly exiſtence, and finally periſh. This is beſt ſeen in the hiſtory of the different varieties of apples, ſome of which, after flouriſhing long, are now in decay, witneſs the golden pippin, while others raiſed from time to time by ſeed, either diſappear by the effects of canker in a very few ſeaſons, or ſeem to promiſe a long future exiſtence. Willows and oſiers of various kinds ſeem, as far as we can obſerve, to be of very long, or even indeterminate, duration, being increaſed by cuttings, year after year, without any apparent decay or deterioration. This is perhaps becauſe each ſpecies is in its natural original ſtate, without the marks or properties of a variety. Beſides, we have had ample opportunities of obſerving that this genus of plants are frequently renewed ſpontaneouſly by ſeed, and ſuch ſeedlings, being more vigorous, may often be choſen unconſciouſly for cuttings by their cultivators. But human life is not long enough fully to determine this queſtion. Gardeners well know that the frequent renewal of plants from ſeed is the beſt way to have them in perfection, and they chiefly therefore prefer that method, except where a variety is to be preſerved, which is not propagated by ſeed. This general experience is ſufficient to confirm what we have advanced above. S.

DURATON, in *Geography*, a river of Spain, which runs into the Duero, near Penafiel.

DURAVEL, a ſmall town of France, in the department of the Lot, on the river of that name; 3 miles E. of Fumel.

DURAZZO, a ſea-port town of European Turkey, in Albania, anciently named *Epidamnus* and *Dyrrachium*, ſtrong and populous, with a good harbour in the gulf of Venice; the ſee of a Greek biſhop; 88 miles S.S.E. of Raguſa. N. lat. 41° 42′. E. long. 19° 16′.

DURBACH, a ſmall town of Auſtria, in the Saxon country of Tranſylvania, in the diſtrict of Biſtritz.

DURBAN, a ſmall town of France, in the department of the Aude, chief place of a canton in the diſtrict of Narbonne. It has only 296 inhabitants; but the canton contains 2837 individuals, diſperſed in 12 communes, upon a territorial extent of 240 kiliometres.

DURBEN, a town of the duchy of Courland; 24 miles S.S.W. of Goldingen.

DURBION, a river of France, which runs into the Moſelle, near Chatel ſur Moſelle, in the department of the Voſges.

DURBUNGA, a town of Hindooſtan, in the country of Bahar; 48 miles N.E. of Patna, and 58 S.W. of Amerpour.

DURBUY, a ſmall town of France, in the department of Sambre and Meuſe, chief place of a canton in the diſtrict of Marche, with a population of 312 individuals, ſituated on the river Ourte, 30 miles S. of Liege and 40 miles S.E. of Namur. It is alſo called Durbu. The canton has a territorial extent of 150 kiliometres, and contains 19 communes, with 5783 inhabitants.

DURCKHEIM, a ſmall town of France, in the department of Mont-Tonnerre, chief place of a canton in the diſtrict of Spire, 15 miles N.W. of Spire, with a population of 3037 individuals. The canton has 19 communes, and 14,520 inhabitants.

DURDUS MONS, in *Ancient Geography*, a chain of African mountains in Mauritania Cæſarienſis, which extend themſelves from the ſouth-weſt to the north-eaſt.

DURE, DOOR. See SUTH-*Dure*.

DUREL, JOHN, in *Biography*, was born at St. Helier, in the iſland of Jerſey, in the year 1626. He was entered a ſtudent at Merton college, Oxford, in 1640, and having continued there about two years, he was, on account of the civil wars, induced to retire into France, and become a member of the college at Caen in Normandy. Here he took his degree of M. A. in the year 1644, and henceforth applied himſelf aſſiduouſly to the ſtudy of theology. In 1647 he returned to Jerſey, and took active meaſures in behalf of the royal cauſe, ſo that when the iſland was reduced by the parliament's forces, he was obliged to ſeek refuge at Paris. Here he was ordained according to the Engliſh epiſcopal forms at the chapel of ſir Richard Brown, king Charles reſiding at that time in France. He received two invitations to ſettle as a miniſter, which he declined, and engaged himſelf as chaplain to the duke de la Force, father to the princeſs of Turenne, a ſituation in which he continued about eight years. On the reſtoration of Charles II. he came to England, aſſiſted in eſtabliſhing the French church at the Savoy, London, where he continued to officiate ſeveral years. His ſteady zeal in defence of the royal prerogative obtained for him conſiderable preferment. In 1663, he was made prebendary in the cathedral church of Saliſbury; chaplain to the king; and ſoon after canon of Windſor, and prebend of Durham. He was afterwards created doctor in divinity by the univerſity of Oxford, in conſequence of letters addreſſed to that body by the chancellor, in which the greateſt praiſe was beſtowed on his loyalty, fidelity, and important ſervices atchieved by him for the king. He had every proſpect of being made biſhop, but his death, in 1683, put an end to farther promotion. He was the author of ſeveral works, but chiefly of the controverſial kind; from this general account we muſt except his "Theoremata Philoſophiæ rationalis, moralis, naturalis, & ſupernaturalis," &c. 4to. 1664. It muſt be ſpoken highly to his praiſe, that as an honeſt and truly conſiſtent character, he was always a zealous advocate for the conſtitution of the church of England, even when he was in the moſt hopeleſs and deſperate condition. As a controverſialiſt he was, by the learned Du Moulin, reckoned candid and open, but by the puritans of England he is differently characterized. Biog. Britan.

DURELL, DAVID, was born at Jerſey in 1728, and though the name is differently ſpelt, it has been thought that he was of the ſame family as John already mentioned. He ſtudied at Pembroke college, Oxford, where he took his degree of M. A. in the year 1753. At this college he was choſen firſt a fellow, and in 1753 the principal. In 1764, he publiſhed a learned theological work, entitled "The Hebrew Texts of the parallel prophecies of Jacob and Moſes relating to the 12 tribes, with a tranſlation and notes, &c. &c." He now took his degree of doctor of divinity, and great expectations were formed of his future ſervices in biblical criticiſm, from his publication in which he diſplayed conſiderable knowledge in the oriental languages, and much induſtry in elucidating the ſenſe of the ſacred ſcriptures. Dr. Durell was preſented in 1767 to a prebend in the church of Canterbury, and ſoon after to the vicarage of Tycehurſt in Suſſex. In 1772, he laid before the public "Critical remarks on the books of Job, Pſalms, Eccleſiaſtes, and Canticles," in a 4to. volume. This work will long remain a monument to his erudition, and at the ſame time it exhibits a ſuperiority to long eſtabliſhed prejudices. In his preface, the doctor pleads earneſtly for a new tranſlation of the bible, and offers powerful arguments for this meaſure, in oppoſition to the objections urged againſt it. To the great loſs of biblical literature, he died in the year 1775, when he was only in the 48th year of his age; he was as diſtinguiſhed for piety and goodneſs, as he was eminent for ſound and extenſive learning. Biog. Britan.

DUREN, in *Geography*. See DEUREN.

DURENMETTSTETTEN, a ſmall town of the kingdom of Wirtemberg, which formerly was an independent lordſhip in Suabia, and which was ceded to Wirtemberg at the peace of Luneville as part of its indemnity for the loſs of ſome provinces on the left ſhore of the Rhine.

DURER, ALBERT, in *Biography*, a painter and engraver of hiſtory, portrait, and landſcape, born at Nuremberg, A. D. 1471. He was the ſon of an eminent goldſmith of that town, by whom, as he has himſelf left on record, he was inſtructed in the art of working in gold, as well as in chaſing in general. His father appears to have deſigned him to follow his own buſineſs, ſince, during his childhood, he had not made even the ſlighteſt attempt at painting, and it was not until he had reached the fifteenth year of his age, that he received the firſt inſtructions in that art from Michael Walzemuth, a painter of Nuremberg, under whoſe tuition he was then placed for a term of three years.

At the expiration of that term, Albert was ſent by his father into Belgium, with what view is uncertain, but he continued there four years, and it is evident that he muſt, in that period, have made himſelf maſter of conſiderable knowledge in the art of engraving, ſince the firſt of his works that is noticed, on his return to his native city, was a print of three or four naked females; a work which bears the date of 1497, and is remarkable for the ſuperſcription which he affixed to it, of O. G. H. ſaid by Sandrart to be deſigned for the initials of the German words O Gott Hüte! or, O God, deliver us from witchcraft!

His engravings of "The paſſion of Chriſt," bear the dates of 1507, 1508, and 1512. The laſt date found on any of his works is that of 1526, on the portrait of Melancthon.

But the diſplay of his talents, however conſpicuous in that art, was not confined to engraving. He diſcovered a general capacity, not only for every branch of deſign, but for every ſcience that ſtood in any relation to it, and wrote treatiſes on proportion, perſpective, geometry, civil and military architecture. He crowned his various knowledge by the moſt eminent ſkill in painting, in which he ſo far ſurpaſſed all thoſe who had hitherto ſtudied and practiſed the art in his own country, that he obtained the appellation of "Father of the German ſchool."

The firſt pictures which are known to have been painted by him, are a portrait of his mother, and another portrait of himſelf in his thirtieth year, A. D. 1500; placed in the palace of Prague, as were, afterwards, many other of his works. Among the moſt celebrated in that collection, were the "Magi;" "The Virgin crowned with Roſes by Angels;" "Adam and Eve," of the ſize of life; "The ſufferings of the Martyrs;" and the "Chriſt on the Croſs, ſurrounded with Glory;" in which the painter has introduced, at the foot of the croſs, a group of popes, cardinals, and emperors, and a figure repreſenting himſelf as holding a ſmall canvas, on which is written: Albertus Durer, Noricus, faciebat, anno de Virginis partu 1511.

His ſtyle was ſo generally admired by the artiſts of his time, that it was imitated by his countrymen to the utmoſt of their ability, and he received a ſtill more gratifying homage from the profeſſors of the Italian ſchool, many of whom, and thoſe, (according to Sandrart) of the higheſt reputation, thought it no diminution of their fame to adopt not only the attitudes, deſigns, dreſſes, and other ornaments of Albert's figures, but the entire figures themſelves, and even ſometimes painted nearly the whole of large hiſtorical compoſitions from his engravings on wood and copper.

Among the artiſts of the then flouriſhing Tuſcan ſchool, in whoſe principles and taſte the importation of his works into Italy is ſaid to have effected a change, Andrea del Sarto, and Jacopo da Pontormo, are particularly mentioned; and Raffaelle himſelf is ſaid to have accepted with pleaſure ſome engravings ſent to him by Albert, and to have hung them in his own apartment.

His works are at preſent very numerous throughout Italy and Germany; and in fame he ranks with the higheſt artiſts of his time.

His character is thus given by an artiſt of our own days. "He was a man of extreme ingenuity, without being a genius. In compoſition, copious without taſte, and anxiouſly preciſe in parts. In conception, he had ſometimes a glimpſe of the ſublime; but it was a glimpſe only. Such is the expreſſive attitude of his "Chriſt in the Garden," and ſuch the figure of "Melancholy," as the mother of invention. He ſtudied, and, as far as his penetration reached, eſtabliſhed certain proportions of the human frame; but he did not invent or compoſe a permanent ſtandard of ſtyle. He made the neareſt approach to genius in his *colour*, which went beyond the age he lived in, and, in eaſel pictures, he as far ſurpaſſed the oil colour of Raffaelle, in juicyneſs, breadth, and handling, as Raffaelle ſurpaſſed him in every other part of his art. His drapery is broad, but much too angular in its folds."

The merit of Albert Durer was not loſt in obſcurity. Having painted a picture of St. Bartholomew, for the church dedicated to that ſaint at Venice, the fame of the work roſe ſo high, that the emperor Rodolphus II. ſent orders to Venice for the picture to be purchaſed for himſelf at any price, and to be brought to Prague, (a journey of great length,) not by the ordinary methods of conveyance, for fear of its receiving ſome damage, but by means of a pole carried on men's ſhoulders.

With the emperor Maximilian he was a ſtill greater favourite, enjoying his particular patronage, as well as afterwards that of Charles V. Several of his principal pictures were painted expreſsly for Maximilian's palace. And it is related that, one day, when the emperor came to viſit Albert in his room, where he was employed on a picture of large dimenſions, the artiſt being deſirous to touch ſome part of his work at a conſiderable height from the ground, and his ſtool not enabling him to reach it, Maximilian ordered one of his nobles who attended him to hold the ladder for Albert, while he went up to the point he wiſhed. The nobleman drew back, and, with the utmoſt reverence and humility, ventured to repreſent to his majeſty his doubt, how far ſuch an office might be derogatory to his rank: on which, Maximilian is ſaid to have replied, that he conſidered Albert Durer as a man far above any noble in his ſuite; for that he could, at any time, make a nobleman of a clown, but that he could not make a painter of a nobleman. In confirmation of theſe ſentiments, he immediately ordered a patent of nobility to be made out for the painter.

In addition to his great celebrity as an artiſt, Albert Durer eſtabliſhed a character no leſs reſpectable in private life. In domeſtic patience he unfortunately experienced very ſevere trials, which he ſupported with calmneſs; and preſerved the ſingular benignity of his diſpoſition unimpaired to the laſt. The avarice of an ill-tempered wife had diſcovered itſelf for a ſeries of years, in continual ſuggeſtions of her huſband's want of proper aſſiduity in the lucrative points of his profeſſion; and her reproaches allowed him ſo little reſt, that ſome of his friends counſelled him to leave her for a time: and, agreeably to their advice, he ſet out ſecretly for Flanders, and took up his reſidence in the houſe of the celebrated painter, Lucas Van Leyden, where the artiſts drew the portraits of each other, in ſign of mutual friendſhip and eſteem. But his abode could not long be concealed from the unremitting curioſity and reſearches of his wife; and, having once diſcovered the ſecret, ſhe, by repeated ſolicitation, and the moſt earneſt promiſes of gentle conduct on her part, prevailed on him to return to his home. He returned, and her ill temper returned, and, fatally for the world, triumphed over the ſtrength of his conſtitution. He is ſaid to have died of this ſecond perſecution.

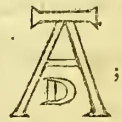
In his behaviour to contemporary artiſts he was ſo courteous, that, whenever they brought their works to him to receive his judgment, even the total want of any thing which he could commend in the pictures did not leſſen his attention to the authors of them. In converſation he was cheerful, without licentiouſneſs; and, as a firm friend of piety and virtue, he never profaned his talents, by employing them on ſubjects unworthy of his mind and pencil.

On his return to Nuremberg, he was named one of the members of the council. He died in that city, in 1528, and was buried in the church of St. John; and a monument was raiſed to his memory, which, falling to ruin, was repaired.

paired 153 years afterwards; and the following elogium inſcribed in braſs over his grave:

Vixit Germaniæ ſuæ decus
ALBERTUS DURERUS,
Artium lumen, ſol artificum,
Urbis patriæ Nor. Ornamentum,
Pictor, chalcographus, ſculptor,
Sine exemplo, quia omniſcius,
Dignus inventus exteris,
Quem imitandum cenſerent,
Magnes magnatum, cos ingeniorum,
Poſt ſeſquiſæculi requiem,
Quia parem non habuit,
Solus heic cubare jubetur,
Tu flores ſparge, viator.
A. R. S. MDCLXXXI.
Opt. Mer. F. Cur.
J. DE S.

Some books written by him in German, on the rules of painting, his "Inſtitutiones Geometricæ," &c. were publiſhed after his death.

He uſed this mark on his works  ; and ſome of his contemporaries having alſo aſſumed it, and particularly Marc Antonio Raimondi, in a ſeries of engravings of the Life of Chriſt, Albert Durer brought an accuſation againſt the latter before the ſenate of Venice, who ordered M. Antonio to efface the mark, and forbad any one beſide Albert to uſe it in future. Sandrart, Pilkington, &c. &c.

DURESSE, *Hardſhip*, in *Law*, is where a perſon is kept in priſon, or reſtrained of his liberty, contrary to the order of law; or is threatened to be killed, maimed, or beaten.

In which caſe, if a perſon ſo in priſon, or in fear of ſuch threats, make any ſpeciality, or obligation, by reaſon of ſuch impriſonment, or threats, ſuch deed is void in law; and in an action brought on ſuch ſpeciality, the party may plead, that it was brought by dureſſe.

DURETAL, in *Geography*. See DURTAL.

DURFORT, a ſmall town of France, in the department of the Oude.—Alſo, a ſmall town of France, in the department of the Gard; 9 miles S.W. of Alais.—Alſo, a ſmall town of France, in the department of the Arriège; 6 miles N.W. of Pamiers.

D'URFY, or D'URFEY, TOM, in *Biography*. We cannot help being a little familiar with this facetious bard, who was himſelf no reſpecter of perſons. Tom had much wit and humour of a certain kind, but very little delicacy or decorum in expreſſing it. Tom's muſe was hardly of a higher order than an oyſter girl, or a cinder-wench, who are not without their wit and humour any more than Tom: only the uſe theſe ladies make of the vulgar tongue is in plain proſe, and Tom's is embelliſhed with verſe.

Tom lived in a merry time, and his writings are well tinctured with the mirth in ſeaſon. As a poet, Tom's meaſures are as frolicſome as his ideas; and as a muſician, his tunes correſpond with the *comicality* of his verſes. If Tom had been a little more ſqueamiſh in his moments of jocularity, and, in making up his "pills to purge melancholy," had kept out the moſt offenſive ingredients, the recipe itſelf, being a good one, might have been filed with ſafety and benefit to the public. To quit the medical metaphor, the collection, had it been purified of its moſt groſs and coarſe materials, containing ſo many original ſongs, and groteſque tunes of a much higher date than his own, would have been a curious repoſitory of ſuch words and tunes as it would be difficult to find any where elſe.

D'Urfy was deſcended from an ancient family in France. His parents, being Hugonots, fled from Rochelle before it was beſieged by Lewis XIII. in 1628, and ſettled at Exeter, where this their ſon was born, but in what year is uncertain. He was originally bred to the law; but ſoon finding that profeſſion too ſaturnine for his volatile and lively genius, he quitted it, to become a devotee of the muſes; in which he met with no ſmall ſucceſs. His dramatic pieces, which are very numerous, were in general well received: yet, within thirty years after his death, there was not one of them on the muſter-roll of acting plays; that licentiouſneſs of intrigue, looſeneſs of ſentiment, and indelicacy of wit, which were their ſtrongeſt recommendations to the audiences for whom they were written, having very juſtly baniſhed them from the ſtage in the periods of purer taſte. Yet are they very far from being totally devoid of merit. The plots are in general buſy, intricate, and entertaining; the characters are not ill drawn, although rather too farcical; and the language, if not perfectly correct, yet eaſy and well adapted for the dialogue of comedy. But what obtained Mr. D'Urfy his greateſt reputation, was a peculiarly happy knack he poſſeſſed in the writing of ſatires and irregular odes. Many of theſe were upon temporary occaſions, and were of no little ſervice to the party in whoſe cauſe he wrote; which, together with his natural vivacity and good humour, obtained him the favour of great numbers of all ranks and conditions, monarchs themſelves not excluded. He was ſtrongly attached to the tory intereſt, and in the latter part of queen Anne's reign, had frequently the honour of diverting that princeſs with witty catches and ſongs of humour, ſuited to the ſpirit of the times, written by himſelf, and which he ſung in a lively and entertaining manner. And the author of the Guardian, who, in N° 67, has given a very humorous account of Mr. D'Urfy, with a view to recommend him to the public notice for a benefit-play, tells us, that he remembered king Charles II. leaning on Tom D'Urfy's ſhoulder more than once, and humming over a ſong with him. He uſed frequently to reſide with the earl of Dorſet at Knowle; where a picture of him, painted by ſtealth, is ſtill to be ſeen.

He was certainly a very diverting companion, and a cheerful, honeſt, good-natured man; ſo that he was the delight of the moſt polite companies and converſations, from the beginning of Charles II.'s to the latter part of king George I.'s reign; and many an honeſt gentleman got a reputation in his county, by pretending to have been in company with Tom D'Urfy. Yet, ſo univerſal a favourite as he was, it is apparent that towards the latter part of his life he ſtood in need of aſſiſtance, to prevent his paſſing the remainder of it in a cage, like a ſinging-bird; for, to ſpeak in his own words, as repeated by the above-named author, "After having written more odes than Horace, and about four times as many comedies as Terence, he found himſelf reduced to great difficulties by the importunities of a ſet of men, who of late years had furniſhed him with the accommodations of life, and would not, as we ſay, be paid with a ſong." Mr. Addiſon then informs us, that, in order to extricate him from theſe difficulties, he himſelf immediately applied to the directors of the play-houſe, who very generouſly agreed to act "The Plotting Siſters," a play of Mr. D'Urfy's, for the benefit of its author. What the reſult of this benefit was, does not appear; but it was probably ſufficient to make him eaſy, as we find him living and continuing to write with the ſame humour and livelineſs to the time of his death, which happened Feb. 26, 1723. What was his age at this time, is not certainly ſpecified any where; but he muſt have been conſiderably advanced in life, his firſt play, which could ſcarcely have been written before he was 20 years of age, having made its appearance 47 years before. He was buried in the church-yard of St. James's, Weſtminſter.

Thoſe who have a curioſity to ſee his ballads, ſonnets, &c. may find a large number of them in 6 vols. 12mo. entitled, "Pills to purge Melancholy," of which the Guardian, in N° 29, ſpeaks in very favourable terms. The titles of his dramatic pieces, thirty-one in number, may be found in the Biographia Dramatica.

DURGA Pooga, the name of the great autumnal feſtival of the Hindoos. On this occaſion, an effigy of Durga, in combat with the chief of the Raccuſſes Soomne Soom, is exhibited, amidſt a gaudy group of evil genii and auxiliary gods, forming a picture, in alto relievo, ſufficient to fill the breadth of a large ſaloon, as ſhewy as brilliant colours and tinſel ornaments can make it. This effigy is removed, on the laſt day at noon, and conveyed in proceſſion to the Ganges, where Durga and her aſſociates are committed all together to the deep. During this latter part of the feſtival, which is generally known in Calcutta by the appellation of the Nautches, the houſes of the moſt opulent Hindoos are open to European viſitors, and conſtantly attract a prodigious concourſe of company. This feſtival, which is the moſt famous among the Hindoos, gives occaſion alſo in Bootan to a great diſplay of ingenuity. The feſtival laſts for ten days, and it is there termed "Mullaum." The groteſque figures that exhibited themſelves in the combat formed a very fantaſtic motley group. Elephants, horſes, apes, and a moſt frightful figure environed with ſnakes, were among the repreſentations intended to perſonate raccuſſes, or evil genii. Virtue appeared in the ſhape of Durga, with a view to exterminate vice; and ſome of the group received very hard blows before they would quit the ſtage; but the force of Durga never failed to maintain its ground in all the triumph of victory. The object of this feſtival ſeems to have been the celebration of the arrival of the autumnal, as that of the "Hooli" does the vernal equinox.

Durga Poogah is diſtinguiſhed alſo as being the well-known period, when the armies of the native powers in India have always been accuſtomed to take the field: and till their acquaintance with Europeans taught them the neceſſity of relinquiſhing ſome of their moſt inveterate prejudices, it was very ſeldom that any of their troops aſſembled in the field, till after the celebration of the Duſſera, which happens on the firſt full moon after the equinox. As that has been ever conſidered as the ſignal for hoſtile preparations, ſo has the Dewali, the following new moon, a feſtival kept in honour of the dead, when it is uſual to make large feaſts, to diſtribute food to the poor, and to make grand illuminations during the night, been commonly the time to ſet their troops in motion. Turner's Embaſſy to Tibet, p. 162.

DURGAN, in *Geography*, a town of Aſiatic Turkey, in the province of Natolia; 48 miles S.E. of Caſtamoni.

DURGUT, a town of Aſiatic Turkey, in the province of Natolia; 18 miles E. of Smyrna.

DURHAM, a county in the northern part of England, bounded to the eaſt by the German ocean, to the north by Northumberland, from which it is ſeparated by the rivers Tyne and Derwent, on the weſt by the counties of Cumberland and Weſtmoreland, and on the ſouth by Yorkſhire. The area thus encloſed forms a triangular figure, and meaſures about 36 miles in its greateſt extent from north to ſouth, by nearly 45 miles in an oppoſite direction. Its ſuperficial area includes about 610,000 acres. This ſpace is divided into four wards, all of which derive their names from places of little importance, *viz.* Cheſter, Darlington, Eaſington, and Stockton; beſides which there are two other diſtricts, called Norhamſhire and Iſlandſhire. The county is divided, according to ſome authors, into 113 pariſhes, while others ſay 120, including one city and ten market towns. According to the laſt report to parliament, this diſtrict contained 27,195 houſes, and 160,361 inhabitants, of whom 74,770 were males, and 85,591 were females. Four members are returned to parliament; two for the county and two for the city.

This part of England was anciently inhabited by the *Brigantes*, a claſs of Britons, diſtinguiſhed by Tacitus as being powerful, brave, and numerous; but who were ſubdued by the Romans. The latter included Durham within the diviſion of Maxima Cæſarienſis; and the Saxons made it part of the kingdom of Northumbria. In the year 685, Egfrid, king of this diſtrict, granted all the lands between "the rivers Weare and Tyne" to St. Cuthbert, the apoſtle of the north. From this time the county was inveſted with great privileges, and has been generally termed the *Biſhopric*, and *County palatine.* Edward I., however, ſeized the power from the biſhop, and transferred the liberties of the ſee to the crown. Theſe were afterwards reſtored in part; and were augmented or enlarged by different monarchs, till queen Mary re-eſtabliſhed them. The biſhops of Durham, from time immemorial, have exerciſed peculiar immunities and power; conſiſting of all manner of royal juriſdiction, both civil and military, by land and ſea. For the exerciſe of which they had their proper courts of chancery, exchequer, and court of pleas, as well of the crown as of the county. The nature and peculiarity of all theſe cannot be properly deſcribed in this place, but may be found fully explained in Hutchinſon's Hiſtory of Durham, 3 vols. 4to. and Gough's edition of Camden's Britannia, vol. iii. p. 109, &c.

The general aſpect of Durham is hilly and mountainous, particularly towards the weſtern angle, which is a bleak, barren, and naked region, croſſed by a lofty ridge called the Engliſh Apennines. Several different ſtreams iſſue from the eaſtern ſide of theſe mountains. On the eaſtern ſide, and near the centre of the county, are ſome fine and fertile vallies, through which various brooks and rivers flow to the ſea. Nearly one-third of the land is held by eccleſiaſtical tenure, under leaſes for lives, or for 21 years. The cattle of Durham are in great repute, as to ſhape, weight, produce of milk, &c. The ſheep are moſtly large, and covered with long wool.

The waſte or uncultivated lands of this county are of conſiderable extent, occupying, according to Mr. Granger, nearly 130,000 acres. According to ſir William Appleby, in a communication to the author of the Agricultural Report, "Durham, taking its ſmall dimenſions into conſideration, is not to be equalled by any other county in Great Britain, except Middleſex, for its numerous and important coal, lead, and iron mines; its large caſt-metal founderies, and iron manufactories, potteries, glaſs-houſes, copperas works, coal, tar, and ſalt works, quarries of marble, fire and free-ſtone; lime, brick, and tile-kilns; grind-ſtone and mill-ſtone; linen and woollen manufactories; trade, agriculture, and population." Granger's general View of the Agriculture of the County of Durham, 4to.

Towards the eaſt and north-eaſt parts of Durham are ſeveral extenſive coal-mines. The ſeams or ſtrata, now worked, are five in number, which extend horizontally for many miles, and are from 20 to 100 fathoms beneath the ſurface. Each ſtratum is from three to about eight feet in thickneſs. Below theſe are ſeveral other ſeams of coal. Some ſteam-engines have been erected, to raiſe the coal to the ſurface, and for the purpoſe of pumping the water out of the mines. In the great ſea-ſale collieries, ſeveral horſes are conſtantly kept under ground, to draw the coals to the mouths of the pits.

In the vicinity of Walſingham, a firm black ſpotted limeſtone or marble is procured, and is much uſed for hearths, chimney-pieces, &c. The ſame neighbourhood alſo abounds with ſtone, much uſed in making mill-ſtones. Many quarries of excellent ſlate have been opened in different parts of the county; and Gateſhead-fell is particularly famous for producing what are vulgarly termed Newcaſtle grind-ſtones, from being moſtly ſhipped off at that port. Fire-ſtone, in high eſtimation for making ovens, furnaces, &c. is obtained in various parts of the county; and large quantities are annually exported. Several lead-mines are worked in Teesdale and Wear-dale. Some extenſive works for manufacturing ſalt from ſea-water have been long eſtabliſhed at South Shields; but theſe have been much neglected, in conſequence of a ſingular ſalt ſpring having been diſcovered at Birtley. The water riſes at the depth of 70 fathoms, and has produced 20,000 gallons *per* day for ſome years paſt. The water is found to be four times ſtronger than any ſea-water.

The manufactures of Durham are numerous and important, and are diſtributed over various parts of the county. At Cheſter-le-Street is a very extenſive foundery for cannon; and another at Waſhington. At Swalwell and at Winlaton are ſome very large iron-works; and at Lumley is a manufactory for converting ſcrap-iron into engine-boiler-plates, and caſt metal into malleable iron. At Shortley-Bridge, Derwent-Coal, and Blackhall-Mills, are manufactories of ſteel for ſword-blades. Tammies, carpets, and waiſtcoat-pieces, are manufactured at Durham; tammies and huckabacks are alſo made at Darlington; cottons are manufactured at Caſtle-Eden, Stockton, and Biſhops-Auckland; glaſs-bottles in large quantities are made at Sunderland, &c.

The chief rivers of this county are the Tees, the Weare, and the Derwent. The total return of income, under the influence of the property-tax bill for this county, in 1806, was 1,320 364*l.* The amount of the poor-rates for 1803, at 2*s.* 4¼*d.* in the pound, was 71,665*l.*

Durham, a city, and the capital of the county of the ſame name, England, is ſituated on a ſingular rocky eminence, riſing near the centre of the county, and almoſt ſurrounded by the river Weare. From all the neighbouring points of view, its appearance is unique and ſtriking: its public edifices exhibiting a degree of magnificence not to be expected at ſo remote a diſtance from the metropolis; and its ſituation and figure being ſo peculiar as to have acquired the emphatic appellation of the *Engliſh Zion.* Durham derives its name from its ſituation; the term being a corruption from the Saxon words, *Dur*, a hill, and *holme*, a river iſland. By the Latins, obſerves Camden, "it is called Dunelmus; and by the common people, Durham or Duresme." The earlieſt hiſtorical notice of this city is contained in the monkiſh legend of St. Cuthbert, from whoſe votaries Dunholme, as it was then called, accumulated all its celebrity and riches. From this legend we collect, that the ſaint died in 687, and was buried in the church of Landisfarne, at that period an epiſcopal ſee, which rank it continued to hold till the year 876, when the Danes, under Halfden, ravaged this part of the country, exerciſed peculiar cruelty againſt the clergy: on which biſhop Eardulf, and the other members of the church, reſolved on immediate migration; and collecting all their relics, ſacred veſſels, ſhrines, jewels, and ornaments, abandoned Landisfarne, and were followed by all the inhabitants. After a long ſeries of temporary reſidences, Dunholme was the place fixed on for the laſting abode of St. Cuthbert's relics, and the further eſtabliſhment of the holy fraternity. From theſe and other correlative circumſtances, we are led to date the riſe of the town of Durham in the beginning of the eleventh century. In the year 1040, it appears to be ſtrongly fortified, when attacked by Duncan king of Scotland: for the townſmen ſuſtained his aſſaults for a conſiderable time; and at length, by a vigorous ſally, totally routed the aſſailants, and beheaded the leaders in the market-place. In 1069, William I. ſent Robert Cumin, whom he had created earl of Northumberland, with 700 veteran Normans, to enforce his authority. Theſe warriors committed great enormities, which excited the inhabitants to a deſperate reſiſtance; when, after a very ſanguinary conteſt, the earl with his 700 guards (one only excepted, who eſcaped wounded) were put to death. William, determined on revenge, indulged the malignity of his heart in the ſpoil and blood of his ſubjects, and deſolated the country in ſuch a manner, that, for 60 miles between York and Durham, he did not leave a houſe ſtanding; reducing the whole diſtrict by fire and ſword. Churches and monaſteries were not ſpared. A dreadful famine enſued; and a mortality unequalled in the annals of this country. The biſhop, eccleſiaſtics, and principal inhabitants, evacuated Durham, and again returned to Landisfarne, till the king's departure, and the reſtoration of ſome degree of tranquillity enabled them to return to their deſolated country. William, on his retreat from an expedition againſt Malcolm king of Scotland, conſidering that Durham was a proper barrier againſt the Scottiſh incurſions, reſolved to erect a caſtle here, which might ſerve alſo to keep the neighbourhood in awe; or, as he explained it, "to ſecure his earl of that province from tumults and inſurrections, as alſo to protect the biſhop of the ſee, and his church." About this time, the Domeſday book was compiled; and as Durham does not occur in it, a ſuppoſition ariſes, that the county was ſo waſted, as not to be worth the expence of a ſurvey. Malcolm king of Scotland now entered the county, and being oppoſed by Robert, ſon of king William, a freſh ſcene of warfare commenced. On the acceſſion of William Rufus, the biſhop of Durham, William de Carilepho, fled into Normandy; and his temporalities were ſeized by the king, who appointed John de Tailbois and Erneſius de Burone governors of the caſtle and palatinate. Durham ſuſtained great injury by fire in the time of biſhop Flambard, when, in conſequence of his flight to Robert duke of Normandy, his poſſeſſions were in the hands of the crown. This biſhop, to ingratiate himſelf at court, oppreſſed the biſhopric with taxes, but without ſucceſs; king Henry having an invincible hatred to the principles of the prelate. In 1112, the biſhop founded the hoſpital of Kepier, which he dedicated to St. Egidius or Giles, and amply endowed it. After his reſtoration to the ſee, he improved the fortifications, by extending the walls between the cathedral and caſtle, removing the houſes on the intermediate area, and levelling the ground. He fortified the caſtle with a moat, improved the banks of the river, and built Framwell-gate bridge. In the reign of Stephen, Durham and its vicinity again experienced the horrors of war, from the incurſions of David king of Scotland, in behalf of his niece Matilda. On the eſtabliſhment of peace, this city was choſen as the place of aſſembly by the members of that convention, in April, 1139. Henry II. having a diſpute with biſhop Pudſey, took poſſeſſion of the caſtle and city of Durham; and, on various pretexts, deprived the biſhop of the cuſtody of ſo ſtrong a poſt. This biſhop obtained a charter from pope Alexander III. at the council of Lateran, in 1176. He alſo made many additions to the cathedral, and ornamented the city by ſeveral public ſtructures; he built Elvet bridge, and rebuilt the borough of that name, which had been deſtroyed by Cumin and his adherents; he conſtructed the city wall from the Gaol-gate to the Water-gate, part of which is ſtill remaining; and re-edified the caſtle, which had been deſtroyed by fire. The *Boldon buke*, now remaining in the auditor's office, was compiled by his order; and has been admitted as evidence in all caſes, to aſcertain the eccleſiaſtical property of the dioceſe. The caſtle ſeems to have remained in the crown; for, when Henry III. conſented to the election of Richard Poore to this ſee, he excepted the poſſeſſion of the caſtles of Durham and Norham. This pious prelate made, by an agreement with the convent, ſeveral regulations concerning the privileges of the two boroughs of Durham and Elvet, with reſpect to civil authority, weights, meaſures, &c. In this reign, it appears that Durham had a royal and palatinate mintage within itſelf, which Edward I. on his acceſſion, made a point of reforming. This city exhibited a ſingular ſcene of feſtivity in 1333, on the promotion of Richard de Bury or Aungerville to the biſhopric. He entertained, in the great hall of his palace, Edward III. and his queen, the queen dowager, the king of Scotland, the two metropolitans, and five biſhops, ſeven earls and their ladies, all the nobility north of Trent, with a vaſt concourſe of knights, abbots, priors. It was in this year that king Edward III. gained the famous battle of Hallidown-hill. This monarch again viſited the city in 1356, and iſſued ſummonſes for the military tenants to attend him, previouſly to the ſiege of Berwick. Biſhop Hatfield, who ſucceeded De Bury, was a great benefactor to the church and city, In 1377, he granted a toll on certain merchandize brought to Durham, to defray the charges of paving the city and repairing the walls. Letters patent were likewiſe granted by him to William de Elmedon, gaoler and porter of the caſtle, with certain profits annexed to the office, among which are fees for ſealing the meaſures to be uſed in the city. In the 3d of Henry VI. the city was enlivened by the marriage of James king of Scotland with his couſin Jane of Somerſet, grand-daughter of John of Gaunt duke of Lancaſter: the ſolemnity was attended by many of the moſt illuſtrious perſons of both kingdoms. The ſuppreſſion of the rebellion of the Nevilles, in the reign of Elizabeth, occaſioned a ſcene of horror in Durham; not fewer than 66 perſons being executed, to ſatisfy the brutality of ſir George Bowes, who boaſted, that in a tract of country 60 miles in length and 40 in breadth, between Newcaſtle and Wetherby, there was ſcarcely a town or village wherein he had not ſacrificed ſome of the inhabitants. During the time of the commonwealth, an attempt was made to eſtabliſh a univerſity at Durham: the plan was ſtrenuouſly promoted by Oliver, and advanced ſo far as to excite the jealouſy and oppoſition of the univerſities of Oxford and Cambridge; when the machine of government fell to pieces, and involved in its ruins this new ſeminary of learning. It is a ſingular fact, that George Fox, the founder of the quakers, aſſumed to himſelf the conſequence, and, as he thought, merit of being the means of ſuppreſſing this laudable inſtitution.

The preſent magnificent cathedral of Durham owes its origin to biſhop William de Carilepho, who, having projected a change in the government of this church, which had hitherto been directed by the ſecular clergy and their provoſt, obtained, under the authority of the king and the pope, a licence to introduce regular canons. Conceiving alſo, that the church built by his predeceſſors was unſuitable to the increaſing dignity of the ſee, he formed a plan for erecting a ſtructure ſimilar to the ſuperb fabrics he had ſeen during his exile on the continent. Accordingly, on Auguſt 11, 1093, the foundation was laid with ſuitable ſolemnity, at which Malcolm, king of Scotland, aſſiſted. The biſhop compelled the monks to labour in the holy work conſtantly; but no conſiderable progreſs was made in his life time, which terminated within two years after the commencement of the edifice. His ſucceſſor, Ralph Flambard, who enjoyed the biſhopric twenty-nine years, and was equally zealous in the pious undertaking, finiſhed the building nearly to the roof. This prelate, before his promotion to the ſee of Durham, had given proof of his ability in architecture, by the erection of the collegiate church of Twinambourne, or Chriſt church, Hampſhire. The cathedral erected by theſe biſhops was of the form univerſally adopted by the Norman architects; a long croſs, with two turrets at the weſt end, and between them, a large and richly ornamented entrance: the eaſt end probably terminated in a ſemicircular form, as the lines of union of the original work, with the chapel of the nine altars, ſtrongly indicate. The ſide aiſles, both of the nave and choir, were vaulted with ſemicircular arches, groined, and the ribs of the groins carved; but the nave and the choir were open to the timber roof. The nave exhibits the next change of ſtyle. Biſhop Poore, having already given a ſpecimen of his taſte in the conſtruction of Saliſbury cathedral, induced prior Melſonby to conform to a more ornamental mode of architecture in the roof, which he was then building. Under his direction the whole vault was accommodated to the pointed arch, though the Norman zig-zag is uſed along the ribs of the groins. Succeſſive additions have rendered this church as it now appears; not only an enlarged ſpecimen of Norman building, but "a moſt inſtructive ſeries of examples, illuſtrating the gradual change of ſtyle which took place during the reigns of the three firſt Henrys, till, by degrees, the pointed had completely ſuperſeded the ſemicircular arch; and the heavy cluſters of the Norman pillars were poliſhed into the light ſhafts of the early Engliſh." "Account of the Cathedral Church of Durham, with Plan, Sections, &c." publiſhed by the Society of Antiquaries of London.

To deſcribe the whole of this ſtructure, with its numerous chapels, tombs, connected edifices, &c. would occupy more ſpace than we can conſiſtently appropriate to this article. Thoſe who are deſirous of ſuch information, may conſult the work juſt referred to, alſo the Beauties of England, vol. v., and Hutchinſon's Hiſtory, &c. of Durham. A few additional particulars reſpecting it may, however, be required. When biſhop Flambard depoſited the remains of St. Cuthbert in the new church, he erected an elegant ſhrine, called the *Feretory*, over them. Biſhop Hugh Pudſey began to erect, at the eaſt end of the cathedral, a chapel to the Virgin Mary; but relinquiſhing this, he appropriated a part of the weſt end, called the *Galilee*, for the admiſſion and ſanctuary of females; as they were not allowed to enter the cathedral. This excluſion was one of the ſtrange prejudices, or infatuations, of the diſciples of St. Cuthbert, who, they aſſerted, had an antipathy to the female ſex.

The great central tower, 214 feet in height, was partly built by prior Melſonby, ſoon after 1233, and completed by priors Middleton and Hugh, before the year 1258. A ſurvey of the cathedral was made in 1776, when it was found to want much reparation, &c. which was immediately commenced: and ſince that period, workmen have been conſtantly employed on this ſtructure. During the laſt fifteen or ſixteen years a ſum amounting to not leſs than 1500*l.* or

2000*l.* has been annually expended for this purpoſe; and a fund is provided to anſwer future demands. Of this noble ſtructure Dr. Johnſon ſpeaks in his uſual ſtyle, that "it ſtrikes with a kind of gigantic dignity, and aſpires to no other praiſe than that of rocky ſolidity, and indeterminate duration." The cathedral may be deſcribed as conſiſting of a nave, with two aiſles; a tranſept with an aiſle towards the eaſt; a choir, with two aiſles; the chapel of the nine altars at the eaſt end, extending north and ſouth; an oblong chapter-houſe, with ſemicircular eaſt end; a cloiſter to the ſouth; a chapel, or Galilee, at the weſt end; and ſeveral apartments on the weſt and ſouth ſides of the cloiſters. The entire length of this ſtructure is 461 feet, thus divided: nave 260 by 74 feet, and 69 feet ſix inches in height; length of tranſept 170 by 57 feet in width; choir 120 by 74 feet; chapel at eaſt end 130 feet from N. to S. by 51 in an oppoſite direction; Galilee 50 feet from E. to W. by 80 feet from N. to S. Theſe are interior meaſurements.

From the cathedral on the north extends an open area, called the Place, or Palace Green, on the north ſide of which is the caſtle, now the reſidence of the biſhop when he viſits Durham. This ſtructure ſtands on the continuation of the ſame rocky eminence on which the cathedral is built; and from its upper apartments commands ſome fine views of the city and ſurrounding country. The moſt ancient part of this edifice is the keep or tower, which occupies the top of an artificial mount, and is ſuppoſed to have been of Norman conſtruction. The buildings, which now conſtitute the caſtle, have been erected at various periods, and have conſequently but little uniformity. Some parts, which have ſuffered by fire, were reſtored by biſhop Pudſey, who acceded to the ſee in 1153. He is alſo ſuppoſed to have erected the firſt hall: but this, with other parts of the caſtle, going to decay, a new and more magnificent hall was built by biſhop Hatfield, the original length of which was 120 yards. From this apartment the preſent hall was formed, which is of extenſive dimenſion; its length being 180 feet, the breadth 50, and the height 36. Contiguous to the keep, on the eaſt, is the great north gateway, a very ſtrong fabric, erected by biſhop Langley, and now uſed as the gaol. The outward, or lower part, was defended by a gate and portcullis; within which is a receſs, conſtructed with ſallyports and galleries, for the annoyance of aſſailants, who might force the firſt gate: the upper part was ſecured by double gates. All the other gates of the city have been removed. On the weſt ſide of the Place Green is the exchequer, a ſtrong ſquare ſtone building, erected by biſhop Neville about the year 1450. Adjoining it is the biſhop's library, built by biſhop Coſin, who alſo greatly contributed towards the erection of the law courts, where the aſſizes, quarter ſeſſions, &c. are held. The court for the trial of crown cauſes was much enlarged in 1791. On the oppoſite ſide of the green is an hoſpital, or almshouſe, for eight poor men and women, founded by biſhop Coſin in 1666; and adjoining it, at each end, a ſchool-houſe, rebuilt by him about the ſame period, but originally endowed by biſhop Langley. From the Place Green is an avenue leading to the public walks called the Banks, which ſkirt the river, and were made, and are ſtill kept in repair, by the munificence of the dean and chapter. Theſe walks are much celebrated for their beauty and intereſting views. Over the river Weare are three bridges: Framwell-gate bridge, erected by biſhop Flambard, about 1120; Elvet bridge, by biſhop Pudſey, about 1155; and the New bridge, built in 1772.

Independently of the cathedral, Durham contains ſix churches, the principal of which is that dedicated to St. Nicholas, an ancient ſtructure, ſituated on the ſouth ſide of the market-place. It conſiſts of a nave and ſide aiſles, with a ſquare tower at the ſouth-weſt angle. The church of St. Mary-le-Bow, or Bough, is on the eaſt ſide of the North Bailey; on the ſame ſpot, according to tradition, where St. Cuthbert's remains were lodged, in a tabernacle of boughs and wands, when firſt brought by the monks to Durham. St. Oſwald's church is an ancient ſtructure, occupying an elevated ſituation on the eaſtern banks of the river in that part of the ſuburbs called New Elvet: it conſiſts of a nave, chancel, and ſide aiſles. St. Giles's church is of remote origin, having no aiſles; it is narrow, long, and lofty. The church of St. Margaret, ſituated in Croſsgate, and that of Little St. Mary, in the South Bailey, diſplay nothing remarkable. The market-place is a ſmall ſquare, having a Guildhall, or Tolbooth, on the weſt ſide, a pant to ſupply the inhabitants with water, near the centre, and a piazza, where the corn-markets are held on the ſouth.

The original denomination of Durham, after its civil eſtabliſhment, was that of Borough; and its local polity was exerciſed by a bailiff, appointed by the biſhops. In 1565 the civil juriſdiction was veſted, by biſhop Pilkington, in an alderman and twelve burgeſſes. In 1602 biſhop Mathew changed it to that of a mayor, twelve aldermen, and twenty-four common councilmen. This mode of government, having ſuſtained ſeveral interruptions, was finally re-eſtabliſhed in 1780, by a new charter from biſhop Egerton, in which the rights of the citizens were explained and confirmed.

Neither the county, nor the city of Durham, was repreſented in parliament till the reign of Charles II.; a circumſtance which may be aſcribed to the vaſt power and influence of the biſhop: as returning members to parliament was anciently conſidered more grievous and inconvenient, than uſeful or honourable. The extenſion of learning induced ideas more favourable to liberty: and, in 1673, an act was paſſed, authorizing the city and county to ſend each two members; and from that time the returns have been regularly made. The right of election for the city is in the mayor, aldermen, and freemen: the voters are about 1000. Durham is ſituated 260 miles N. from London; has a weekly market on Saturdays, and three annual fairs; and contained, as returned under the late act, 1024 houſes, and 7530 inhabitants.

Durham, a townſhip of America, in Cumberland county, Maine, on the S.W. bank of Androſcoggin river, which ſeparates it from Bowdoin on the N.E. It was incorporated in 1789, contains 1242 inhabitants, and lies 145 miles north-eaſterly of Boſton. N. lat. 43° 55'.—Alſo, a poſt town in Strafford county, New Hampſhire, ſeated on Oyſter river, near its junction with the Piſcataqua; 12 miles W. of Portſmouth. It was incorporated in 1633, and contains 1126 inhabitants. It was formerly a part of Dover, which adjoins it on the north, and was called Oyſter river.—Alſo, a poſt town in New Haven county, Connecticut, ſettled from Guildford in 1698, and incorporated in 1708. It is about 22 miles S.W. of Hartford, and 18 miles N.E. of New Haven. The Indians called it "Cagingehague," which name a ſmall river that riſes here ſtill bears. It has 1029 inhabitants.—Alſo, a townſhip in Bucks county, Pennſylvania, having 405 inhabitants.—Alſo, a county in Upper Canada, bounded on the E. by the county of Northumberland, on the S. by lake Ontario, until it meets the weſternmoſt point of Long Beach, thence by a line running N. 16° W. until it interſects the ſouthern boundary of a tract of land belonging to the Miſſaſſaga Indians, and thence along the ſaid tract, parallel to lake Ontario, until it meets the

N. weſternmoſt boundary of the county of Northumberland. Morſe.

DURIA Major *and* Minor, in *Ancient Geography.* See *La* Doria *Baltea* and *Riparia.*

DURIO, in *Botany,* (from a Malay word *dury,* which, according to Rumphius, means a thorn, the names of this ſpinous fruit, *Duryon,* Durëin, or *Dureyn,* in Malacca, Ternate and Ambovna, are derived. Linnæus, perhaps, conſidered the word *Durio* as rendered canonical, by an equally correct alluſion to the hard coarſe rind of the fruit, "a fructûs duritiâ.") Durion. Linn. Syſt. Veg. ed. 13. 581. Schreb. 516. Willd. Sp. Pl. v. 3. 1434. Juſſ. 244. König in Tr. of Linn. Soc. v. 7. 266. Claſs and order, *Polyadelphia Polyandria.* Nat. Ord. *Malvaceæ,* König.

Gen. Ch. *Cal.* Perianth inferior, double, each of one leaf, ſomewhat coriaceous, ſmooth within, externally clothed with very minute, ſhining, ſilvery, ſtellated, pellucid ſcales: the outer one wideſt, obtuſely two-lobed, ſpreading: the inner longeſt, nearly an inch in length, urn-ſhaped, ſwelling, with five erect, acute, equal, marginal ſegments. *Cor.* Petals five, above twice as long the inner calyx, inſerted into its baſe, elliptic-lanceolate, entire, recurved, equal, with ſurrowed claws. *Stam.* Filaments numerous, from twenty-five to forty-five, rather longer than the petals, upright, thread-ſhaped, equal, united in a ſomewhat forked manner into five ſets, inſerted into the bottom of the calyx, oppoſite to the petals; anthers roundiſh, compoſed of numerous aggregate cells. *Piſt.* Germen ſuperior, obovate, obſcurely five-ſided, ſcaly; ſtyle ſimple, thread-ſhaped, the length of the filaments, a little twiſted upwards; ſtigma capitate, with five furrows. *Peric.* Apple very large, globoſe, inclining to oval, pointed, entirely clothed with crowded, prominent, pyramidal, acute tubercles, of five cells which open outwardly. *Seeds* from two to five in each cell, ovate-oblong, ſhining, encloſed in one, common, aggregate, ſoft, pulpy tunic, which fills each cell, and is firmly attached to the central column. Cotyledons two, without any ſeparate albumen. Embryo ſtraight, in the baſe of the ſeed.

Eſſ. Ch. Calyx double, the outer one two-lobed. Petals five. Style one. Apple with five cells. Seeds in a pulpy tunic.

D. *zibethinus,* the only ſpecies. Kön. Tr. of L. Soc. v. 7. 266—273. t. 14, 15, 16. Mart. Mill. Dict. v. 2. Lamarck Dict. v. 2. 333. t. 641. (Durio, Rumph. Amb. v. 1. 99. t. 29.) Native of Malacca, Sumatra, Java, Borneo, and the Molucca iſlands. It forms a very lofty tree. *Leaves* alternate, on ſwelling ſtalks, elliptic-oblong, pointed, entire, with one rib and numerous veins; ſmooth and dark green above; clothed with minute ruſty ſcales beneath. Stipulas none? *Flowers* in lateral bracteated branches from the larger branches, unpleaſantly ſcented. *Partial ſtalks* two or three inches long, round, ſcaly, jointed at the baſe. *Petals* of a dirty white. *Stamens* and ſtyle red. *Fruit* yellowiſh-green externally. *Seeds* of a yellowiſh brown; their tunics white, of a ſoft, mucous, and very tender ſubſtance. Theſe tunics conſtitute the eatable part of the Durion fruit, which is eſteemed one of the moſt delicious vegetable productions of India, and compared by Rumphius to cream or *blanc manger.* This author tells us, however, that perſons not accuſtomed to eat this fruit, are at firſt deterred from taſting it by the intolerable ſmell which it diffuſes, reſembling rotten onions; but thoſe who overcome their firſt repugnance grow extremely fond of it. He further mentions, that it is not always to be eaten with impunity. The pulp of one or two Durions is ſufficient for one perſon at a time, though ſome ſtomachs will bear a much greater quantity. Their immoderate uſe cauſes violent and dangerous inflammatory diſorders, and the ſeaſons when they abound are generally very unhealthy. It is forbidden by law to throw the rinds of this fruit into much-frequented places, on account of their dangerous fœtor. The Chineſe uſe their aſhes in painting and dyeing. Mr. König is the firſt who has given an accurate botanical deſcription of this plant.

DURIUS, in *Ancient Geography,* a river of Hiſpania Interior, now *Douero* or *Douro.*

DURKO, in *Geography,* a town of Aſiatic Turkey, in the province of Natolia; 42 miles S.W. of Amaſieh.

DURLACH, or Dourlach, a ſmall but handſome town of Germany, in the grand duchy of Baden, on the river Pfinz, with a caſtle called Karlſburg. It was formerly the reſidence of one branch of the houſe of Baden, the ſons of margrave Chriſtopher of Baden, who had reunited two former lines in 1503, having commenced two new lines of Baden Baden, and Baden Durlach. See Baden.

DURLAH, a river of Bengal, which divides the diſtrict of Cooch Bahar from that of Rungpore.

DURNESS, a town of Scotland, in the county of Sutherland, near the N. coaſt, at the bottom of a bay, formed by a river of the ſame name, called the "Kyle of Durneſs;" 46 miles N.N.W. of Dornoch. N. lat. 58° 33′. Long. 1° 21′ W. of Edinburgh.

DURNISH, a town of Scotland, on the weſtern coaſt of the iſland of Skye.

DURNOVARIA, in *Ancient Geography,* a town of Albion, which all our antiquaries agree to fix at Dorcheſter, where many Roman antiquities have been found, and where the veſtiges of the Roman walls of the city and of an amphitheatre without them are ſtill viſible. See Dorcheſter. It was alſo called Dunium, which ſee.

DUROBRIVIS, the ancient name of Rocheſter in Antonine's Itinerary, which our antiquaries derive from *Dur,* a river, or water, and *Briv,* a town.

Durobrivis, is alſo a name given in the 5th Iter of Antonine to a place ſituated between Cambridge and Ancaſter. Dr. Gale fixes it at Bridge Caſterton, two miles N. from Stamford: but Camden, Baxter, and Horſley, place it at Caſtor upon the river Nen, or rather at the village of Dornford, near Caſtor, where many Roman coins and other antiquities have been found.

DUROCHSKOI, in *Geography,* a town of Ruſſia, in the government of Irkutſch, on the borders of China, near the river Argunia; 160 miles S.S.E. of Nertchinſk.

DUROCOBRIVIS, in *Ancient Geography,* a place marked in Antonine's Itinerary between Fenny Stratford and St. Albans, which is generally fixed at Dunſtable; though Mr. Horſley conjectures, that the two ſtations Magiovintum and Durocobriva have been tranſpoſed by the careleſſneſs of ſome tranſcriber; and that the latter was at Fenny Stratford, and the former at Dunſtable; becauſe, in that caſe, the meaning of the original Britiſh names of theſe places will be more agreeable to their ſituations.

DUROCORNOVIUM, a ſtation between Glouceſter and Speen, ſuppoſed to be Cirenceſter.

DUROIA, in *Botany,* (in commemoration of Dr. John Philip Duroi, a phyſician of Brunſwick, author of an inaugular diſſertation, conſiſting of botanical remarks, publiſhed in 1771, and of a German work on trees and economical plants, with figures. He was a frequent correſpondent of Linnæus, whoſe herbarium, as we are informed by Dr. Smith, he much enriched.) Linn. Suppl. 30. Schreb. 230. Willd. Sp. Pl. v. 2. 222. Juſſ. 203. Mart. Mill. Dict. v. 2. (Pubet; Linn. Amœn. Acad. v. 8. 264.) Claſs and order, *Hexandria Monogynia.* Nat. Ord. *Rubiaceæ,* Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſuperior, cylindrical, abrupt, ſhort, contracted. *Cor.* of one petal. Tube cylindrical;

limb the length of the tube, in ſix deep, oval, ſpreading ſegments. *Stam.* Filaments none; anthers ſix, oblong, ſeſſile in the tube of the corolla. *Piſt.* Germen inferior; ſtyle thread-ſhaped, the length of the tube; ſtigmas two. *Peric.* Berry globoſe, umbilicated, denſely clothed with prominent hairs. *Seeds* numerous, imbedded in pulp, oval, flat, very ſmooth, lying in two rows over each other. The flowers are often abortive, and there are many of them alſo male, wanting the germen altogether. Linn.

Juſſieu, from the evident characters of his natural order of *Rubiaceæ* in this plant, preſumes its fruit to be of two cells. Its characters very nearly approach *Gardenia*.

Eſſ. Ch. Calyx ſuperior, cylindrical, abrupt. Corolla with a cylindrical tube, and ſix-cleft regular border. Anthers ſeſſile in the tube. Berry hiſpid, umbilicated.

D. *Eriopila*, is the only ſpecies. Linn. Suppl. 209. (Marmelade-Doosjes-Boom; Merian Surin. 43. t. 43.) Native of Surinam, whence it was ſent by Dalberg to Linnæus, from whoſe account and the figure in Merian, concerning whoſe ſynonym there ſurely can be no reaſonable doubt, all our knowledge is derived, for we have never ſeen a ſpecimen. It is deſcribed as a lofty tree, with thick, unequal branches, hairy in their upper part. *Leaves* about the ſummits of the branches, oppoſite, crowded, a ſpan long, obovate, bluntiſh, entire, hard, rigid, downy above, reticulated beneath, with one rib, and many tranſverſe veins. *Foot-ſtalks* ſhort, hairy. Merian deſcribes a kind of rough excreſcences, growing either on the ſtalks or branches, throwing out numerous cylindrical or awl-ſhaped horns, which are preſcribed in pulmonary diſorders. The *flowers* are terminal, ſeſſile, cluſtered, numerous, but moſt of them abortive; their *corolla* white, reſembling the Arabian Jaſmine. *Fruit* rather larger than a turkey's egg, globoſe, with a furrow on each ſide, yellow, covered with ſhort, denſe, brown, prominent hairs, crowned with the cup-like permanent baſe of the calyx, and filled with numerous ſeeds lodged in pulp which is eatable, and compared by Madam Merian to that of the European medlar. Her figure evidently indicates a ſeparation of the berry into two cells, as ſuſpected by Juſſieu. The bark reſembles a box, and hence the above Dutch name, equivalent to Marmelade-box tree.

The caterpillar of a beautiful butterfly feeds on this tree, which is near *Papilio Proteſilaus* of Linnæus, but, we believe, very diſtinct, though cited for it by him as well as by Fabricius.

DUROLEVUM, the name of a ſtation between Rocheſter and Canterbury; the ſituation of which is uncertain; and Mr. Horſley ſeems to be ſingular in placing it at Milton.

DUROLIPONS, a ſtation fixed by ſome at Cambridge; but thoſe antiquarians who place Camboricum at Cambridge, fix Durolipons at Godmancheſter.

DUROLITUM, in *Ancient Geography*, a ſtation between Chelmsford and London, ſuppoſed to be Lecton.

DURONIA, a town of Italy, placed by Livy in the country of the Samnites.

DUROT, in *Geography*, a bay on the N. ſide of the S. peninſula of the iſland of St. Domingo.

DUROTRIGES, in *Ancient Geography*, the name of an ancient Britiſh nation, ſeated next to the Danmonii on the eaſt ſide, and poſſeſſing that country, which is now called Dorſetſhire. The name is evidently derived from the two Britiſh words *dur* or *dwr*, water, and *trigo*, to dwell; and it is equally evident that they owed this name to the ſituation of their country, which lies along the ſea coaſt. It is not very certain whether the Durotriges formed an independent ſtate under a prince of their own, or were united with their neighbours, the Danmonii; as they were reduced by Veſpaſian under the dominion of the Romans, at the ſame time, and with the ſame eaſe, and never revolted. (Eutrop. l. 5. c. 8.) The peaceable diſpoſition of the inhabitants is the reaſon why the Romans had ſo few towns, forts, and garriſons in this pleaſant country. Dorcheſter, its preſent capital, was a Roman city of ſome conſideration, and is ſuppoſed to have been called Durnovaria. The country of the Durotriges was included in the Roman province called Flavia Cæſarienſis, and governed by the preſident of that province, as long as the Romans kept any footing in theſe parts.

DUROVERNUM, a ſtation about the ſituation of which at Canterbury there is no doubt; and Mr. Baxter derives its name from *dur* a river, and *vern*, a ſanctuary.

DUROUR'S ISLAND, in *Geography*, an iſland in the Pacific ocean, diſcovered by Capt. Carteret, in September, 1767. S. lat. 1° 14′ or 16′. E. long. 143° 21′.

DURRENBERG, a ſmall town of the kingdom of Saxony, in the diſtrict of Merſeburg, remarkable for ſome very abundant ſalt-ſprings, which furniſh as much ſalt as the whole conſumption of the kingdom requires.

DURROW, a market and poſt town of the county of Kilkenny, Ireland, on one of the roads from Dublin to Cork. It is very neat, and has an excellent inn. The roads near it are peculiarly pleaſant, paſſing through the demeſne and plantations of lord Aſhbrooke, whoſe reſidence is at Caſtle Durrow adjoining the town. It has been obſerved that this tract contains more extenſive woods, and preſents a greater variety of beautiful proſpects from the diverſity of well planted hills, and rich vallies, than any other part of Ireland. Durrow, though ſurrounded by the Queen's county, is in Kilkenny, which is thus accounted for. On its coming into the poſſeſſion of the Butler family, who were perpetually harraſſed by the powerful ſept of the Fitzpatricks, the earl of Ormond procured an act of parliament to make this eſtate part and parcel of the county of Kilkenny, and the offending Fitzpatricks being taken were transferred immediately to Kilkenny, and there, removed from their connections, they ſuffered the penalties of the law. Durrow is 52 miles S.W. from Dublin, and 12 from Maryborough. Wilſon's Directory, &c.

DURSEY, an iſland in the Atlantic, about two miles long, and half a mile broad, ſituated near the ſouth-weſt coaſt of Ireland, belonging to the county of Cork. It is near the northern point of Bantry bay. It is in long. 10° 4′ W. Lat. 51° 33′ N. Beaufort.

DURSIANS, or DURURIANS, in *Eccleſiaſtical Hiſtory*, See DRUSES.

DURSLEY, in *Geography*, a town in the hundred of Berkeley, Glouceſterſhire, England, was formerly a borough, but has long ſince loſt the privilege of ſending members to parliament. It conſiſts of two narrow ſtreets. The government is veſted in a bailiff and four conſtables. The church is a ſpacious ſtructure, having two aiſles and a tower. On the ſouth ſide of the church-yard a copious ſpring of water riſes, which gives motion to a fulling mill. In the vicinity is a peculiar rock, called by Leland *Towſe ſtone*, and by the natives Puff-ſtone, which, though ſoft in hewing, becomes very durable when expoſed to the air: of this ſtone the church is built. Durſley is 108 miles N.W. from London: has two annual fairs; and a market on Thurſdays: the market houſe, which is a handſome edifice, was erected in 1738. By the late return, the town contained 460 houſes, inhabited by 2379 perſons, of whom 1040 were deſcribed as being employed in trade and manufacture; there being a conſiderable traffic in broad cloth, and card making for the clothiers; and an extenſive paper manufactory. Here was anciently a caſtle, the ſite of which is ſtill called *Caſtlefield,* where ſome earth-works are ſtill to be ſeen. Rudge's Hiſtory of Glouceſterſhire, vol. ii. p. 216.

DURSTUS, or Drust, in *Biography,* was the ſon of Erp, or Erpin, a diſtinguiſhed character in the line of Pictiſh kings; who began to reign A. D. 406; and after fighting more than a hundred battles, and living to the protracted age of one hundred years, died A. D. 451. In that monarch's reign the Picts were converted to Chriſtianity by St. Ninian. See Dr. Anderſon's Royal Genealogies.

DURTAL or Duretal, in *Geography,* a ſmall town of France, in the department of Mayenne and Loire, chief place of a canton in the diſtrict of Segré, 9 miles S. W. of la Flèche, with a population of 3107 individuals, and remarkable for the fertility of its territory, which produces excellent wine, and abundance of corn. The canton contains ſix communes and 9498 inhabitants, upon a territorial extent of 205 kiliometres.

DURVES, a town of Aſia, in the country of Candahar; 130 miles S.E. of Candahar.

DURUM, *Latin,* in *Muſic,* hard, harſh, ſharp, one of the diſtinctive terms applied to the three original major keys, in forming the hexachords. G is the *ut* of the durum hexachord. C of the *natural* hexachord, and F of the *molle.* Theſe furniſh a ſeries of ſix ſounds aſcending in each, by the ſame intervals.

G A B C D E
C D E F G A
F G A Bb C D

By theſe hexachords the three keys are connected: there being three notes of each, in common with the next hexachord above or below.

DURUNGI, or Durunigi, in *Botany,* the Arabic appellation of the *Doronicum Pardalianches,* from which its preſent generic name is ſuppoſed to have been corrupted by modern writers, as ſome ſtill more recently have made *Ailanthus* from Aylanto, and *Pandanus* from Pandang, words which, to uſe the expreſſion of Linnæus, "may be tolerated, but are not to be imitated." See Doronicum.

DURVUS Mons, in *Ancient Geography,* a mountain of Gaul, in the province called "Maxima Sequanorum." By this mountain there was a paſſage from the country of the Rauraci on the north to that of the Helvetii in the ſouth.

DURY, John, in *Biography,* a learned divine, who flouriſhed in the ſeventeenth century, was born in Scotland, and educated for the miniſtry. The great object of his early life was an endeavour to unite the Lutherans and Calviniſts; for this purpoſe he obtained the approbation of the archbiſhop of Canterbury, and ſome other of the biſhops. He circulated his plans over the whole of proteſtant Europe, which he ſeconded by his own perſonal labours, and by almoſt innumerable journies taken expreſsly with this view. After many years of labour and toil, he gave up the hope of uniting the Proteſtants; and began a ſtill more arduous work, *viz.* of uniting in the bonds of friendſhip Chriſtians of all ſects, which he expected to effect by a new explication of the Apocalypſe. Beſides this work he publiſhed a book, entitled "Johannis Duræi Irenicorum Tractatuum Prodromus, in quo præliminares continentur tractatus de I. pacis eccleſiaſticæ remoris è medio tollendis. II. Concordiæ Evangelicæ fundamentis ſufficienter jactis. III. Reconciliationis Religioſæ procurandæ argumentis et mediis. IV. Methodo inveſtigatoria ad controverſias omnes, ſine contradicendi ſtudio et præjudicio pacifice decidendas, &c." In this book the author gives an account of the works which he had promiſed to the public, and of the expedients which he thought moſt favourable to his deſign. Dury wrote a letter to Peter du Moulin, concerning the ſtate of the Engliſh, Scotch, and Iriſh churches under Cromwell, which, with other pieces, was printed at London, in the year 1658, by the care of Louis du Moulin. It is uncertain in what year he died. Bayle.

DUSART, Cornelius, painter of converſations, dancings, and taverns, born at Haerlem 1665, diſciple of Adrian Oſtade. He ſtudied with great aſſiduity, and expreſſed with equal humour and ſpirit the manners and paſſions of the boors in their feaſts, ſports, &c. and he nearly approached, although he never equalled, the merit of his maſter. He was naturally of a weak conſtitution, which he had ſtill more impaired by ſtudy; but his memory continued ſo ſurpriſingly retentive, that he could, at any diſtance of time, retrace any ſtriking object which he had once ſeen, with the utmoſt accuracy and preciſion in every point. He died in 1704. Pilkington.

DUSENSUS, or Dusitanus, in *Ancient Geography,* an epiſcopal ſee of Africa.

DUSKY Bay, in *Geography,* a bay on the S.W. coaſt of the moſt ſoutherly iſland of New Zealand, diſcovered and ſo named by Cook in March 1770. It is between three and four miles broad at the entrance, and ſeemed to be as deep as broad: it contains ſeveral iſlands, behind which a ſhelter is afforded from all winds. The north point of this bay, when it bears S. E. by S. is rendered very remarkable by five high peaked rocks which lie off it, and have the appearance of the four fingers and thumb of a man's hand, on which account it was called "Point Five Fingers;" and the land of this point is further remarkable, for being the only level land within a conſiderable diſtance.

It extends nearly two leagues to the northward; it is lofty and covered with wood. The land behind it is very different, conſiſting wholly of mountains, totally barren and rocky; and this difference gives the cape the appearance of an iſland. The weſtern-moſt point of land upon the whole coaſt, called "Weſt Cape," lies about three leagues to the ſouthward of Duſky bay, in the latitude of 45° 54′ S. and in the longitude of 193° 17′ W. The land of this cape is of a moderate height next the ſea, and is diſtinguiſhed by a very white cliff, two or three leagues to the ſouthward of it. Captain Cook again viſited Duſky bay in March 1773; and found, at the entrance of it, 44 fathoms water, a ſandy bottom, the Weſt Cape bearing S. S.E. and Five Fingers point, or the north-point of the bay, north. A great ſwell rolled in from the S.W. The depth of water decreaſed to 40 fathoms; and afterwards they had no ground with 60. Diſliking the place in which they had anchored, they removed to another on the S. E. ſide of the bay, where they had a good harbour, with every conveniency. Captain Cook determined to make ſome ſtay in this bay, and thoroughly to examine it; as no one had ever landed before, on any of the ſouthern parts of this country. He alſo availed himſelf of the opportunity that was now afforded for neceſſary repairs, and for other occupations that were conducive to the health and convenience of his fellow-navigators. Here he found a tree, reſembling the American black ſpruce, from the branches and leaves of which he made a kind of beer, that with the addition of inſpiſſated juice of wort and molaſſes furniſhed a very wholeſome beverage, and ſupplied the want of vegetables, which the place did not afford.

The ſouth entrance of Duſky bay is ſituated on the N. ſide of Cape Weſt, in S. lat. 45° 48′; and is formed by the land of the cape to the ſouth, and Five Fingers point to the north. This land, when viewed from certain ſituations, bears ſome reſemblance to the five fingers of a man's hand, whence it takes its name; and different from the other adjacent lands, it is a narrow peninſula, lying north and ſouth, of a moderate and equal height; altogether covered with wood. The depth of water is the only inconvenience that attends the entrance into this bay, as it affords no anchorage, except in the coves and harbours, and very near the ſhores, which is ſometimes impracticable. The anchoring places, however, are ſufficiently numerous, and equally ſafe and commodious. "Pickerſgill harbour," where captain Cook lay, is not inferior to any other bay for two or three ſhips; it is ſituated on the ſouth ſhore abreaſt of the weſt end of "Indian iſland," which iſland may be known from the others by its greater proximity to that ſhore. There is a paſſage into the harbour on both ſides of the iſle, which lies before it. The next place on the upper or eaſt ſide is "Caſcade Cove," ſo called from a large caſcade at the eaſt point of the cove, that falls from a high mountain on the S. ſide of the bay. In this cove there is room for a fleet of ſhips, and a paſſage in, on either ſide of the iſland which lies in the entrance. The ſeveral anchoring places in this capacious bay are marked in Cook's chart, which will be a ſufficient guide to all who need information. The north entrance into this bay lies in S. lat. 45° 38′, and five leagues to the north of Five Fingers Point.

The adjacent country is very mountainous; not only about Duſky bay, but through all the ſouthern part of the weſtern coaſt of "Tavai Poenammoo." Within land nothing appears but the ſummits of mountains of a ſtupendous height, and conſiſting of rocks that are totally barren and naked, except where they are covered with ſnow. But the land bordering on the ſea-coaſt, and all the iſlands, are thickly covered with wood, almoſt down to the water's edge. The trees are of various kinds, and are fit for the ſhipwright, houſe-carpenter, cabinet-maker, and many other uſes. The moſt conſiderable for ſize is the ſpruce tree, many of which trees are from ſix to eight or ten feet in girt, and from 60 to 80 or 100 feet in length; large enough to make a main-maſt for a 50 gun ſhip. The woods in many parts are ſo overrun with ſupple-jacks, 50 or 60 fathoms in length, that it is ſcarcely poſſible to force one's way amongſt them. The ſoil is a deep black mould, compoſed of decayed vegetables; and the ground amongſt the trees is covered with moſs and fern, of both which there is great variety; but except the flax or hemp plant, and a few other plants, there is very little herbage, and none that is eatable, except ſome few creſſes and a ſmall quantity of celery. Duſky bay abounds moſt with fiſh; ſo that a boat with ſix or eight men, with hooks and lines, caught every day enough to ſerve the whole ſhip's company. Of ducks there is alſo great plenty, and no leſs than five different kinds. One cove, which abounds with them, was called "Duck-cove." The moſt miſchievous animals are the ſmall black ſand flies, which are very numerous and very troubleſome. Wherever they bite they cauſe a ſwelling, and ſuch an intolerable itching, which induces a ſcratching that brings on ulcers like the ſmall-pox. The almoſt continual rains may be reckoned another evil attending this bay. But though our navigators were perpetually expoſed to them, they experienced no pernicious effects. Thoſe who were ſick and complaining, when they entered the bay, recovered daily, and the whole crew ſoon became ſtrong and vigorous. This happy circumſtance could only be attributed to the healthineſs of the place, and the freſh proviſions it afforded; and more particularly to the liberal ſupply of beer.

The inhabitants of this bay belong to the ſame race of people with thoſe in the other parts of this country: they ſpeak the ſame language and obſerve nearly the ſame cuſtoms. They live a kind of wandering life, and one family ſeems to maintain no perfect amity with another.

From a great variety of obſervations made by Mr. Wales, he found that the latitude of his obſervatory at Pickerſgill harbour was 45° 47′ 26½‴ S.; and by the mean of ſeveral diſtances of the moon from the ſun, that its longitude was 166° 18′ E. The variation of the needle or compaſs was found to be 13^{h} 49′ E., and the dip of the ſouth end 70° 5¾′. The times of high water, on the full and change days, he found to be at 10° 57′, and the tide to riſe and fall at the former eight feet, at the latter five feet eight inches. Hawkſworth's Voyage, vol. iii. Cook's Voyage, vol. i.

DUSRACH, a town of Perſia, in the province of Kerman; 156 miles S. of Sirgian.

DUSSAC, a town of France, in the department of the Dordogne and diſtrict of Exideuil; 4 miles N. of Exideuil.

DUSSEL, a river of Germany, in the kingdom of Weſtphalia, which runs into the Rhine at Duſſeldorp.

DUSSELDORF, or Dusseldorp, a very handſome town of Germany, chief city of the grand duchy of Berg, which, ſince the appointment of its grand duke, Joachim Murat, to the throne of Naples in 1808, has been taken poſſeſſion of by the French. Duſſeldorf is ſituated on the river Duſſel, at the place where this river falls into the Rhine. Till the peace of Luneville it belonged to the elector palatine of Bavaria, now king of Bavaria, to whom it is principally indebted for its embelliſhments. It is 27 miles N.W. of Cologne, 27 miles N.E. of Juliers, and 75 S.W. of Munſter. The ſtreets are wide, regular, and clean; the houſes lofty, and the inhabitants extremely induſtrious. Their number amounts to about 15,000.

Duſſeldorf is chiefly remarkable for its celebrated gallery of pictures, which conſiſts of three large and two ſmaller rooms, bearing each the name of the ſchool to which the pictures belong, *viz.* the Flemiſh ſchool, Gerrard Dow, the Italian ſchool, Vander Werff, and Rubens.

DUSSENT, Josef, in *Biography*, a Spaniſh painter, diſciple of Vanloo, and one of the competitors in public, at the opening of the Royal Academy of San Fernando, at Madrid, in 1752. Diccionario Hiſtorico, &c. de las Bellas Artes.

DUST, minute and almoſt inſenſible particles broken off from any hard body.

Thoſe broken from ſtones, or formed of extremely ſmall ſtones, are more properly called *ſand.* See Sand.

The ſubtle matter of Des Cartes is a ſort of duſt produced by the colliſion of the matter of the ſecond element.

Dust, *Gold* and *Lead.* See the reſpective articles.

Dust, *Moſs.* See Byssus.

DUSZMIANY, in *Geography*, a town of Lithuania, in the palatinate of Troki; 20 miles S.S.W. of Troki.

DUTCH *Coins, Fortification, Monies, Pens, Pink, Teleſcope, Tyles, Trading Companies, Meaſures.* See the ſubſtantives.

DUTCHESS County, in *Geography*, a county of New York, in America, lying on the eaſt ſide of Hudſon river. It has the ſtate of Connecticut on the E., Weſt Cheſter on the S., and Columbia county on the N. It is about 48 miles long, and 23 broad, and contains 15 townſhips, of which Poughkeepſie and Fiſh-kill are the chief. The number of its inhabitants is 47,775, of whom 1609 are ſlaves. This county ſends ſeven repreſentatives to the aſſembly of the ſtate.

DUTCHMAN'S Bay, a bay on the N. coaſt of the iſland of Antigua.

DUTCHMAN's *Iſland*, an iſland of America, in the Potomack river; 14 miles above Waſhington.

DUTCHMAN's *Point*, a point of land on the Vermont ſide of the lake Champlain, about 16 miles S. of the Canada line. It was retained by Britain for ſome time after the peace of 1783; but it has been ſince ſurrendered to the United States.

DUTCHY, an appellation given to the dominions of a duke. See DUKE.

DUTCHY-*Court*. See COURT.

DUTHILL, in *Geography*, a town of Scotland, in the county of Inverneſs; 20 miles S.E. of Inverneſs.

DUTKINA, a town of Ruſſian Siberia, in the government of Irkutſch, on the Lena; 16 miles S. of Orlenga.

DUTLINGEN, a ſmall town of the kingdom of Wirtemberg, with a caſtle and a bridge over the Danube; 36 miles N.E. of Schafhouſe, and 40 miles N.W. of Conſtance, remarkable for ſome rich iron mines ſituated in its neighbourhood. N. lat. 47° 55′. E. long. 8° 40′.

DUTY, in a moral ſenſe. See OFFICE.

DUTY *of Marriage*. See MARRIAGE.

DUTIES, taxes, or impoſts, levied for the purpoſe of raiſing a public revenue. It has been ſaid, that there is no branch of the art of government which is attended with more difficulty, than how to take from the pockets of individuals the ſums neceſſary for the exigencies of the ſtate, without diſabling the perſons who contribute from enjoying moſt of the neceſſaries and conveniencies of life to which they have been accuſtomed. It is proper that individuals ſhould contribute in proportion to the benefit they derive from government; and this is, in ſome degree, determined by the quantity of property, in the poſſeſſion of which they are protected. But, unfortunately, the vaſt increaſe of the public expenditure, and the neceſſity of large and immediate ſupplies, have furniſhed modern financiers with a pretext for overlooking theſe principles; and in the duty impoſed expreſsly on property, different claſſes of the community are ſo very differently affected by it, that formerly while duties were profeſſed to be impoſed on equitable principles, it would have been deemed very unequal and unjuſt.

Duties have been levied on property of various deſcriptions, but particularly on goods imported from other countries, on which the impoſt appears as a toll for receiving them into protection. It has been the policy of ſome countries to keep the duties on the importation and exportation of merchandiſe very low; this was the caſe in Holland, previous to the revolution, which gave great advantages to the trade of that country, as from the eaſineſs of paying the duties, both ſtrangers and natives were invited to bring great quantities of merchandiſe there, not only as to a market, but as to a great magazine, where it might be lodged, with little expence, till demanded for other markets; ſo that Amſterdam and Rotterdam were filled with the produce and manufactures of every part of the world. At Hamburgh, Bremen, and Lubeck, the duties on exportation and importation were very moderate, which contributed materially to the commercial proſperity of thoſe cities. In moſt countries, a diſtinction was formerly made between the duties paid by natives and by foreigners, the latter being ſubject to a much higher rate.

High duties give riſe to ſmuggling, and diminiſh the conſumption of the article on which they are laid. This important financial principle has, however, been frequently diſregarded, and the actual produce of an exiſting duty being thought to furniſh the means of computing, with tolerable certainty, the ſum to be procured by an augmentation of it, new duties have been added to the old ones, either by ſeparate rates, or a proportion of the former rates, which have not only created much perplexity in the revenue, and trouble to traders, but often diminiſhed the old duty, on the produce of which the computation of the additional revenue had been founded. Before the paſſing of the Conſolidation Act, there were ſeven duties on ale, ſix duties on malt, nine duties on foreign ſpirits, as great a number on the diſtillery; and on many articles of the cuſtoms there were ten, twelve, and even fifteen duties: the abolition of theſe complex rates, and the ſubſtitution of a ſingle duty on each article, contributed materially to the improvement of the revenue; and this ſimplification of duties has been repeated at ſeveral ſubſequent periods.

The evidence ſo frequently produced of the encouragement given to ſmuggling by high duties, has occaſionally induced the legiſlature to lower the duties, with the view of augmenting the revenue. Thus, in the year 1745, when the groſs produce of the inland duty on tea was 151,168*l.* 7*s.* 1*d.* the duty was reduced from 4*s.* in the pound to 1*s.* in the pound, and 25 *per cent.* on the price. The conſequence of this reduction was, that in the year following, the produce of the duty roſe to 249,018*l.* 19*s.* 11*d.*, and in 1747, it was 263,514*l.* 0*s.* 3*d.* But the advantage which evidently flowed from this meaſure was not long kept in view, the duties being raiſed again, at different times, till they exceeded their former amount. The revenue committee, in their firſt report, ſtate, that in the year 1783, the total duties of cuſtoms and exciſe, paid on tea, before it could legally come into the hands of the conſumer, amounted, on the loweſt kinds of tea, to more than *cent. per cent.* on the prime coſt, and on other kinds of tea, on an average, to about 75 *per cent.* It was, therefore, thought proper to recur again to the former principle of lowering the rate of the duties, with the view of augmenting the revenue; in conſequence of which, the act, known by the name of the Commutation Act, was paſſed, by which the duties on tea were reduced to 12½ *per cent.* on the prime coſt. Before this period, on an average of ten years, there were very little more than ſix million pounds weight *per annum*, legally conſumed in Great Britain; but within the firſt twelve months after the act took place, the quantity legally ſold exceeded 16 millions of pounds, which has ſince increaſed to upwards of 20 million pounds.

For an account of the various duties conſtituting the permanent public revenue, ſee CUSTOMS, EXCISE, STAMPS, &c.

DUTY, in the *Military Art*, is the exerciſe of thoſe functions that belong to a ſoldier; with this diſtinction, that mounting guard, and the like, where there is no enemy directly to be engaged, is called duty; but marching to meet and fight an enemy, is called going on ſervice.

DUVAL, VALENTINE JAMERAY, in *Biography*, was born at Artonay, a village of Champagne, in the year 1695, of very poor parents, who died while Valentine was very young, leaving behind them a very numerous progeny, in a ſtate of the greateſt indigence. The ſubject of this article was in a ſhort time taken into the ſervice of a farmer, and employed by him in the care of his poultry. For this kind of buſineſs he was ill qualified; and, for want of ſteadineſs of conduct, he was diſmiſſed from his humble ſtation, at the beginning of the ſevere winter of 1709. Deſtitute of every reſource, and probably without a ſingle friend, he ſet out, not knowing whither he was to proceed. In walking towards Lorraine, he was ſeized with the ſmall pox, of which he muſt have periſhed, but for the humanity of a ſhepherd. From this time, till the age of 19, he became an attendant on the flocks of the plains, when, being of a contemplative turn of mind, and having, by his own exertions, acquired a taſte for reading, he ſought protection at the hermitage of St. Anne, not far from Luneville, of which the inhabitants made him an overſeer of their rural concerns. Here, beſides a moſt diligent attention to the buſineſs in which he was engaged, he learned writing and arithmetic; and, like our own countryman Ferguſon, ſpent his nights in examining the heavens. His obſervatory he made in the top of one of the higheſt oaks, which he conſtructed of oziers, in the form of a ſtork's neſt. His finances, though very trifling, enabled him to purchaſe a few maps; with theſe he contrived to gain ſome knowledge in aſtronomy and geography, which was introductory to more ſublime purſuits. He now found himſelf in want of money to purchaſe books and other things neceſſary to the attainment of knowledge; and to ſupply his need, he hunted and killed a vaſt number of wild animals, for the ſake of their ſkins, the produce of which he converted into a fund to ſupply his literary exigencies. Accident procured him the protection and aſſiſtance of an Engliſhman, Mr. Forſter, by whoſe liberality he obtained a library of ſome hundred volumes: he began now to be uneaſy at his ſituation in life, which he thought was not that in which he ought to move. Purſuing his ſtudies one day under the ſhade of a widely ſpreading tree, with his maps and books about him, he was accoſted by a hunting party, who proved to be branches of the royal family, with their tutors. Struck with the novelty of the ſcene, and having learnt Duval's hiſtory, they perſuaded him to follow the bent of his inclination at the Jeſuits' college at Pont-à-Mouſſon, under the patronage of the duke of Lorraine, who was ſo much pleaſed with his progreſs in ſcience and general literature, that he afforded him the opportunity of accompanying him to Paris, at the end of the year 1718. Soon after he became a profeſſor of hiſtory in the high ſchool of Luneville. His lectures were attended by many foreigners, particularly Engliſhmen, who happened to be at Luneville at that time, and by whoſe report the reputation of Duval was greatly increaſed. In the year 1738, Duval removed to Florence, and became keeper of the ducal library: the ſtudy of coins was a favourite object, and he now began to collect all that he could meet with which were valuable on account of their antiquity. Scarcely had he formed his plan, when the emperor Francis I. formed the reſolution of eſtabliſhing at Vienna a cabinet of ancient and modern coins, and invited Duval to that capital to undertake the inſpection and arrangement of it. A houſe was aſſigned him in the imperial quarter near the palace, and he uſually dined with the emperor one day in every week. He was appointed ſub-preceptor to Joſeph II., in 1751, and was ever held in the higheſt eſteem and veneration by the court. He remained free from the uſual infirmities of age till his 79th year, and died in 1775, in the 81ſt year of his age. After his death, M. de Kock, ſecretary of legation at Peterſburgh, collected and publiſhed his works, which, with his life, written by himſelf, are conſidered as very intereſting, and highly to the credit of the author. He was plain in his dreſs; ſimple in his manners; mild and kind in his diſpoſition; and grateful to his benefactors. To the hermits of St. Anne he preſented an elegant manſion, with land; and on the ſpot where he was born, he erected a houſe, and aſſigned it as a dwelling for a ſchool-maſter. Gen. Biog.

Duval, Peter, born at Abbeville, about the year 1618, was nephew of the famous geographer Sanſon, and became a teacher of the ſcience in which his uncle had ſo much excelled. He died at Paris in 1683, leaving behind him various geographical treatiſes, maps, &c. which have been ſuperſeded by better works of the ſame kind: "La Geographie Françoiſe, contenant les deſcriptions, les cartes, et les blaſons de France, &c." ſtill bears ſome degree of reputation. He was the author of chronological tables, and ſeveral articles in genealogy and heraldry. Moreri.

Duval, Nicholas, a painter of hiſtory; born at the Hague, 1644, where he learned the art of painting; travelled to Italy; became the diſciple of Pietro da Cortona, whoſe manner he imitated. He was recommended to the prince of Orange, (William III.) who employed him in ſeveral works at Loo, and afterwards, in England, entruſted him to clean and repair the cartoons of Raffaelle at Hampton-court.

He was appointed director of the academy at the Hague, where he painted the cieling of the ſaloon. He died 1732. Pilkington Dict.

DUVENEDE, Marc Van, painter of hiſtory, born at Bruges in 1674; went to Italy; and at Rome became a diſciple of Carlo Maratti. On his return to Flanders, he painted many great works in the manner of his maſter, among others, the Martyrdom of St. Lawrence, in the chapel of St. Chriſtopher at Bruges. Pilkington.

DUUMVIR, a general appellation among the ancient Romans, given to magiſtrates, commiſſioners, and officers, where *two* were joined together in the ſame function. So that they had almoſt as many duumviri as they had officers joined two by two in commiſſion. There were *duumviri* to direct the building, repairing, and conſecrating of temples and altars; *capital duumviri*, who took cognizance of crimes, and condemned to death; *duumviri* of the marine, or navy, &c. But the moſt conſiderable of the duumviri, and thoſe uſually thus called by way of eminence, were the

Duumviri *Sacrorum*, created by Tarquin the Proud, for the performance of ſacrifices, and keeping of the Sybils' books. Theſe were choſen from among the nobility, or patricians, and held their office for life: they were exempted from ſerving in war, and from the offices impoſed on the other citizens; and without them the oracles of the Sibyls could not be conſulted.

The commiſſion laſted till the year of Rome 387, when, at the requeſt of C. Licinius, and L. Sextius, tribunes of the people, they were changed into decemviri; that is, in lieu of *two* perſons, the truſt was committed to *ten*, who were half patricians, half plebeians.

Sylla A. U. C. 671, added five more to their number, upon which they became denominated quindecemviri; their body was afterwards much increaſed, and at length amounted to ſixty; yet ſtill it retained the denomination of quindecemviri.

They were entirely aboliſhed under the emperor Theodoſius, towards the cloſe of the 4th century, along with the reſt of the heathen ſuperſtitions. See Paganism.

Duumviri, *The capital, Duumviri Perduellionis*, were not ordinary magiſtrates; but created only on certain occurrences.

The firſt commiſſioners of this kind were thoſe appointed to judge the ſurviving Horatius, for killing his ſiſter, after vanquiſhing the Curiatii, in the reign of Tullus Hoſtilius. See Curiatii.

There were alſo duumviri in the Roman colonies, who held the ſame rank and authority in their reſpective colonies, that the conſuls held at Rome. They were choſen out of the body of decuriones, and wore the prætexta, or robe, bordered with purple.

We alſo read of municipal duumviri, whom Vigenere compares

pares to our ſheriffs, or rather mayors of towns, whoſe authority laſted only five years.

DUUMVIRATE, DUUMVIRATUS, the magiſtrature, office, or dignity, of the duumviri. See DUUMVIR.

DUX, in *Geography*, a town of Bohemia, in the circle of Leitmeritz; 15 miles W.N.W. of Leitmeritz.

DUXBOROUGH, a maritime and poſt town of America, in the ſtate of Maſſachuſetts, and county of Plymouth, incorporated in 1637. This is a healthy town; employs 20 veſſels, moſt of them being from 60 to 90 tons, and contains 1664 inhabitants. It lies N. by W. of Plymouth, 3 miles from it by water, and 8 by land, and 58 S.E. by S. from Boſton. Within the harbour are Clarke's iſland, containing about 100 acres of excellent land, and Suquiſh iſland formerly joined to the Gurnet, which is an eminence at the ſouthern extremity of the beach, having on it a light-houſe, but now inſulated by the water. The Indian name of this town was Mattakeeſet, or Namakeeſet. It was firſt ſettled by Standiſh and his aſſociates, who came to Plymouth with the firſt ſettlers in 1620.

DUXBURY, a townſhip of America, in Chittenden county, Vermont, about 20 miles S.E. of Burlington; containing 153 inhabitants.

DUYT, in *Commerce*, a Dutch copper coin.

DUYVELAND, in *Geography*, an iſland of Zealand, ſeparated from the ſouth-eaſt part of Schouwen by a narrow paſſage; its dimenſions being about three leagues by two.

DUZDEB, a town of Aſiatic Turkey, in the province of Natolia; 28 miles W. of Eregri.

DUZEY, a town of France, in the department of the Meuſe and diſtrict of Eſtain; three leagues N. E. of Eſtain.

DWALE, or DWAL, in *Heraldry*, the herb nightſhade; uſed by ſuch as blazon with flowers and herbs, inſtead of colours and metals, for ſable or black.

DWARF. See PYGMY and STATURE.

Dwarfs were called nani and nanæ among the Romans; and were held in ſuch requeſt, that artificial methods were uſed in order to prevent the growth of boys deſigned for dwarfs, by incloſing them in a box, or binding them with bandages. Auguſtus's niece, Julia, was very fond of one of theſe dwarfs, called Sonopas, who was only two feet and a hand breadth high.

In the Philoſophical Tranſactions we have well authenticated accounts of two dwarfs; one born in Norfolk, who, at the age of 22, weighed no more than 34 pounds with all his cloaths on, and whoſe height, including hat, wig, and ſhoes, was only 38 inches; and another, in Wales, who, at the age of 15, meaſured no more than two feet ſeven inches, and weighed only 13 pounds; and who, at that early period of life, laboured under all the infirmities and calamities of very old age. Phil. Tranſ. vol. xlvi., p. 67., and vol. xlvii., p. 279.

DWARF-*trees*, a ſort of diminutive fruit trees, frequently planted in the borders of gardens; thus called from the lowneſs of their ſtature.

Dwarf-trees were formerly very much in requeſt in gardens; but, ſince the introducing of eſpaliers, they are much neglected. The manner however of propagating dwarf pears, which have been found to ſucceed the beſt of any dwarfs, is this: they are to be grafted on a quince ſtock, and that at about ſix inches above the ground; and when the bud has ſhot ſo far as to have four eyes, it is to be ſtopped, to give riſe to lateral branches. Two years after the budding the trees will be fit to tranſplant to the ſpot where they muſt remain. They ſhould be ſet at 25 or 30 feet ſquare diſtance, and the ground between may be ſown or planted for kitchen uſe while the trees are young, only obſerving not to plant too near their roots. There ſhould be ſtakes driven down all round the tree, to which the branches muſt be nailed with liſt while they are young, training them into an horizontal direction; and no branches are to be ſuffered afterwards to croſs one another, and in ſhortening the ſhoots the uppermoſt eye muſt always be left outwards. The ſummer and autumn pears are thoſe which do beſt in dwarfs, for the winter ones never ſucceed well on them.

Apples are alſo ſometimes planted as dwarfs, and are for this purpoſe moſt commonly grafted on paradiſe ſtocks; theſe ſpread much leſs than the pears, and therefore need only be ſet at about eight feet diſtance. Some alſo plant apricots and plums for dwarfs, but theſe being of a more tender conſtitution ſeldom ſucceed well. Miller. See ESPALIER.

DWARF-*fern*. See *Dwarf* FERN.

DWINA, in *Geography*. See DVINA.

DWORZEC, a town of Lithuania, in the palatinate of Novogrodek; eight miles S. of Novogrodek.

DWORZYSZCE, a town of Lithuania, in the palatinate of Wilna; 20 miles S. of Wilna.

DYADIC, *Arithmetic*. See ARITHMETIC.

DYCK, { ANTONIO VAN,
PHILIP VAN,
FLORIS VAN, } See VANDYCK.

DYE, in *Architecture*, the part of a pedeſtal contained between the baſe and the cornice, in the form of a ſquare priſm, approaching frequently to a cube or dye, whence the name originates.

DYE is alſo uſed for a cube of ſtone, placed under the feet of a ſtatue and over its pedeſtal, to raiſe it and ſhew it the more.

DYEING, *Hiſtory of*. The origin of the art of dyeing is involved in that obſcurity which pervades the hiſtory of all thoſe arts connected with the common wants and neceſſities of life. They have originated in times beyond the reach of hiſtory or tradition, and are the offſpring of the natural faculties of man directed by the great primeval wants of food, ſhelter, and raiment. The art of dyeing is, of courſe, poſterior to many of theſe, and is founded leſs on the neceſſities than paſſions of mankind. A love of diſtinction is common to man in every ſtage of civilization, but that paſſion for admiration which is diſplayed in a love of finery and ornament is peculiar to him in his moſt barbarous and uncultivated ſtate. Hence ſavage nations delight in brilliant and gaudy colours, and many paint their ſkins, and adorn themſelves with feathers, ſtones, and ſhells of various hues. Hiſtory has not furniſhed us even with her fables on the origin of dyeing; but from analogy, as well as obſervation of the practice of barbarous nations at the preſent day, we may trace the rude beginnings from whence the art has ſprung. The rich and gaudy plumage of birds, the finely ſpotted ſkins of animals, coloured ſtones, and ſuch other ſubſtances as nature herſelf ſupplies, would afford the firſt materials for ſavage finery and dreſs. The caps and mantles of the chiefs of the South Sea iſlands, ſuch as were brought home by captain Cook, are compoſed almoſt wholly of feathers richly coloured.

It is eaſy to conceive that accident muſt furniſh innumerable inſtances of obſervation even to the eye of a ſavage, that many of theſe colours were capable of imitation, and that ſome ſubſtances readily imparted their colour to others. The bruiſing of a fruit, a flower, or leaf, is one of the moſt natural and obvious occurrences to which we ſhould look for the firſt notion of applying vegetable juices to dyeing, and doubtleſs the knowledge of the tingent properties of various herbs was thus early acquired. The art, however, muſt have waited the progreſs of induſtry and luxury, before it became extended and improved. Long antecedent, however, to the period when authentic hiſtory begins, it muſt have made conſiderable progreſs. Moſes ſpeaks of ſtuffs dyed blue, and purple, and ſcarlet, and of ſheep-ſkins dyed red. Theſe colours require great ſkill in the preparation, and the knowledge of them implies a very advanced ſtate of the art at that period.

The colour which appears to have been earlieſt brought to perfection, and which was held in ſuch high eſtimation among the ancients, is purple. It was to chance alone, according to the tradition of antiquity, that they owed this diſcovery. A ſhepherd's dog, inſtigated by hunger, having broken a ſhell on the ſea ſhore, his mouth became ſtained with ſuch a colour as excited the admiration of all who ſaw it. They endeavoured to apply it to ſtuffs, and ſucceeded. There is ſome diſcordance in the details of the ancient writers of the circumſtances of this event. Some place this diſcovery in the reign of Phœnix, ſecond king of Tyre, that is to ſay, a little more than 500 years before Chriſt: others, at the time that Minos the firſt reigned in Crete, about 1439 years before the Chriſtian era. But the greateſt number agree in giving the honour of the invention of dyeing purple ſtuffs to the Tyrian Hercules. He gave his firſt trials to the king of Phœnicia, who was ſo jealous of the beauty of this new colour, that he forbade the uſe of it to all his ſubjects, reſerving it for the garments of royalty alone.

Some authors relate the ſtory differently. Hercules's dog having ſtained his mouth with a ſhell, which he had broken on the ſea ſhore, Tyras, a nymph of whom Hercules was enamoured, was ſo charmed with the beauty of the colour, that ſhe declared to her lover ſhe would ſee him no more till he brought her a ſuit dyed the ſame. Hercules thought of a way to ſatisfy his miſtreſs; he collected a great number of the ſhells, and ſucceeded in ſtaining a robe of the colour the nymph had demanded. Such are the different traditions handed down by the ancients of the origin of the purple dye. They are evidently blended with fiction, yet they may ſerve to fix the epoch of this diſcovery, which appears to have been made about fifteen centuries before the Chriſtian era. Whether the purple of Tyre was ſimilar to that mentioned in holy writ, as uſed by Moſes for the veſtments of the high prieſt, and the ornaments of the tabernacle, may admit of ſome diſpute, ſince it is not certain, according to M. Huet, that the word *argaman*, of the Hebrew text, which all the interpreters tranſlate by *purpura*, means in reality that colour.

The teſtimony of Homer confirms the antiquity of this diſcovery. This great poet and accurate obſerver, aſcribes to the heroes of that age, in which we have ſuppoſed it became known, ornaments and cloths of purple.

The ancients had ſuch an eſteem for this colour, that it was eſpecially conſecrated to the ſervice of the deity. Moſes, as we have juſt obſerved, uſed ſtuffs of purple for the works of the tabernacle, and the habits of the high prieſt. The Babylonians gave purple habits to their idols; it was the ſame with moſt of the other people of antiquity. The Pagans were even perſuaded that the purple dye had a particular virtue, and was capable of appeaſing the wrath of the gods.

Purple was alſo the diſtinguiſhing mark of the greateſt dignities from the earlieſt times. We have ſeen that the king of Phœnicia, to whom tradition ſays the firſt eſſays of this colour were preſented, had it reſerved for the ſovereign. Among the preſents which the Iſraelites made to Gideon, the ſcripture makes mention of purple habits found among the ſpoils of the kings of Midian. Homer gives us plainly to underſtand, that it only belonged to princes to wear this colour; and we may remark, that this cuſtom was obſerved by all the nations of antiquity.

It is not eaſy to give a clear and preciſe idea of the proceſs followed by the ancients in the production of this highly valued colour. We find ſome details in the works of Ariſtotle and of Pliny, in whoſe days the practice was very common, but they are not ſufficiently circumſtantial. The purple dye, according to Pliny, was drawn from many ſpecies of ſhell fiſh. The beſt were found near the iſle where New Tyre was built. They fiſhed for them in other parts of the Mediterranean. The coaſts of Africa were famous for the purple of Getulia. The coaſts of Europe ſupplied the purple of Laconia, which was held in great eſteem.

In the 36th chapter of his ſeventh book, Pliny ranges in two claſſes the different kinds of ſhell fiſh which produced the purple. The firſt comprehended the ſmaller ſpecies under the denomination of *buccinum*, from their reſemblance to a hunting horn; the ſecond included thoſe denominated *purpura*. Theſe Fabius Columna conceives to have been alſo diſtinguiſhed by the generic name of *murex*, though others ſuppoſe this to have ſignified all the different ſpecies generally. All theſe ſeveral ſpecies, the chief of which are enumerated by Pliny, appear to have given colours of different ſhades, from which, by mixture of the liquors in various proportions, other varieties of colour were produced. A few drops only of this precious dye were obtained from each fiſh, by extracting a white vein placed in the throat; but to avoid this trouble with the ſmaller ſpecies, according to Ariſtotle and Pliny, the whole fiſh was bruiſed in a mortar, a practice which, according to Vitruvius, was often followed with the larger. The liquor, when extracted, was mixed with a conſiderable portion of ſalt, and ſuffered to remain three days; after which it was diluted with five or ſix times its quantity of water, and digeſted, moderately hot, during ten days, in a lead or tin veſſel, ſkimming it frequently, to ſeparate all impurities. The wool was afterwards put in, being well waſhed, cleanſed, and properly prepared. After ſoaking five hours, it was taken out, carded, and again immerſed in the boiling dye, till all the colour was taken up or exhauſted. To produce particular ſhades of colour, nitre, urine, and a marine plant called fucus, of which the beſt kind is found on the rocks of the iſle of Crete, were occaſionally added.

The Tyrians, by the confeſſion of all antiquity, ſucceeded beſt in dyeing ſtuffs purple. Their proceſs differed a little from what we have related above. They uſed nothing to make their colour but purple ſhells taken out at ſea. They made a bath of the liquor they drew from theſe fiſhes. They ſteeped their wool in this a certain time, and afterwards took it out and ſteeped it in another boiler, in which was nothing but buccina or trumpet fiſh. This is all the ancients tell us of the practice of the Tyrians. Wool, which had received this double Tyrian dye, (diabapha) was ſo very coſtly, that in the reign of Auguſtus, each pound ſold for 1000 Roman denarii, about 36*l.* ſterling. Nor need we wonder at this exceſſive price, when we conſider the tedious nature of the proceſs, and the ſmall quantity of dye afforded by the ſhell fiſh, from each of which not more than a ſingle drop was obtained. For 50lb. of wool they uſed no leſs than 200lbs. of the liquor of the buccinum, and 100lbs. of that of the purpura, or 6lbs. of liquor to 1lb. of wool. We ought not to be much ſurprized, therefore, that this colour vied in value even with gold itſelf. The ancient writers diſtinguiſh many different ſhades of purple. One of them, which was very dark, appears to have been a kind of violet, inclining towards a reddiſh hue. "Nigrantis roſæ colore ſublucens,"

ſublucens," Pliny, lib. 9. ſec. 50. Another, leſs eſteemed, was a kind of crimſon. "Rubens color, nigrante deterior," lib. 9. ſec. 62. The moſt valued of all, and in which the Tyrians particularly excelled, was a deep red purple, of the colour of coagulated blood. "Laus ei ſumma in colore ſanguinis concreti," Pliny, ibid. It is in alluſion to this that Homer and Virgil give to blood the epithet *purple*. There was a fourth kind known in later times, very different from thoſe we have ſpoken of. The colour was whitiſh; an account of which may be ſeen in Perrault's tranſlation of Vitruvius.

The purple has been almoſt every where a mark of diſtinction attached to high birth and dignity. It was an ornament of the firſt offices of Rome; but luxury, which was carried to great exceſs in that capital of the world, rendered the uſe of it common among the opulent, till the emperors reſerved to themſelves the right of wearing it. Soon afterwards it became the ſymbol of their inauguration. They appointed officers to ſuperintend the manufactories, principally eſtabliſhed in Phœnicia, where it was prepared ſolely for their uſe. The puniſhment of death was decreed againſt all who ſhould have the audacity to wear it, though covered with another colour. The penalty, ſo tyrannically denounced againſt this whimſical ſpecies of treaſon, doubtleſs occaſioned the loſs of the art of dyeing purple; firſt in the Weſt, but much later in the Eaſt, where it flouriſhed conſiderably till the eleventh century.

It appears that ſome kinds of purple preſerved their colour for a very long time. Plutarch, in his life of Alexander, relates that the Greeks found in the treaſury of the king of Perſia a great quantity of purple which had not loſt its beauty, though it was 190 years old.

It is commonly aſſerted, on the authority of moſt of the ancient writers, that the purple had a very ſtrong and diſagreeable odour. It would appear, however, from Pliny, lib. 9. ſec. 36. that this was the caſe only with ſome particular kinds. After extolling the beauty of the true purple, and allowing that it was juſtly an object of ambition, he aſks, how it happens that the other kinds of purple, obtained from the ſhell-fiſh called *conchylia*, ſhould be ſo high priced, conſidering the ſtinking diſagreeable odour which the ſtuffs have that are dyed with them.

After all, the boaſted purple of antiquity was a miſerable dye compared with many which we now poſſeſs, and affords a ſtrong proof of the imperfect ſtate of the art at the period when it was held in ſuch eſteem. It was, no doubt, the moſt rich and brilliant colour then known.

It is a curious fact, that Mr. Bruce, whoſe acquaintance with ancient authors ought to have convinced him of the contrary, maintains that the Tyrian purple was produced with cochineal, and that the ſtory of its being the blood of a ſhell-fiſh was invented and propagated by the Tyrians with a view of deceiving other nations, and keeping the art of dyeing this colour excluſively to themſelves. He even adduces this as a proof of the early intercourſe carried on with the new world, in times long antecedent to thoſe in which we ſuppoſe the diſcovery of the continent of America was firſt made.

The ancients obtained from the *coccus*, now known by the name of kermes, a colour which was almoſt as highly eſteemed as purple, and which was ſometimes mixed with it. Pliny informs us it was employed in the preparation of the imperial robes. It was generally called ſcarlet, and was ſometimes confounded with the purple. The uſe of the coccus in dyeing is very ancient, ſince it appears from the commentators, to be alluded to in Exodus, chap. xxxix. ver. 1. and 28.

Our materials for a hiſtory of the art of dyeing, during the ages of claſſical antiquity, are very ſcanty. Amongſt the Greeks the uſeful arts were degraded even in the eyes of philoſophers, and this contempt deſcended to the Romans; for Pliny, ſpeaking of dyeing, avowedly neglects the deſcription of operations which are unconnected with the liberal arts. "Nec tingendi rationem omiſiſſimus, ſi unquam ea liberalium artium fuiſſet."

The art of dyeing among the Greeks appears to have made no great progreſs; the dreſs of the people was of cloth which had received no dye, and which might be waſhed. The rich preferred coloured clothes; they eſteemed ſuch as were dyed ſcarlet with the kermes, but they valued ſtill more highly thoſe of purple.

The few details relative to dyeing into which Pliny has entered in his great work, are almoſt wholly confined to the purple, of which we have given an account. The few ſcattered facts to be met with, that ſerve at all to illuſtrate the hiſtory of the art, we ſhall briefly notice. Some varieties of colour, derived from the purple, and produced by different mixtures of the various kinds of ſhell-fiſh, and alſo by admixture with the dye of the coccus, or kermes, appear to have been faſhionable in Pliny's time. Theſe originated, according to our author, in the errors and failure of the dyers, who having, in the firſt inſtance, ſpoiled their cloth, endeavoured to hide the defects by giving it another ſhade: hence aroſe thoſe compound twice-dyed colours which were ſoon held in high repute.

Beſides the Tyrian purple, ſcarlet, and the varieties and compounds of thoſe colours, Pliny mentions yellow as a very ancient dye, and highly eſteemed in former times. The veil which the bride wore on her wedding day was of yellow, and none but women were permitted to uſe it. They had alſo a colour reſembling the cyanos, or blue-bottle, and another like the golden yellow flower elichryſon. None of theſe colours, ſays Pliny, were known, or at leaſt in requeſt in the days of Alexander the Great; for the Greek writers, who wrote ſoon after his deceaſe, make no mention of them. They are evidently, however, of Greek origin, as appears from their names, which, though Greek, were current in Italy in Pliny's time.

The uſe of vegetable dyes appears to have been in a great meaſure unknown to the Romans; though the inhabitants of Gaul, according to Pliny, imitated all colours, even the Tyrian purple and the ſcarlet, with the juice of certain herbs. In the eleventh chapter of the thirty-fifth book of Pliny's hiſtory, is preſerved a valuable notice of the proceſs followed by the Egyptians in dyeing linen. They ſtained, ſays he, white cloth, not with colours, but with certain drugs, which have the property of abſorbing them, but which exhibit no appearance of any dye till they have been boiled ſome time in a cauldron, from which they are withdrawn painted or ſtained of various colours. What is moſt extraordinary, ſays Pliny, is, that the cauldron containing only colour of one kind ſhould impart to the cloth ſhades of various hues according to the nature of the drugs which were laid on, and the colours are ſo fixed that they can never be waſhed out, but are more durable and fixed than if they had never been immerſed in the boiling dye.

We have here a tolerably accurate deſcription of the proceſs of calico printing; and the only mention in any ancient author of an art which has exiſted for ages paſt in the Eaſt, and is practiſed there at this day, probably with little variation from the mode deſcribed by Pliny.

The art of dyeing linen appears not to have been known in Greece before Alexander's invaſion of India, where they dyed the ſails of his veſſels of different colours. The Greeks ſeem to have borrowed this art from the Indians.

We may form ſome idea of the ſtate of the art of dyeing amongſt the Romans, from the enumeration of the different colours which were in uſe, and the ſubſtances employed in producing them. In addition to thoſe enumerated by Pliny, we find, that in the equeſtrian games of the circus, the different diviſions were diſtinguiſhed by the colours *green*, color praſinus; *orange*, ruſatus; *grey*, venetus; and white. We ſhall enumerate, after Mr. Biſchoff, who has minutely examined the ſubject, the ingredients employed at that time in the art of dyeing, in addition to the two important ones already mentioned, the purple fiſh and coccus.

1. Alum. It is probable, from what we ſhall ſtate hereafter, that the ancients were unacquainted with our alum in its ſtate of purity.
2. Alkanet. Suidas ſays, that this ſubſtance was alſo uſed by women as a paint.
3. The blood of birds, which was uſed amongſt the Jews.
4. The fucus; that of Crete was preferred, and it was generally employed as a ground or preparative for valuable colours.
5. Broom.
6. The violet, from which the Gauls prepared a kind of purple.
7. Lotos medicago arborea; ſnail trefoil; the bark was uſed in dyeing ſkins, and the root in dyeing wool.
8. The bark of the walnut-tree and the peel of the ſhell.
9. Madder. We are not certain whether the madder of the ancients was the ſame as ours, or another root of the ſame tribe.
10. Woad (glaſtum). This plant was undoubtedly in uſe among the ancients, but we do not know whether their preparation of it was the ſame as ours.

We are not to infer, however, that theſe were the only ſubſtances employed by the ancients in the art of dyeing; many more being, in all probability, in uſe, of which we have no account. Indigo (indicum nigrum) is mentioned by Pliny, and though ſome doubts have been entertained by his commentators reſpecting the true nature of this ſubſtance, ſome ſuppoſing it to have been Indian ink, yet it is very evident he meant the indigo of the moderns, from the purple ſmoke which he ſays it emitted when ſet on fire, and which we believe is peculiar to indigo. It was never, however, we believe, employed in dyeing, but ſimply as a pigment.

India was the nurſery of the arts and ſciences, which were afterwards ſpread and perfected among other nations. Accidents, which had a tendency to improve the art, could not fail to be multiplied rapidly in a country rich in natural productions, which requires little labour for the ſupport of its inhabitants, and the population of which was favoured by the bounty of nature and the ſimplicity of manners, till it was oppoſed by the tyranny of ſucceeding conquerors. But religious prejudices, and the unalterable diviſion into caſts, ſoon put ſhackles upon induſtry; the arts became ſtationary, and it would ſeem that the knowledge of dyeing cotton in that country was as far advanced in the time of Alexander as it is at preſent.

The beautiful colours which we obſerve in their printed calicoes, would lead us to ſuppoſe that the art of dyeing had then attained a high degree of perfection, yet we find, from the details of thoſe who have witneſſed their operations, that the Indian proceſſes are ſo complicated, tedious, and imperfect, that they would be impracticable in any other country, on account of the difference in the price of labour. The art of printing calicoes has been practiſed in India at leaſt twenty-two centuries; for the hiſtorians of Alexander's invaſion of that ill-fated country ſpeak of their flowered cloths or chintz. If they excelled therefore in the richneſs and brilliancy of two or three colours; it is to be attributed to the ſuperior quality of ſome of their dyes, peculiar to their own country, the effect of which was perhaps heightened by the length and multiplicity of their operations. The knowledge of this art appears to have ſpread over a conſiderable part of Aſia. It was practiſed, and is to this day, by the Perſians; and we have ſeen that in Pliny's time, it was eſtabliſhed in Egypt.

From the fifth volume of the "Memoires concernant l'Hiſtoire, les Sciences, les Arts, les Mœurs, &c. des Chinois," it appears, that wool was never worn in China but as a ſubſtitute for fur, and that cotton and ſilk, being the only ſubſtances ever dyed by the inhabitants, received all their colours from vegetable tingent matters; that their colours were principally red, blue, violet, and what is called a woad colour; and that under the three firſt dynaſties the buſineſs of dyeing was chiefly practiſed by the female part of each family, for its own particular uſe; and it probably continued to be practiſed without any thing like principle or ſcience until near the end of the ſeventh century, when the Chineſe diſcarding their own, borrowed the art and means of dyeing which were then in uſe among the Indians and Perſians; and it is ſaid, that alum and copperas, which the Chineſe did not uſe before, were among the means ſo borrowed; a fact which renders it probable, that there was little, if any thing, in the Chineſe art of dyeing, of which the loſs need now be regretted.

It appears, however, that long before this time a knowledge of the uſes of alum and of iron in dyeing had ſpread from Hindooſtan and Perſia weſtward to Egypt, and thence to Greece and Rome. Bergmann, indeed, and after him, Beckmann, have repreſented the alum of the ancients as different from the cryſtallized ſalt of the moderns; and have ſuppoſed that the varieties of alum mentioned by Dioſcorides, were ſtalactites, containing but little alum, and conſiſting chiefly of calcareous earth. Nature, however, does produce ſome, though but little, cryſtallized alum, particularly in Egypt and ſome parts of Aſia; and it probably was in this ſtate that its good effect in dyeing had been firſt obſerved, before mankind were led to the means and operations ſince employed for ſeparating and collecting it from the various aluminous ores. Bergmann informs us, that the factitious ſalt which is now called alum, was firſt diſcovered in the eaſtern countries, and that among the moſt early works eſtabliſhed for the preparation of alum, we may juſtly number that of *Roccho*, a city in Syria, now called Edeſſa, hence the appellation of *roch alum*. He adds, that Bartholomew Perdix, or Pernix, a merchant of Genoa, who had been at Roccho, diſcovered the matrix of alum in the iſland of Iſchia, about the year 1459, and eſtabliſhed a manufactory there; at the ſame time, John de Caſtro, who had viſited the manufactories at Conſtantinople, diſcovered a matrix at Tolfa, by means of the ilex aquifolium, which he had alſo obſerved to grow in the adjacent mountains of Turkey; and his opinion was confirmed by the taſte of the ſtones. The attempts made by the Genoeſe at Viterbium and at Volaterre ſucceeded extremely well; and the preparation of it in Italy ſoon increaſed wonderfully faſt. The firſt manufactory of alum in England was eſtabliſhed in the reign of Elizabeth, at Giſborough, by one Thomas Chaloner.

In the fifth century all the arts were loſt throughout the Weſt, except a few, which in a ſtate of decay were preſerved in Italy; and no traces were left of knowledge, induſtry, or humanity.

Muratori quotes a manuſcript of the eighth century, in which we find a deſcription of ſome dyes, principally for ſkins, and ſome proceſſes connected with the arts; but the Latin, which is almoſt unintelligible, and the chaſms we find here and there, prevent us from being able to form a juſt idea of theſe proceſſes.

The arts were better preſerved in the Eaſt, where articles of luxury were procured by ſome of the great, even ſo late as the twelfth century. During the cruſades, the Venetians derived their power from the barbarous mania of the age: their commerce increaſed; the arts were eſtabliſhed among them, and improved by the induſtry of the Greeks, and ſpread from thence through the other parts of Italy. In the year 1338, Florence contained two hundred manufacturers, who are ſaid to have made from ſeventy to eighty thouſand pieces of cloth, which, as an object of commerce, were worth twelve hundred thouſand crowns of gold.

It is ſaid that archil was accidentally diſcovered by a Florentine merchant, about the year 1300. Having obſerved that urine imparted a very fine colour to a certain ſpecies of moſs, he made experiments, and learned to prepare archil. He kept his diſcovery ſecret a long time; his poſterity, a branch of which ſtill exiſts, according to Dominique Manni, have retained the appellation of Ruccellai, from oreiglia, the Spaniſh term for that kind of moſs.

The arts continued for a long time to be cultivated in Italy with increaſing ſucceſs. In the year 1429, the firſt collection of the proceſſes employed in dyeing appeared at Venice under the name of "Mariegola del' arte dei tentori"; a ſecond edition, much improved, came out in 1510. A certain perſon, named Gioran Ventura Roſetti, formed the deſign of rendering this deſcription more uſeful and extenſive. He travelled through the different parts of Italy, and the adjacent countries, where the arts had begun again to flouriſh, in order to make himſelf acquainted with the various proceſſes employed, and he publiſhed, under the title "Plictho de l'arte de tentori," &c. a collection which, according to Mr. Biſchoff, is the firſt that united the different proceſſes, and which ought to be regarded as the leading ſtep toward the perfection which the art of dyeing has attained. This work was printed at Venice, in 1548; a French tranſlation of it appeared at Paris in 1716. It is remarkable that in the work entitled "Plictho," not a word is ſaid either of cochineal or indigo; from which we may conclude that theſe two dyes were either unknown or not employed at that time in Italy.

The firſt indigo uſed in Europe appears to have been brought from the Eaſt Indies by the Dutch. India was doubtleſs the country where that valuable ſubſtance was firſt produced. The uncivilized inhabitants of other countries have, indeed, diſcovered modes of obtaining colouring matter, very nearly reſembling that of indigo, from other plants, as the iſatis tinctoria, or woad, and the genipa americana, but they obtained theſe matters in a liquid form only, and employed them in their recent ſtate.

The natives of India, however, went farther, they precipitated and collected, in a dry ſolid form, the colouring matter of indigo, and diſcovered the means of afterwards diſſolving and applying it to ſtuffs. In Africa, the Mandigo negroes, according to Mr. Park, dye their cloth of a laſting blue colour, by the following ſimple proceſs. The leaves of the indigo, when freſh gathered, are pounded in a wooden mortar, and mixed in a large earthen jar, with a ſtrong ley of wood aſhes; chamber-lye is ſometimes added. The cloth is ſteeped in this mixture, and allowed to remain until it has acquired the proper ſhade. In Kaarta and Ludamar, where indigo is not plentiful, they collect the leaves and dry them in the ſun, and when they wiſh to uſe them, they reduce a ſufficient quantity to powder, and mix it with the lye as before. "Either way," ſays Mr. Park, "the colour is very beautiful, and equal to the beſt Indian or European blue." The uſe of indigo was known to the Mexicans before the arrival of the Spaniards, and Clavigero, in his hiſtory of that country, gives an account of the method of obtaining it. Hernandes had long before deſcribed the plant as being indigenous in Mexico, and employed by its ancient inhabitants; and Ferdinand Columbus, in his "Life of Chriſtopher Columbus," mentions it as one of the native plants of Hiſpaniola. What the abbé Raynal therefore aſſerts, of its being tranſplanted from the Eaſt Indies to America, can be true only of one ſpecies, the indigofera tinctoria, Linn. The manufacture of indigo, however, was not eſtabliſhed in America till ſome time after the diſcovery of that country; and on the plant which produces it being recognized by the Portugueſe in Brazil as identical with that from which indigo was extracted in the Eaſt Indies. The uſe of indigo, which was a great acquiſition to the art of dyeing, was not eſtabliſhed without conſiderable difficulty. It was ſtrictly prohibited in England in the reign of Elizabeth, as was alſo logwood, which was ordered to be burned if found in any manufactory. This prohibition was not taken off till the reign of Charles II.

In like manner the uſe of indigo was proſcribed in Saxony, in the edict againſt it, which brings to one's mind the edict againſt the employment of antimonial emetics; it is ſpoken of as a highly corroſive colour. This is a ſtriking example of the errors into which an unenlightened adminiſtration may fall, which liſtens to the ſuggeſtions of intereſted individuals. Thoſe who dyed blue, and were accuſtomed to uſe paſtel and woad, repreſented that indigo would deſtroy the ſale of thoſe two articles, which were the produce of the country. Such a reaſon, which would appear ſpecious to many, even in the preſent day, eaſily produced a prohibition which would be ſoon eluded by paying a tribute to the induſtry of other nations. The prejudice againſt indigo was likewiſe communicated to France, and Colbert's inſtructions forbade the uſe of more than a certain quantity in the paſtel vats.

Cochineal was another important acquiſition to the art of dyeing, for which we are indebted to the firſt conquerors of Mexico. The Spaniards, having obſerved that the inhabitants of Mexico employed cochineal in painting their houſes and dyeing their cotton, gave their government an account of the beauty of the colour; and Cortes, in the year 1523, was ordered to promote the increaſe of the valuable inſect from which it is obtained. The natural colour, however, which the cochineal gives, is but a dull colour. Soon after cochineal was known in Europe, a great chemiſt of the name of Kuſter, Kuffler, or Kepfler, found out the preſent proceſs for dyeing ſcarlet by means of a ſolution of tin, and carried the ſecret to London in the year 1543. See Cochineal and Scarlet.

The ancients applied the name ſcarlet to the colour obtained from kermes, which was much inferior in beauty to the colour we diſtinguiſh by that appellation. We probably know how to employ the kermes to greater advantage than they did, ſince we poſſeſs a pure alum which diſpoſes the ſtuff to receive a more beautiful and durable colour; yet our dyers have almoſt entirely diſcontinued the uſe of it, becauſe they can obtain from cochineal a colour beyond all compariſon more beautiful. The ſuppoſition, that the colour which we obtain from kermes is preferable to that obtained by the ancients, is ſupported by the teſtimony of Pliny, who inſinuates that it was not a durable colour; now the colour we give by means of kermes to wool prepared with alum, is exceedingly durable. The diſcovery of ſcarlet may be conſidered as the moſt important era in the art of dyeing, as it introduced to our knowledge the ſolution of tin, ſince ſo variouſly and happily applied. A Flemiſh painter, called Gluck, got poſſeſſion of this ſecret, and communicated it to Gobelin. The knowledge of the proceſs afterwards ſpread throughout all Europe. Gluck travelled into the Eaſt, where there were ſtill ſome remains of Grecian induſtry, and afterwards ſettled in Flanders, where he ſpent a long and proſperous life. According to Mr. Francheville, this man, who had been ſo uſeful to his country, died about the year 1550.

For a long time Italy, and eſpecially Venice, poſſeſſed the art of dyeing almoſt excluſively; a circumſtance which contributed to the proſperity of their manufactures and commerce: by degrees it was introduced into France. Giles Gobelin, to whom the proceſs for making the true ſcarlet had been communicated, eſtabliſhed a manufactory in the place which ſtill bears his name; and this undertaking was deemed ſo raſh, that it was termed *Gobelin's folly*.

The attention of the Royal Society appears to have been early directed to the improvement of the art of dyeing. At a meeting of that learned body on the 30th of April, 1662, Mr. Hook was deſired to tranſlate into Engliſh, a work on dyeing, which appears to have been that already mentioned under the title of Plictho. On the ſame day alſo, ſir William Petty, one of its earlieſt and moſt active members, in conſequence of a previous requeſt from the ſociety, brought in "An Apparatus to the Hiſtory of the common practices of Dyers," which was afterwards printed in "Dr. Spratt's Hiſtory of the Royal Society," and ſeems to have been the firſt work publiſhed in the Engliſh language on the proceſſes and operations of dyeing. Nearly two years afterwards Mr. Boyle preſented to the ſociety his "Experiments and Conſiderations touching Colours." And on the 10th of Auguſt, 1664, it was ordered by the ſociety, "that the way of *fixing colours* ſhould be recommended to Mr. Howard, Mr. Boyle, and Dr. Merritt." Theſe, and eſpecially the two firſt, were amongſt the moſt diſtinguiſhed members of the ſociety; but it does not appear that any thing deſerving of notice was done in conſequence of this recommendation. However, at a meeting of the ſociety on the 11th of November, 1669, that very ingenious and uſeful member, Mr. Hook, produced a piece of calico ſtained after the way contrived by himſelf, which he was deſired to proſecute in other colours beſides thoſe that appeared in this piece; and accordingly on the 9th of the following month, Mr. Hook produced another ſpecimen of ſtaining with yellow, red, green, blue, and purple colours, which he ſaid would endure waſhing with warm water and ſoap. But from this time it does not appear that any thing conſiderable was done for nearly the ſpace of a century by men of ſcience in this country towards the improvement of the arts of dyeing and calico printing.

In France, however, the miniſter Colbert, anxious to extend the commerce and manufactures of his country, which had languiſhed during the ſtormy adminiſtrations of Richlieu and Mazarin, turned his attention particularly to the art of dyeing. He invited the moſt ſkilful artiſts, rewarded their talents, and eſtabliſhed many manufactories; and it is curious to remark, that thoſe of Vaurobais and Sedan were called, in the letters patent which were granted them, manufacturers of fine cloth after the Dutch and Engliſh faſhion. In 1672, he publiſhed a Table of Inſtructions for Dyeing, under the title of "General Inſtructions for dyeing Wool and woollen Manufactures of all Colours, and for the Culture of the Drugs or Ingredients employed in them." This, however, was not intended merely to diffuſe information, but as a legiſlative act, to controul the dyers in their operations. This work merits attention; we ſhall firſt notice the reaſon which he gives for conſidering the ſubject as one of great importance.

"If," ſays Colbert, "the manufactures of ſilk, wool, and thread are to be reckoned amongſt thoſe which moſt contribute to the ſupport of commerce, dyeing, which gives them that ſtriking variety of colour by which they reſemble what is moſt beautiful in nature, may be conſidered as the ſoul of them, without which the body could ſcarcely exiſt. Wool and ſilk, the natural colour of which rather indicates the rudeneſs of former ages, than the genius and improvement of the preſent, would be in no great requeſt if the art of dyeing did not furniſh attractions which recommend them even to the moſt barbarous nations. All viſible objects are diſtinguiſhed and recommended by colours, but for the purpoſes of commerce it is not only neceſſary that they ſhould be beautiful, but that they ſhould be good, and that their duration ſhould equal that of the materials they adorn."—But Colbert, though he inſtituted many uſeful regulations for the inſtruction of the farmer and the artiſt, impoſed a ſyſtem of prohibition and reſtraint ſo exceſſive, as almoſt to bar all future improvement. He divided the dyers into two claſſes, to one of which were confined the colours deemed durable and fixed, whilſt the other claſs was allowed only to meddle with thoſe which were conſidered fugitive. In the dyeing of black cloth he inſiſted that the operation ſhould be begun by the dyers in grain, or thoſe who gave the durable colour, and finiſhed by thoſe who produced the falſe one. Each was confined to a certain number of ingredients, and neither were ſuffered to have Brazil wood, and various other articles. The bad effects of this prohibition were moderated by the facility of eluding it, and by the rewards beſtowed on thoſe whoſe experiments promoted the progreſs of the art, and whoſe diſcoveries were afterwards to be publiſhed, and to modify the exiſting regulations.

French induſtry loſt its pre-eminence by the criminal revocation of the edict of Nantz, which carried deſolation into her manufactories, and diſperſed her workmen, and the knowledge of her arts, throughout all Europe.

Since that time the department of adminiſtration, charged with the ſuperintendence of the arts and manufactures, has conſtantly ſought to repair thoſe errors, and to encourage induſtry and exertion by the diffuſion of knowledge, which, under wiſe laws, is the moſt efficacious means that can be employed.

Dufay, Hellot, Macquer, and Berthollet, have been ſucceſſively charged with the care of improving the art of dyeing; and to their labours all Europe is indebted for moſt valuable acquiſitions.

Dufay amended, or rather ſuperſeded, the "Inſtructions, &c." of Colbert, by the publication of a new one, under the adminiſtration of M. d'Orry, in 1739. He appears to have been the firſt who entertained juſt, though incomplete, ideas of the true nature of colouring ſubſtances, and the cauſe of their adheſion to ſtuffs when dyed. In his "Obſervations phyſiques ſur le melange de quelques couleurs dans le tincture," Mem. de l'Academ. 1737, he obſerves, that colouring particles are naturally diſpoſed to adhere, more or leſs firmly, to the filaments which receive them; and he remarks very juſtly, that without this diſpoſition ſtuffs would never aſſume any colour but that of the bath, and would always divide the colouring particles equally with it; whereas the liquor of the bath ſometimes becomes as limpid as water, giving out all the colouring matter to the ſtuff, "which ſeems to indicate," ſays he, "*that the ingredients have leſs attraction for the water than for the particles of the wool.*" He alſo noticed, *the difference in the degree of attraction which different ſubſtances, as wool and cotton, exert on the ſame colouring matters*, and which he found ſo great, that a ſkain of each having been in an equal degree ſubjected to the operation for dyeing ſcarlet, the woollen yarn was found to be fully and permanently dyed, while the cotton retained all its former whiteneſs. Yet theſe facts, important as they were, to the foundation of a theory of the art of dyeing, were unproductive in his hands; for though ſatisfied with the explanation they offered of many phenomena, yet they left, ſays he, ſo much to be wiſhed for, that he would relinquiſh it readily, if a more probable one could be found. He appears to have had no idea of the other and more important cauſe of the permanency of colours, that which ariſes from the uſe of mordants, or the interpoſition of a ſuitable baſis, poſſeſſing a particular attraction both for the colouring matter and dyed ſubſtance, and acting as a bond of union between them. He examined, with great ſagacity, certain proceſſes, and eſtabliſhed the ſureſt methods that could at that time be employed for determining the goodneſs of a colour, and this he did in an eaſy and familiar manner. His labours, on the whole, entitle him to the gratitude of poſterity, and he may juſtly lay claim to the merit of having firſt diſcovered and enunciated the facts, and of having drawn ſome partial concluſions from which the true theory of dyeing was ſome years afterwards clearly and luminouſly deduced.

He was ſucceeded by Hellot, to whom we are indebted for one of the beſt practical treatiſes on the art of dyeing wool and woollen cloths now extant. This work is valuable for the accuracy with which the numerous proceſſes are deſcribed: without profiting however by the hints thrown out by his predeceſſors, he ſuffered himſelf to be miſled by a vague and groundleſs hypotheſis, on the cauſe of the adheſion of the colouring particles to the ſubſtance dyed, the action of mordants, and the difference between the true or durable, and falſe or fading dyes. Of his theoretical ideas, and the principles he laid down, ſome judgment may be formed from the following paſſage taken from his work. "I believe it may be laid down as a general principle in the art of which I am now treating, that all the inviſible mechaniſm of dyeing conſiſts in dilating the pores of the body to be dyed, in depoſiting in them particles of foreign matter, and retaining them there by a kind of covering not liable to be affected by water, rain, or the rays of the ſun; in chooſing colouring particles of ſuch a degree of fineneſs as to be rendered ſufficiently fixed in the pores of the ſtuff opened by the heat of boiling water, and again conſtricted by cold, and alſo coated by the kind of varniſh which the ſalts, employed in its preparation, had left in thoſe pores; whence it follows that the pores of the fibres of the wool which has been wrought, or is to be wrought into cloth, ſhould be cleanſed, enlarged, coated over, and then conſtricted, ſo that the colouring particles may be retained in them nearly in the ſame manner as the diamond is retained in the collet of a ring." He fancied that he could diſcern in every dyeing proceſs ſome means by which ſulphate of pot-aſh, then called vitriolated tartar, might be formed; and this neutral ſalt not being readily ſoluble by cold water, nor air, nor light, he conceived the whole art of dyeing to conſiſt in firſt dilating the pores of the ſubſtance to be dyed, ſo as to procure a copious admiſſion of colouring matter, divided by a ſuitable preparation into atoms, and then wedging or faſtening theſe atoms within the pores of the dyed ſubſtance, by the ſmall particles or cryſtals of this difficultly ſoluble ſalt. Upon this *mechanical* hypotheſis, he ſuppoſed that alum became uſeful in dyeing, not by the pure clay or alumine which it contains, but by furniſhing ſulphuric or vitriolic acid, to aſſiſt in forming the ſulphate of pot-aſh, which was to perform the important function of wedging or faſtening the colouring atoms. But though nothing could be more groundleſs than ſuch a theory, the learned in all countries appear to have been ſatisfied with it for a conſiderable length of time, it being always leſs troubleſome to believe than to make experiments.—Macquer followed next. He has given us an exact deſcription of the proceſſes employed in dyeing ſilk, and his practical treatiſe, publiſhed in 1763, is held in deſerved eſtimation. He has made us acquainted with the combinations of the colouring principle of Pruſſian blue; he has endeavoured to make an application of it to the art of dyeing, and has given us a proceſs for communicating the moſt brilliant colour to ſilk, by means of cochineal. Macquer intended to have publiſhed a general treatiſe on the art of dyeing, the proſpectus of which he iſſued in the year 1781, but the indiſpoſition which ſo long preceded his death, prevented his engaging in it, and he died in 1784, before he had been able to carry into effect any part of his plan. It is ſurpriſing that Macquer, who was an excellent chemiſt, and amongſt the firſt who entertained correct ideas of the nature of chemical affinity ſhould have been ſeduced by the hypotheſis of Hellot. "I ſhould now," ſays he in his treatiſe on dyeing ſilk, "explain the action of mordants, and unfold the cauſes of durable and fading dyes; but this ſubject has been treated with ſuch ſagacity by Mr. Hellot, that I ſhall refer the reader to him." Bergmann ſeems to have been the firſt who referred the phenomena of dyeing *entirely* to chemical principles. Having dyed ſome wool and ſilk in a dilute ſolution of indigo in ſulphuric acid, he explains the effects he obſerved in the operation, by attributing them to the precipitation occaſioned by the blue particles having a ſtronger attraction for the particles of the wool and ſilk than for thoſe of the acidulated water: he remarks, that this attraction of the wool is ſo ſtrong as to deprive the liquor entirely of the colouring particles, but that the weaker attraction of the ſilk can only diminiſh the proportion of thoſe particles in the bath; and he ſhews that both the durability of the colour, and the degree of intenſity it is capable of acquiring, depend on theſe different attractions. This is the true light in which the phenomena of dyeing, which are purely chemical, ſhould be conſidered. Dufay had advanced thus far, but overlooked the importance of his own ſimple truths, in the ſearch after more recondite and complicated cauſes. But the peculiar action of mordants was ſtill unexplained, except on the wild hypotheſis of Hellot, till our countryman Mr. Keir, the ingenious tranſlator of Macquer's Chemical Dictionary, ſuggeſted, "that in dyeing, the earth of alum was precipitated, and in this form attached to the material prepared or dyed." Macquer ſoon after adopted the opinions of Bergmann and Keir, and in the ſecond edition of his dictionary, under the article *Dyeing*, publiſhed in 1778, treated the ſubject in a more extended manner, and proved that he had formed juſt conceptions of the nature and uſes of alum, and of different metallic ſolutions, as mordants in dyeing. Berthollet ſucceeded next to the place of truſt which had been ſucceſſively held by Dufay, Hellot, and Macquer, a poſt which he has held, and ſtill holds, with diſtinguiſhed honour to himſelf, and advantage to his country. In a ſeries of memoirs, inſerted in the Tranſactions of the academy, the Annales de Chimie, and Journal de Phyſique, he has examined various points of chemical theory connected with the art of dyeing, and almoſt all his labours have ſince been directed to this object. In 1791, he publiſhed his elements of the art of dyeing in 2 vols. 8vo. a work which has contributed more to the progreſs of true theory and the general improvement of the art, than any other treatiſe whatever. This work has been tranſlated into Engliſh by Dr. Hamilton, and a ſecond edition of the original, with conſiderable additions, appeared in 1803. Every thing which a liberal and enlightened government could do for the encouragement and progreſs of the art, has been done in France, and this ſolicitude has been crowned with the ſucceſs it merited. Mr. Anderſon attributes the ſuperiority which certain articles of French manufacture maintain over thoſe of other nations, who poſſeſs the moſt beautiful wool, to the perfection of their dyes; and Mr. Home is of opinion, that the French are indebted to the academy of ſciences for their ſuperiority in many of the arts, and eſpecially that of dyeing. Perhaps another cauſe of the alleged ſuperiority of the French over other nations in the art of dyeing, may be diſcovered in the peculiar nature of their manufactures. Silk, of all other ſubſtances, ſeems beſt adapted to the diſplay of fine and brilliant dyes, and it conſtitutes, in all its various forms, a large portion of the manufactures of France. We may look, therefore, to the dye-houſes of Lyons, as well as to the academy of ſciences, for the cauſe of that ſuperiority which is now gradually declining. We have already ſpoken of our countryman Mr. Keir, as the firſt who ſuggeſted the true theory of mordants, which was afterwards extended and improved by Macquer. The worthy preſident of the literary and philoſophical ſociety of Mancheſter, Mr. Henry, ſome time after, read a paper to the ſociety, ſince publiſhed in the 3d volume of their Memoirs, "On the nature of wool, ſilk, and cotton, as objects of the art of dyeing; on the various preparations and mordants requiſite for theſe different ſubſtances, and on the nature and properties of colouring matter." This paper, which is replete with new and ingenious views of the nature and objects of dyeing, may be conſidered as amongſt the firſt attempts in this country to reduce to ſyſtem and theory the ſubject of which it treats: Mr. Henry, in theſe Memoirs, firſt pointed out the peculiar nature of the aluminous mordant of the calico printers; he ſhewed that by double decompoſition an acetite of alumine was formed, and explained the cauſe of its ſuperiority over the ſulphate of alumine, which conſiſts in the ſubſtitution of a volatile vegetable acid in lieu of the ſulphuric.

In the year 1794, Dr. Bancroft publiſhed his "Experimental Reſearches concerning the philoſophy of permanent colours, and the beſt means of producing them by dyeing, calico printing, &c." which may be conſidered as the firſt, and indeed only original work on the ſubject which this country has produced. This work, as the title indicates, is rather an experimental than practical treatiſe: it contains, however, much valuable information, which the practical dyer may apply in many caſes with conſiderable advantage, and is alſo uſeful as containing a hiſtory of all the different ſubſtances of which it treats, and an account of the labours of Macquer, Dufay, Hellot, Berthollet, and others, in this field of ſcience. It is to be regretted, that the work is ſtill imperfect, the firſt volume only having yet appeared. The ſecond, which was intended to comprehend all the remaining adjective colours and colouring matters, not treated of in the firſt, particularly thoſe very intereſting ones which are derived from the tribe of madders, can hardly, after an interval of fifteen years, be looked for with confidence.

Dr. Bancroft firſt pointed out the true action of tartar in the proceſs for dyeing ſcarlet, and clearly proved that the nitro-muriate of tin, or any ſolution of tin alone, produced a crimſon only; and that the addition of tartar produced a ſcarlet, by the converſion of a portion of the crimſon colouring matter of the cochineal, to a pure yellow. On this obſervation he founded an improvement in the ſcarlet dye, which conſiſted in communicating to the cloth, by means of quercitron bark, and any ſuitable mordant, ſuch a ſhade of yellow as would produce, with the crimſon of the cochineal, a true ſcarlet. By this proceſs he expected to ſave all that cochineal which he conceived to be expended in the production of the yellow: the trials on the large ſcale, however, we are informed by Dr. Bancroft, did not juſtify the expectations he had formed, of the importance of the proceſs.

A more important and laſting ſervice, however, he has rendered to the art of dyeing, by the introduction of the quercitron bark, a drug which is now become of ſuch general and acknowledged utility, as to ſuperſede almoſt every other kind of yellow colouring matter whatever. For the hiſtory of this ſubſtance, and other particulars reſpecting its introduction, we muſt refer to the article itſelf, under the head QUERCITRON BARK.

Though we have to record no brilliant diſcoveries or improvements in the practice of dyeing, within theſe few years, yet the art has continued progreſſively to improve, the different proceſſes have been ſimplified and amended; and what ſome years ago was conſidered a matter of chance and uncertainty, is now reduced to fixed principles.

The dyeing of Turkey red is now fully underſtood and practiſed in this country, with a ſucceſs at leaſt equal to that of any other. The proceſs has, with ſome modifications, been applied lately to the dyeing of piece goods, and the red thus produced ſurpaſſes in beauty and durability, all other colours which it is poſſible to fix on cotton. But it is not our intention here to enter into a hiſtory of all the minor improvements that have been made in the art of dyeing; they will be treated of at large, during the progreſs of the work, under their reſpective heads.

DYEING, *the Laws relating to*, are as follow: Dyers ſhall dye both the cloth and the liſt, or forfeit it. 1 R. III. cap. 4. No dyer may dye any cloth with archil, or with brazil, to make a falſe colour in cloth or wool, &c. on pain of twenty ſhillings. Stat. 3 & 4 Edw. VI. cap. 2. Dyers are to fix a ſeal of lead to cloths, with the letter *M*, to ſhew that they are well maddered, &c. or forfeit three ſhillings and fourpence; and not to uſe logwood in dyeing on pain of forfeiting twenty pounds. Stat. 23 Eliz. cap. 9. And penalties are inflicted on dyers, who dye any cloths deceitfully, and not being dyed throughout with woad, indigo, and madder; alſo marks ſhall be put to the cloth dyed, &c. Dyers in London are ſubject to the inſpection of the Dyers' company, who may appoint ſearchers; and out of their limits, juſtices of peace in ſeſſions to appoint them: oppoſing the ſearchers incurs ten pounds penalty, by ſtat. 13 Geo. I. c. 24.

DYEING, in a more extenſive ſenſe, is applied to all kinds of colourings given to bodies of any ſort.

In which ſenſe, dyeing amounts to the ſame with *coloration;* and includes ſtaining, painting, gilding, marbling, printing, &c. The Chineſe are ſaid to practiſe the dyeing of tea with catechu, which gives the worſt ſorts of green tea leaf the colour, and its infuſion the tincture of bohea. Short, Diſſert. on Tea, pref. p. 15. See TEA and CATECHU.

The ſorts of dyeing now commonly uſed in vulgar trades, are 1. Whitening of wax, and ſeveral ſorts of linen, and cotton cloths, by the ſun, air, and reciprocal effuſions of water. See BLEACHING. 2. Staining of wood and leather by lime, ſalt, aud liquors, as in ſtaves, canes, marble, leathers, marquetry, &c. 3. Marbling of paper by tempering the colours with ox-gall, and applying them upon a ſtiff-gummed liquor. See PAPER. 4. Colouring, or rather diſcolouring ſilks, tiffanies, &c. by brimſtone. 5. Colouring ſeveral iron and copper works into black with oil. 6. Giving leather a gold colour, or rather dyeing ſilver-leaves like gold, by varniſhes; and in other caſes by urine and ſulphur. 7. Staining of marble and alabaſter, with heat, and coloured oils. 8 Tinging ſilver into braſs with brimſtone or urine. 9. Colouring the barrels and locks of guns blue and purple with the temper of ſmall-coal heat. 10. Colouring glaſs cryſtals, and earthen-ware with the ruſts and ſolutions of metals. See POTTERY, &c. 11. Colouring live hair, as in Poland, both horſe and man's hair; and alſo of furs. 12. Enamelling and annealing. See ENAMELLING. 13. Application of colours, as in the printing of books and pictures; and the making of playing cards, japanning, &c. See PRINTING, CARDS, and JAPANNING. 14. Gilding and tinning with mercury, block tin, and ſal ammoniac. See GILDING and TINNING. 15. Colouring metals, as copper with calamine into braſs, and with zinc or ſalt-petre into falſe gold, or into falſe ſilver with arſenic. See CALAMINE, BRASS, ZINC, ARSENIC, &c. 16. Making painters' colours, by preparing of earth, chalk, and ſlates, as in umber, oker, Cologn earth, &c. out of the calces of lead, as ceruſs and minium; by ſublimates of mercury and brimſtone, as in vermillion; by tinging of white earths variouſly, as in verditer, and ſome of the lakes; by concrete juices or fæculæ, as in indigo, pinks, ſap-green, and lakes: and by ruſts, as in verdigris, &c. See CERUSS, MINIUM, VERMILLION, INDIGO, &c. 17. The applying of theſe colours by the adheſion of ox-gall, as in the marbled paper aforeſaid; or by gum-water, as in limning: or clammy drying oils, as the oils of linſeed, nuts, ſpike, turpentine, &c. See PAINTING, LIMNING, &c. 18. Watering of tabbies. See WATERING, CALENDER, TABBY, &c. Petty. Appar. Hiſt. of Dyeing, ap Sprat.

Glaſs dyed is the common matter of artificial jewels: the tinctures are given with zaffer, manganeſe, feretto, crocus martis, &c. The proceſſes are deſcribed at length in Antonio Neri, de Re Vitrario, lib. i. cap. 12, 13, 14, ſeq. See GLASS, GEM, &c.

The Peruvian women, when grown old, dye their grey hairs black by a very untoward operation, *viz.* holding the head ſome hours with the hair ſopped in a boiling tincture of the root of a tree called *cuchau*, by the Spaniards *maquey*.

DYEING *of Hats*, is done by boiling a hundred pounds of logwood, twelve pounds of gum, and ſix pounds of galls, in a proper quantity of water for ſome hours; after which about ſix pounds of verdigris, and ten pounds of green vitriol are added, and the liquor kept ſimmering, or of a heat a little below boiling. Ten or twelve dozen of hats are immediately put in, each on its block, and kept down by croſs bars for about an hour and an half; they are then taken out and aired, and the ſame number of others put in their room; the two ſets of hats are then dipped and aired alternately, eight times each; the liquor being refreſhed each time with more of the ingredients, but in leſs quantity than at firſt. This proceſs affords a very good black on woollen and ſilk ſtuffs as well as on hats. Com. Phil. Tech. p. 428. See HAT.

DYEING, or *ſtaining of wood, for inlaying, veneering, &c.* *Red* is done by boiling the wood in water and alum; then taking it out, adding brazil to the liquor; and giving the wood another boil in it. *Black*, by bruſhing it over with logwood boiled in vinegar, hot; then waſhing it over with a decoction of galls and copperas, till it be of the hue required. Any other colour may be given by ſqueezing out the moiſture of horſe-dung through a ſieve, mixing it with diſſolved roch alum, and gum-arabic; and to the whole adding green, blue, or any other colour deſigned. After ſtanding two or three days, pear-tree, or other wood, cut to the thickneſs of half a crown, is put into the liquor boiling hot, and ſuffered to remain till it be ſufficiently coloured. Park. Treat. of Japan. chap. xxvii. p. 82.

DYEING *of bone, horn,* or *ivory*. *Black* is performed by ſteeping braſs in aqua fortis till it be turned green: with this the bone, &c. is to be waſhed once or twice; and then put in a decoction of logwood and water, warm. *Green* is begun by boiling the bone, &c. in alum-water; then with verdigris, ſal ammoniac, and white wine vinegar; keeping it hot therein till ſufficiently green. *Red*, is begun by boiling it in alum-water, and finiſhed by decoction in a liquor compounded of quicklime ſteeped in rain-water, ſtrained, and to every pint an ounce of brazil wood added: the bone, &c. to be boiled therein till ſufficiently red. Other methods are given by Salmon. And from him by Houghton. Park. lib. cit. p. 83. Salm. Polygraph. lib. iii. cap. 35. p. 275. Hought. Collect. N° 138. tom. i. p. 361. See BONES, HORN, IVORY, &c. The refuſe of the Bow-dye given to hogs to feed on, is ſaid to tinge their very bones red.

DYEING *of Leather*. See LEATHER.

DYEING *of marble and ſtones*. See STAINING.

DYEING *of Thread*. See THREAD.

DYER, SIR JAMES, in *Biography*, was born about the year 1511, and received his academical education at Oxford, whence he removed to the Middle Temple, with a view of ſtudying the law, where he diſtinguiſhed himſelf for his aſſiduity and talents. He acted ſome years as a barriſter, and, in 1552, he was, by the king's writ, called to the degree of a ſerjeant at law, and, in the ſame year, was elected ſpeaker of the houſe of commons. He roſe to the office of chief juſtice of the common pleas, an office which he held upwards of 20 years, with a high character for integrity and ability. He poſſeſſed a remarkably placid and even temper; and on the trial of Sir John Throckmorton, he ſcorned to take the ſame ſort of liberties with the priſoner which were taken by the other counſel, Mr. ſerjeant Standford. He died in 1581, at his eſtate of Howton, in Huntingdonſhire, leaving behind him a "Book of Reports" in folio, containing caſes and deciſions occurring in the reigns of Henry VIII., Edward VI., Mary, and Elizabeth; this work is very highly eſteemed for its conciſeneſs and ſolidity, and has been ſeveral times reprinted. He was author of "A Reading upon Statute 32 Henry VIII., c. 1., of Wills, and upon two others for its Explanation." By the ſervices which he rendered his country, as well by his official duties as by his works, he obtained the reputation of being a moſt upright judge and excellent interpreter of the laws. Biog. Brit.

DYER, JOHN, was born in Carmarthenſhire in 1700, but was educated at Weſtminſter ſchool. He was intended by his father, who was an eminent ſolicitor, for the ſame profeſſion as he had long followed himſelf; but the young man felt a repugnance to the law, and, on the death of his parent, determined upon painting as a profeſſion, and became a pupil to Mr. Richardſon. In this he never greatly excelled, nor perhaps roſe higher than an itinerant artiſt. His mind ſeems to have been more inclined to poetry, and in 1727 he made himſelf known by his "Grongar Hill," which became very popular, and has been admitted in many collections. After the publication of this piece Mr. Dyer travelled to Italy, by way of improvement as a landſcape painter; but his acquirements in this journey were of more importance to him as a poet than a painter. In the year 1740, he diſplayed his taſte, and the augmentation of his poetical images, by the publication entitled "The Ruins of Rome." "The title of this work," according to Dr. Johnſon, "raiſes greater expectation than the performance gratifies." But a more candid critic ſays, "It contains many paſſages truly poetical, and the ſtrain of moral and political reflection is that of a benevolent and enlightened mind." After this Mr. Dyer took orders, was married, and went to reſide in Leiceſterſhire, where he had a ſmall living; this he exchanged for one in Lincolnſhire, to which another was ſoon added. The county, however, he ſoon found to be ill ſuited to his conſtitution, which had ever been delicate. In 1757 he publiſhed his "Fleece," a didactic poem, of which the theme is the care of ſheep, the labours of the loom, and the arts of trade. The firſt part is paſtoral, the ſecond mechanical, and the third hiſtorical and geographical. The poem has been often publiſhed, and yet it has not been one of our popular poems; there are, notwithſtanding, in it many pleaſing, and ſome grand and truly impreſſive paſſages. Mr. Dyer did not ſurvive this publication many months: he died in 1758, and, in the year 1761, his works were collected and publiſhed in one volume octavo. He lived highly reſpected, and at his death, left the reputation of a good poet, and the character of an honeſt, humane, and good man. Biog. Brit.

Dyer's *Black*. See Black.

Dyer's *Blue*. See Blue.

Dyer's *Broom*, the name of a ſpecies of *Geniſta*; which ſee.

Dyer's *Green*. See Green.

Dyer's *Iſland*, in *Geography*, a ſmall iſland of America, in Narraganſett bay.

Dyer's *Weed*, in *Botany*, the luteola of Tournefort, and a ſpecies of the reſeda in the Linnæan ſyſtem. For the generic characters, ſee Reseda.

It grows in moſt parts of the world. The Greeks, of old, uſed it in dyeing yellow, as we do at this time, and called it cymene, and ſometimes thapſia, the word ſignifying, with them, ſeveral different things which had the property of dyeing yellow. It was called alſo by ſome robia, or rubia; but thoſe who gave it this name have always diſtinguiſhed it by ſome peculiar epithet from the common rubia, or madder. Paulus Ægineta mentions it as an herb uſed in dyeing cloths; and Neophytus, and ſeveral others, give it a place among the things uſed to tinge the hair. See Weld.

Dyer's *Yellow*. See Yellow.

DYHRENFURT, in *Geography*, a ſmall town of the kingdom of Pruſſia, in the duchy of Sileſia, on the river Oder, anciently called Prſig.

DYKE, in *Mineralogy*. This term ſeems to have originated among the collieries of the north of England and of Scotland, where it was and is ſtill employed to denote thoſe banks of baſalt (locally named whin) by which the coal ſtrata are frequently divided. The breadth of a dyke varies from a few feet to many yards, and its length and depth are generally of great but unknown extent: its direction is nearly vertical, forming with the plane of the ſtrata that it paſſes through, an angle approaching, more or leſs, to 90 degrees.

By the Scottiſh mineralogiſts, the term dyke is employed as ſignifying a vein, compoſed of any compact earthy mineral; and in this ſenſe is often made uſe of in the controverſial publications, wherein the Huttonian theory is attacked or defended. At preſent, however, the term ſeems, in a good meaſure, ſuperſeded by the more general one of vein.

Dyke, *Offa's*, or *Clawdh Offa*, a famous dyke, conſtructed by Offa the great king of Mercia, towards the cloſe of the eighth century, about A. D. 780; and intended either to mark the boundaries between a colony of Saxons whom he planted in the level country between the Severn and the Wye, and the Welſh whom he had driven out of it, or to defend the former from the hoſtile incurſions of the latter. This dyke extended from north to ſouth, about 90 miles, running along the ſides and bottoms of the hills, from the mouth of the river Dee to that of the Wye near Chepſtow. It is thought to have been an imitation of the ramparts thrown up by Agricola, Adrian, and Severus, to guard the Roman province againſt the incurſions of the northern barbarians; but from ſome remains of it, which are ſtill to be ſeen, and for other reaſons, lord Lyttelton (Hiſt. Hen. II. vol. ii.) concludes, that it was rather intended for a boundary, to ſeparate the territories of the Engliſh from thoſe of the Welſh, than to protect the former, as a fortification. Whatever the intent of ſo vaſt a work may have been, it was probably at this period, that the larger towns and cities, ſituated to the eaſt of the Severn and Dee, were built, for the purpoſe of checking the irruptions of the Welſh by a ſtrong line of frontier poſts. The villages likewiſe, on the eaſt ſide of Clawdh Offa, whoſe names terminate in *ton* or *ham*, were about this time inhabited by Saxons, who were uſually called "Gwyr-y-Mars," or the men of Mercia; though in after-times the Welſh ſettled on each ſide of the dyke. During an interval of peace, Offa finiſhed this dyke; but the Welſh were not inſenſible of the diſhonour and injury done to their country. Accordingly they ſecretly concerted the plan of its deſtruction, and having ſettled a previous agreement with the kings of Northumberland, and of the South-ſaxons, with whom they were then is alliance, they ſuddenly beſet Clawdh Offa, in the night of St, Stephen's day, the night itſelf being extremely dark; and aſſiſted alſo by the country people, they broke down the rampart, and in a ſhort time, filled up and levelled the dyke to the length of a bow-ſhot. Early in the morning they aſſailed the camp of king Offa, and ſlew great numbers of his ſoldiers; who, depending on the time, were either aſleep or unarmed, or had given themſelves up to pleaſure, or to the religious obſervance of the feſtival. The labour and charge of this dyke were much greater than the benefit; for ſoon after Offa's death, the Welſh again extended their dominions beyond that dyke, forcing their way, like a rapid torrent, which deſcends from the mountains, and overflows the plain country. We ſhall only add, that the limits of the Welſh from that time, were very uncertain; being often advanced, or ſet back, as the fortune of war happened to change, in favour of them or of the Saxons.

Dyke-*Reeve*, a bailiff, or officer, that has the care and overſight of the dykes and drains in deepening fens, &c. We find mention made of this officer ann. 16 & 17 Car. II. cap. 11. See. Dike.

DYLE, in *Geography*, a river of France, which gives its name to the laſt of the thirteen departments of the firſt region of France, called the region of the countries added to France by the peace of Luneville (des pays réunis.) It has its ſource in a ſmall ſpring near Marbais, paſſes by Wavre, Louvain, and Malines. On coming from the latter, it takes up the Senne and the two Nethes near Rumpel, and flows not far from this place into the river Rupel. Formerly boats uſed to be towed on the Dyle from Wavre to Louvain. Merchant veſſels, however, come up as far as Malines from the Scheldt, by means of the tides which flow regularly twice a day.

Dyle, *the department of the*, is the thirteenth department of the firſt region called la région des pays réunis in France. Bruſſels is its chief city. It is formed of part of the duchy of Brabant, and owes its name to the river Dyle, by which it is irrigated.

The limits of the department of the Dyle, are on the north, the department of the two Nethes; on the eaſt, the departments of the Lower Meuſe and of the Ourthe; on the ſouth, thoſe of Sambre and Meuſe and of Jemmapes; and on the weſt, that of the Eſcaut, (Scheldt.)

Its principal rivers are the Dyle, the Demer, and the Senne; it has alſo two fine canals, that of Louvain and that of Bruſſels. The ſoil is uncommonly rich and fertile. Agriculture in all its branches, grazing, the rearing of cattle, the buſineſs of the dairy, and horticulture, are extremely flouriſhing and well underſtood. The management of ſheep, however, is rather neglected, but great attention is paid to bees. Mineral productions are ſcarce; there is a little iron. The quarries yield ſome very good white free-ſtones, and ſome blue, which are a kind of marble, beſides grind-ſtones, and a ſort of ſmall granite, which makes good roads and keeps them in excellent repair.

There is hardly any manufacture but what flouriſhes in the department of the Dyle, and every one in the higheſt ſtate of perfection. Its trade is in proportion to its abundance of raw and manufactured productions. Induſtry is every where exerted in the higheſt degree, of which it appears capable.

The moſt conſiderable towns, next to Bruſſels, are Louvain, Tirlemont, Nivelles, Dieſt, Wavre, and Halle. The whole territorial extent of the department of the Dyle, is 3137 ſquare kiliometres and a half, or 671,746 arpens, 95,704 of which are covered with foreſts. The population amounts to 363,956 individuals, or about 1978 inhabitants upon a ſquare league. Their average contribution to the expences of the ſtate is about 10*s.* *per* head annually. The department is divided into three diſtricts, Bruſſels, Louvain, and Nivelles, 30 cantons, and 388 communes.

DYMA, or Dyme, in *Ancient Geography*, a town of the Peloponneſus in Achaia, W. of Olené, and at the bottom of a ſmall gulph, having to the north-weſt the promontory Araxum. This town was more anciently called Palea according to Pauſanias, and Strabo ſays, that it was alſo called Stratos. Polybius, when he is ſtating the influence which the Lacedæmonians and the king of Macedonia had on the affairs of Greece, particularly after the death of Alexander, adds, that in the 124th olympiad, 284 B. C. Dyme and Patras, were two of the firſt cities which united to ſhake off the foreign yoke; afterwards, however, as we learn from Pauſanias, it was the only city of thoſe belonging to the Achæans, which took the part of Philip, ſon of Demetrius, when the Romans declared their oppoſition to him. This they honourably did by way of acknowledging the kindneſs of this prince for recovering and re-eſtabliſhing in their city thoſe of its inhabitants, whom the Romans had made priſoners. But Sulpicius, who commanded the Roman army, devoted this city to plunder after he had taken it. In the time of the piratical war, Pompey placed here a number of thoſe pirates, of whom he had cleared the ſea on the coaſt of Cilicia. Auguſtus ſubjected Dyme to the dominion of Patras; the vicinity of this city was famous for ſeveral engagements, and particularly for that which terminated in the entire defeat of the Achæans by the Lacedæmonians, under the conduct of Cleomenes in the year 227 B. C.

Dyma, or *Dyme*, a town of Thrace, ſeated on the eaſtern bank of the river Hebrus, at ſome diſtance from the ſea; called by Ptolemy, and in the Itinerary of Antonine, *Dimi.*

DYNA, in *Commerce*, a kind of Eaſt Indian coin, worth about thirty ſhillings of Engliſh money.

DYNAMICS (from δυναμις, *power*) is the ſcience of moving powers; or of the action of forces on ſolid bodies, when the reſult of that action is motion. *Mechanics*, in its moſt extenſive meaning, is the ſcience which treats of *quantity*, of *extenſion*, and of *motion*. Now that branch of it which conſiders the ſtate of ſolids at reſt, ſuch as their equilibrium, their weight, their preſſure, &c. is called *ſtatics*; and that which treats of their motion, is called *dynamics*. When fluids are conſidered, inſtead of ſolids, then that branch of mechanics which treats of their equilibrium, weight, &c. is called *Hydroſtatics*, and that which treats of their motion, is called *Hydrodynamics*.

An extenſive and varied field of ſtrict inveſtigation, and of ſpeculative diſcuſſion, falls under the denomination of dynamics. Various difficult queſtions are naturally connected with the more evident propoſitions reſpecting viſible effects; and if inſtead of our remaining ſatisfied with facts, we endeavour to reaſon upon the nature of their primitive origin, the long and laborious inveſtigation is ſeldom attended with any uſeful or ſatisfactory reſults. In our preſent ſtatement of this ſcience, we ſhall endeavour to explain the neceſſary definitions, ſo far as to render our meaning unequivocal in the following pages; and we ſhall arrange the general principles with as much additional illuſtration as the nature of the ſubject may ſeem to demand; but we ſhall avoid, as much as it may appear practicable, the diſcuſſion of abſtruſe and ſpeculative particulars.

Matter denotes in general the ſubſtance of which bodies are formed. Thus a man, a ſtone, a tree, &c. are all formed of matter. But we do not mean to aſſert, that the matter which forms the man, the ſtone, the tree, or any other body, is, or is not, all originally of the ſame kind; for we are perfectly ignorant of its original nature.

Volume, *bulk*, or *magnitude*, denotes the ſize of a body with reſpect to the ſpace it occupies. Thus the bulk of a full grown man is greater than that of a new-born child. The bulk of a ball of two inches in diameter, is eight times as great as that of a ball of one inch in diameter, and ſo forth.

Denſity means the proportional quantity of matter which is contained under a given extenſion; and we judge of this quantity of matter by its weight. Thus, a cubic inch of mercury weighs about $13\frac{1}{2}$ times as much as a cubic inch of water; therefore we ſay that the denſity of mercury is to the denſity of water as $13\frac{1}{2}$ to one.

Maſs denotes, at the ſame time, the bulk and the denſity of a body, *viz.* is the product of the bulk multiplied by the denſity. Thus, in the inſtance of the preceding paragraph, the maſs of a cubic inch of mercury is to the maſs of a cubic inch of water, as $13\frac{1}{2}$ to one; the maſs of two cubic inches of mercury is double the maſs of one cubic inch of the ſame fluid metal; but is equal to 27 times the maſs of one cubic inch of water; for it is evident, that if one cubic inch of mercury contains $13\frac{1}{2}$ times as much weight as one cubic inch of water, two cubic inches of mercury muſt contain twice $13\frac{1}{2}$ times; or in general, that the maſs is equal to the denſity multiplied by the bulk.

Motion is a continual and ſucceſſive change of place. It is diſtinguiſhed into *abſolute* and *relative*, according as the motion is performed in abſolute or in relative ſpace. Thus, if a ſhip could remain immoveable in the univerſe, a man ſitting in a part of it, would be abſolutely at reſt; but if the ſhip

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New-Street Square, London.

ſhip be in motion whilſt the man continues ſitting; then this man will be abſolutely in motion with reſpect to the univerſe; but relatively at reſt with reſpect to the parts of the ſhip. If you ſuppoſe, that the ſhip moves equably forward over a diſtance equal to its length, and that at the ſame time the man in his chair is drawn from the fore to the back part of the ſhip, with the ſame equable motion; then the man will be in motion relatively to the parts of the ſhip; yet he would remain in the ſame abſolute place.

Equable motion is that which paſſes over equal portions of extenſion, or of ſpace, in equal portions of time.

Accelerated, and *retarded motion*, is when equal portions of extenſion are paſſed over in portions of time either ſucceſſively ſmaller or ſucceſſively larger. Thus, if a body in motion paſſes over the firſt yard of extenſion in one hour, the ſecond yard in 50 minutes, the third in 40 minutes, and ſo on; then its motion is ſaid to be accelerated. But if a body paſſes over the firſt yard in one hour, the ſecond in one hour and a quarter, the third in one hour and a half, &c. then its motion is ſaid to be retarded.

Velocity is the ratio of the quantity of lineal extenſion that has been run over in a certain portion of time; or it is the ratio of the time that has been employed in moving along a determinate extenſion. For inſtance, if a body A has moved along an extenſion of ten miles in one hour, and another body B has moved along an extenſion of one mile in the ſame time, *viz.* in one hour; then the velocity of A is ſaid to be to the velocity of B as ten to one. Alſo, if the body A has moved along the diſtance of one mile in four minutes, and the body B has moved along the ſame diſtance in two minutes, then the velocity of B is to the velocity of A, as two to one. When both the times and the ſpaces are unequal, then the velocity is equal to the quotient of the ſpace divided by the time; it being evident, that if a body paſſes over two miles in one minute, or four miles in two minutes, or ten miles in five minutes, the velocity is conſtantly the ſame; and, therefore, in order to reduce theſe expreſſions to unity, we muſt divide the 4 miles by 2 minutes, or the 10 miles by 5 minutes, and the quotient is always the ſame, *viz.* 2; meaning two miles per minute. But if the body paſſes over the ten miles in two minutes, then the velocity, when reduced to unity by dividing the 10 miles by two minutes, is 5, meaning five miles per minute. Hence, univerſally, the velocity is repreſented by, or is equal to, the quotient of the ſpace divided by the time. Thus, if a body A paſſes over four miles in 10 minutes, and another body B paſſes over 12 miles in 18 minutes; then the velocity of A is to the velocity of B, as $\frac{4}{10}$ to $\frac{12}{18}$; or as 0.4 to 0.666, &c. In this inſtance, we have taken a minute for the unit of time; but any other portion of time, ſuch as an hour, or a ſecond, &c. may be conſidered as the unit; but then in the ſame computation, the ſame portion of time muſt be conſtantly conſidered as the unit. In moſt mechanical computations, a ſecond is uſually taken for the unit.

A *force* is that which cauſes a change in the ſtate of a body, be it of reſt or of motion. Of the nature of forces we know nothing. Their effects alone come within our knowledge, and it is from the quantity of theſe effects, that we meaſure forces. Thus, if a body is ſet in motion by the action of a certain force, and is enabled by it to move with a certain velocity, and another equal body is ſet in motion by another force, which enables it to move with the double of the above-mentioned velocity; then we ſay, that the former force is to the latter as one to two; or that the latter is double the former.

Some authors are of opinion, that a quadruple force is required to produce a double velocity, and they alledge certain facts which ſeem to corroborate their opinion; but we ſhall in the ſequel mention an argument which to us ſeems concluſive in favour of the above-mentioned ſtatement. It is evident, that if the maſſes are unequal, and the velocities which have been produced by the action of certain forces, are equal, then the forces muſt be as the maſſes; conſequently when both the maſſes and the velocities are unequal, then the forces are as the products of the maſſes multiplied by their reſpective velocities.

The *momentum*, or *quantity of motion*, is the force of a body in motion, and is equivalent to the impreſſion which it would make on another body that ſhould be placed at reſt juſt before it. Therefore, according to the definition of forces, the momentum is equivalent to the product of the maſs of the body multiplied by the velocity; hence forces are equivalent to, or are meaſured by, the momentum, or quantity of motion, they are capable of producing. From this ſtatement then it follows, that if we put Q for the maſs or quantity of matter, M for the momentum, and V for the velocity, the following proportions will ſtand good, *viz.* $Q \propto \frac{M}{V}$ $M \propto QV$, and $V \propto \frac{M}{Q}$, or in other words, the maſs is as the momentum divided by the velocity, the momentum is as the maſs multiplied by the velocity, and the velocity is as the momentum divided by the maſs.

Forces have been uſually conſidered as being of two ſpecies, and theſe eſſentially different from each other. They have been called *preſſures* and *impulſes*. Whatever acts upon a body ſo as to put it in motion, and, by the continuance of the action, accelerates that motion, has been called a *preſſure*, or *preſſive force*; and the force of gravity, which, by conſtantly acting upon deſcending bodies continually accelerates their velocity, is of this kind.

An *impulſe* or *impulſive force*, is that which acts inſtantaneouſly upon a body (according to our perception) and then leaves the body without any farther ſolicitations; and ſuch is the ſtroke of a hammer, or in general of one body ſtriking againſt another body. Thus a ball in motion ſtrikes againſt another ball at reſt, and puts it in motion. The latter, having received the ſtroke, proceeds by itſelf, and its velocity will be uniform as long as it does not meet with obſtructions.

The reaſons which ſeem to prove that an impulſive force is infinitely greater than a preſſure, or that the one is not capable of compariſon with the other, are derived from the effects. For inſtance, a man with the moderate ſtroke of a hammer can drive a nail into a plank, when a weight of ſeveral hundreds gently laid upon the head of the nail will not produce the ſame effect. A pebble, likewiſe, which would ſupport an immenſe weight, is eaſily broken by the ſtroke of another pebble, or of a hammer. This difference of effects has given riſe to a variety of conjectures, of explanations, and of controverſies, which towards the commencement of the laſt century filled up many volumes, and employed the thoughts of the moſt able philoſophers and mathematicians. (See Reid's Eſſay on Quantity in the Phil. Tranſ. vol. xlv. and Dr. Irwin's inquiry into the meaſure of the force of bodies in motion, Phil. Tranſ. for 1745.) Yet upon a due examination of the facts, and of the reaſonings which have been grounded upon thoſe facts, it does not appear, that the gradual communication of motion by a preſſure, and the inſtantaneous communication of it by an impulſe, are clearly proved to be eſſentially different in their nature. Perhaps an impulſe may be conſidered as a powerful preſſure acting for a very ſhort time, and a preſſure may be conſidered as a weak impulſe repeated at infinitely ſmall portions of time. But let the real ſtate of the caſe be as it may, we ſhall,

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agreeably to our plan, omit any farther conſideration reſpecting the nature of forces ; acknowledging to notice merely their effects.

In the examination of theſe effects, it becomes neceſſary to ſtate, to examine, and to explain the various motions that take place amongſt the works both of nature and of art ; the general laws to which they are reconcileable; the peculiarities by which they are diſcriminated from each other, and in conſequence of which they are arranged under diſtinct denominations; and laſtly, the application of the ſame to various uſeful purpoſes. The ſubject is vaſt and intricate ; but ſince according to the nature of our work, every particular branch of motion muſt be explained under the article of its peculiar appellation ; there remains very little more for us to arrange in the preſent article, than an enumeration of the various ſpecies of motion, a ſtatement of their definitions, or of the peculiarities by which they are diſcriminated from each other, and that mutual dependence which evidently ſeems to regulate the whole doctrine of motion. We ſhall, at the ſame time, refer the reader to other articles for a more ample and ſatisfactory explanation reſpecting each particular kind of motion.

For the ſake of perſpicuity, the examination of the various movements of bodies, has been uſually arranged under the following heads :

1. Uniform rectilinear motion, with what is commonly called the compoſition and reſolution of forces.
2. Colliſion, both direct and oblique.
3. Motions ariſing from the actions of central forces.
4. Motions ariſing from the joint actions of a central and an impulſive force ; *viz.* of a preſſure and of an impulſe.
5. Projectiles.
6. Deſcent of bodies along inclined planes.
7. Vibrations of pendulums.
8. Curve of ſwifteſt deſcent.
9. Rotation of bodies about fixed axes.
10. Centres of oſcillation, of percuſſion, of gyration, &c.
11. Movements of machines.

Each of theſe ſpecies of motion has certain peculiarities by which it is diſcriminated from the reſt, or rather that render a ſeparate examination of whatever belongs to it, more conducive to perſpicuity. But there are certain rules, laws, or affections, which belong to them all, and which we ſhall now ſtate. They are three in number, and are commonly known by the denomination of ſir Iſaac Newton's laws of motion.

Firſt Law. Every body will remain either in a ſtate of reſt, or of uniform motion in a ſtraight line ; unleſs it be compelled to change that ſtate by forces impreſſed.

Second Law. The change of motion is always proportionate to the moving force impreſſed, and is always made in the direction of the right line in which that force is impreſſed.

Third Law. Action and re-action are always equal and contrary to each other. Or the mutual actions of two bodies upon each other, are always equal and directed contrary ways.

Theſe laws have been eſtabliſhed by all the facts which have been hitherto obſerved, and by the ſtricteſt reaſoning of the moſt enlightened philoſophers. A careful examination of the particulars will eaſily manifeſt the evidence and the extent of theſe laws ; which at firſt ſight may perhaps not be eaſily comprehended. In order to aſſiſt the elucidation of the ſame, we ſhall add a ſhort explanation of thoſe parts at leaſt, which are more likely to create any difficulty.

That a body at reſt ſhould continue in that ſituation, unleſs it be put in motion by ſome force or forces, no perſon will be inclined to deny, it being an idea naturally ſuggeſted by the reſult of common occurrences. But that a body once put in motion, and not afterwards driven by any other force, or oppoſed by any obſtacle, ſhould continue to move on in a ſtraight line for ever after is not eaſily believed ; conſidering that all the movements, however rapid, which fall under our obſervation on the ſurface of the earth, preſently terminate in reſt. This apparent difficulty, however, will be eaſily removed by conſidering that all the movements which fall under our obſervation near the ſurface of the earth, are performed under the influence of other forces ; the principal of which are the force of gravity, and the reſiſtance of the air, in which the whole earth and all its ſeparate bodies are involved ; the former of which forces continually draws bodies towards the centre of the earth, whilſt the latter obſtructs all ſorts of motion. So that a body ſet in motion by any impulſive force ; for inſtance, a bullet thrown horizontally by the diſcharge of a gun, would continue to move uniformly in a ſtraight line for ever after, were it not drawn downwards by the force of gravity, which, combined with the impulſive force, would oblige it to deſcribe a particular curve, which is very nearly a parabola ; but the reſiſtance of the atmoſphere, which continually obſtructs it, forces it to deſcribe another ſort of curve, the nature of which is extremely intricate. Therefore it appears that the motion of the bullet, thus impelled by a gun, falls under the condition of the ſecond part of the firſt law of motion ; *viz.* it is compelled to change its ſtate of uniform rectilinear motion, by the force of gravity, and by the preſſure of an obſtructing medium.

But notwithſtanding theſe evident cauſes of deviation from the direction of the original impulſe, it may ſtill be ſuppoſed, that without them, the bullet would have continued its motion only ſome time longer ; but that it would ultimately terminate in reſt. The anſwer to this is, that as far as obſervations and calculations can reach, the deviation of the bullet from its original motion, or of any other body ſet in motion by an impulſive force, is always proportional to the obſtructing cauſe, or cauſes ; whence it neceſſarily follows, that when the obſtructing cauſe vaniſhes, or becomes zero, the deviation of the original motion in the abovementioned caſes muſt likewiſe vaniſh.

Several uſeful conſequences are naturally deduced from the foregoing illuſtration. Thus, whenever we ſee a body in motion, we muſt conclude that it has been put in motion by an adequate force. If the direction, and the velocity of that motion be altered, we muſt conclude that its alteration has been occaſioned by the action of other forces. If the movement continues without any viſible alteration, or if its velocity be increaſed, we muſt ſuppoſe, that the body is continually urged by a preſſing force ; for otherwiſe it would not, even for a moment, remain uninterrupted in a reſiſting medium, and under the influence of other exiſting forces.

With reſpect to the ſecond law of motion, it is only neceſſary to obſerve, that though it be expreſſed as if we were acquainted with the nature of the force which produces the change of motion ; yet the real meaning is, that we only conſider the changes of motion as the meaſures of the forces which occaſion thoſe changes ; and we conſider the direction of the change as the indication of the direction of the force.

The third law of motion, namely, that action and reaction are always equal and contrary to each other, will be eaſily aſſented to, if the leaſt attention be paid to common occurrences. A weight faſtened to a horſe by means of a rope, and thus dragged over the ground, produces a reſiſtance which

which muſt be overcome by the ſuperior power of the horſe; for the ſtone reſiſts in a direction contrary to that of the horſe. If a ſtone be thrown againſt a glaſs, or a glaſs be thrown again a ſtone, the ſtroke will be equally felt by both bodies; yet the glaſs will be broken by it, and the ſtone will not, becauſe the ſame ſtroke is ſufficient to break the continuity of the former, and not of the latter. When a boat is moved by means of oars upon water, the action of one extremity of each oar againſt the water in one direction, re-acts upon the boat, and impels it in the oppoſite direction.

Thus much may be ſufficient to illuſtrate the laws of motion for the preſent article; but if farther explanation be required, ſee the article, Motion, *Laws of.*

We ſhall now proceed to define, and to make ſome general obſervations on the different ſpecies of motion according to the enumeration ſtated above.

The ſimpleſt ſtate of motion is that of a body actuated by a ſingle impulſive force, and moving uniformly in a ſtraight line. But ſuch a caſe can exiſt only in our imagination; for, as we have already remarked, all the movements which can come within our obſervation, are performed in reſiſting media, and within the influence of other forces; yet it is from the conſideration of ſuch ſuppoſed ſimple caſe, that we can form uſeful theorems or uſeful deductions. We are alſo led to conclude, that the above-mentioned ſimple caſe would actually take place, if every obſtructing medium, and every other interfering force could be removed, becauſe we find, that, as far as calculation and experiments can aſſiſt us, the deviation of the body's uniform rectilinear motion is proportionate to thoſe diſturbing cauſes.

The particulars which may be remarked, with reſpect to the above-mentioned ſimple motion, are the relations of the time during which a certain linear extenſion is run through; the extenſion itſelf when the time is given, which expreſſes the velocity; the quantity of matter moved; and the momentum. Thoſe relations are eaſily obtained; for, according to the definitions at the commencement of this article, the velocity is as the quantity of linear extenſion run through in a given time: for inſtance, in one ſecond. Hence, of two bodies in motion, that which runs through a greater extenſion during a ſecond of time is ſaid to have the greater velocity. But if the extenſions or ſpaces run through in different times be compared together; then, in order to reduce them to one ſecond, each of the ſpaces muſt be divided by the time in which it has been run through. For inſtance, if a body, A, has paſſed over ten feet in two ſeconds; and another body, B, has paſſed over eighteen feet in three ſeconds; and their velocities are to be compared together, I ſay, with reſpect to the body A, if, in two ſeconds, A has moved along ten feet, how much has it moved in one ſecond? thus, 2 : 10 :: 1 : where, in order to find the fourth proportional, I need only divide the 10 by 2, *viz.* the ſpace by the time, and the quotient is 5. With reſpect to the ſecond body, I ſay, by the very ſame way of reaſoning, 3 : 18 :: 1 : and dividing the ſpace by the time, *viz.* 18 by 3, the quotient is 6. Then the ratio of the velocities of A to B is that of 5 to 6. Therefore it appears that, univerſally, the velocity is as the ſpace divided by the time: hence, putting V for the velocity, S for the ſpace, and T for the time, we have $V \propto \frac{S}{T}$. Then, according to the uſual ſtatement of proportionable and variable quantities, it follows that S is as V T, and T is as $\frac{S}{V}$. Or, in words, the velocity is as the quotient of the ſpace divided by the time; the ſpace is as the product of the velocity multiplied by the time, and the time is as the quotient of the ſpace divided by the velocity. The momentum, according to the explanation which has been annexed to the definition, is as the quantity of matter divided by the velocity. In this caſe of ſimple motion, there is an important obſervation to be made with reſpect to the origin of the motion, the uſe of which in mechanics is very extenſive. What we allude to is, that a body, ſet in motion by two impulſes at the ſame time, will likewiſe move uniformly in a ſtraight line: therefore, when a body moves uniformly in a ſtraight line, it may be ſuppoſed to have been actuated by one impulſe, or by two in certain directions, which, as it will preſently appear, may be varied indefinitely. This theorem is uſually expreſſed in the following manner.

If a body be acted upon by two moving forces at the ſame time, ſo that each of thoſe forces would by itſelf cauſe it to deſcribe the ſide of a parallelogram, uniformly in a given time; the body, in conſequence of their joint actions, will deſcribe the diagonal of that parallelogram uniformly in the ſame time.

Thus, ſuppoſe that the body A, *Plate* XXV. *Mechanics*, *fig.* 1, be impelled in the direction A D, by a force which would enable it to move at the rate of four feet *per* ſecond; alſo, that at the ſame time the ſame body be impelled by another force, in the direction A B, which would enable it to move at the rate of three feet *per* ſecond. Make A D equal to four, and A B equal to three (inches or feet, or any other meaſure to repreſent feet). Through D draw D C parallel to A B, and through B draw B C parallel to A D, which will complete the parallelogram. Draw the diagonal A C; and this diagonal will repreſent the direction and the velocity of the body, ariſing from the two impulſes which have put it in motion; ſo that at the end of one ſecond, the body will be found at C.

That the body thus impelled by two forces muſt move along the diagonal A C, is eaſily deduced from the ſecond law of motion: for, ſince the change of motion is proportionate to the moving force impreſſed, if from any point *c*, in the diagonal A C, you draw two right lines; *viz.* *dc* parallel to A B, and *bc* parallel to A D, thoſe two lines will repreſent the deviations of the body's motion from the directions A D and A B; ſince, by the ſecond law, the change of motion is made in the direction of the moving force impreſſed, and thoſe two lines are proportional to the impelling forces, or to the lines A B and A D, which repreſent thoſe forces. If it be ſaid, that the body thus impelled will at any time be found at ſome other place *o*, out of the diagonal A C, draw *om* parallel to A D, and *od* parallel to A B; then *om* and *od*, which repreſent the deviations, ought to be proportional to the forces which occaſion thoſe deviations, *viz.* to A D and A B. But this is not the caſe, becauſe the parallelogram A *dmo* is not ſimilar to the parallelogram A D B C. Therefore it appears, that the body muſt move along the diagonal A C, and in no other direction.

This theorem is aſſented to, or is acknowledged by all the writers on mechanical philoſophy; and it is from this that we derive the argument mentioned above in our definition of a *force*. Thus, ſuppoſe that the two impulſive forces which put a body A, *fig.* 2, in motion are equal, and that their directions form a very ſmall angle; A D being the direction of the one, and A B the direction of the other. Complete the parallelogram, which, on account of the equality of the impulſive forces, is equilateral, and draw the diagonal A C. In conſequence of the form of the parallelogram, it is evident that the diagonal A C is nearly equal to the ſum of A D and D C, or of A D and A B; *viz.* the velocity repreſented by A C is nearly double the velocity repreſented by A D, or A B; that is, the velocity derived from the two impulſes is nearly double the velocity derived by one of thoſe impulſes. Now if we ſuppoſe that the directions of the two forces come ſo near as to coincide, then the ſides of the parallelogram will coincide with the diagonal A C; *viz.* the velocity repreſented by the diagonal will become exactly double the velocity repreſented by A D, or A B; and it evidently ſhews, that a double force produces a double velocity: for the two equal impulſes joined together form a double impulſive force; and the velocity A C is double the velocity, which each of thoſe impulſes by itſelf would have generated.

In the above-mentioned caſe, the forces which would produce the movements along the ſides of the parallelogram are called the *ſimple forces*, or the *conſtituent forces;* and their compound effect, which actually produces the movement along the diagonal of the parallelogram, is called the *compound force*, or the *reſulting force*, or the *equivalent force*.

Now, as this compound effect is determined by finding the diagonal of a parallelogram, whoſe ſides are the movements ariſing from the ſimple forces; ſo, when we have any uniform rectilinear movement of a body, we may conſider it as the diagonal of any parallelogram, and may ſuppoſe it to be the compound courſe ariſing from two ſimple forces acting in the directions of the ſides of that parallelogram. Thus, for inſtance, let a body A, *fig.* 3, move from A to B in a given time. We may ſuppoſe that the body has been impelled by a ſingle force in the direction A B; or by two forces, one of which impelled it in the direction A E, and the other in the direction A F; or by two other forces, one of which impelled it in the direction A C, and the other in the direction A D; and ſo forth: for A B is the diagonal of the parallelogram A C B D, and of the parallelogram A E B F, and of an infinity of other parallelograms.

This mode of finding a compound courſe ariſing from more impulſes than one, or of ſuppoſing that a given courſe is the reſult of more than one impulſe, is called the *compoſition* and *reſolution of forces;* and the application of it in mechanics is highly uſeful and extenſive.

Beſides the caſe of two forces, a compound courſe may ariſe from the joint actions of three, or four, or more ſimple forces; or it may be ſuppoſed to be the reſult of ſeveral ſimple forces. But the farther conſideration of theſe more complicated caſes, and their applications, &c. will be found under the article *Compoſition and Reſolution of* FORCES.

The next ſtep which demands conſideration in the movements of bodies, is the colliſion of thoſe which happen to go againſt and ſtrike each other. This is generally reduced to three caſes; *viz.* the bodies may run in the ſame ſtraight line, but in contrary directions; they may run in the ſame ſtraight line, and in the ſame direction, but the preceding going at a ſlower rate, ſo that the ſubſequent may overtake it, and ſtrike againſt it; or, laſtly, the two bodies may ſtrike againſt each other in oblique directions. The effects of thoſe caſes differ according as the bodies are elaſtic or non-elaſtic. See COLLISION.

The above-mentioned movements ariſe from the action of ſimple impulſes, and the particulars which belong to them are eaſily determined; but thoſe which ariſe from the actions of preſſures, or of actions conſtantly acting are much more intricate. Theſe are called *variable motions.* A body actuated by a ſingle impulſe will, according to the firſt law of motion, continue uniformly in the direction of that impulſe; but if, whilſt ſo moving, another impulſe acts upon it, then its motion will be altered; and if the direction of the ſecond impulſe coincide with that of the firſt, the velocity of the body will thereby be increaſed. If the direction of the ſecond impulſe be directly contrary to that of the former, then the firſt velocity will be checked; and, according to the ratio of the two velocities in oppoſite directions, the body may either proceed in its former direction, but at a ſlower rate; or, it may be entirely ſtopped; or, laſtly, it may be obliged to go back with the exceſs of the ſecond velocity above the firſt. If, inſtead of the two impulſes acting in the ſame ſtraight line, the direction of one of them be oblique to the other, then a compound motion ariſes, which muſt be determined according to the particular circumſtances of the caſe. The body may alſo receive a third, a fourth, and many other ſubſequent impulſes: theſe may ſucceed each other at equal or unequal intervals of time; and they may act either in the ſame, or in different directions: whence an indefinite variety of caſes ariſes, which can by no means be comprehended under a few general propoſitions.

When a force acts continually and uniformly upon a body, it is the ſame thing as if equal impulſes were repeated at equal and infinitely ſmall intervals of time. In this caſe, the velocity of the body undergoes equal changes; and the force thus acting is called a *conſtant* or *uniform accelerating force*, or a *conſtant retarding force*, according as it tends to increaſe or to diminiſh the velocity of a body actually in motion.

The particulars which demand peculiar conſideration, with reſpect to theſe forces, are the ſpace deſcribed by the body thus ſet in motion, the time of deſcription, the velocity acquired, the force which produces it, and the variations of thoſe quantities, which ariſe from the difference of the forces, as well as of the maſſes upon which they act. The determination of theſe particulars (which will be neceſſary for the illuſtration of the following part of this article) has been conciſely demonſtrated by Mr. O. Gregory, in the following manner.

“ Propoſition. *The velocities generated in equal bodies by the action of conſtant forces, are in the compound ratio of the forces and times of acting.*

“ For, when the times are the ſame, the velocities generated each inſtant are as the forces of acceleration, and conſequently the velocities generated at the end of equal times are as thoſe forces; and if the forces are the ſame, the velocities generated are as the times wherein the forces act: becauſe, when the force is given, equal velocities are generated in equal times, and conſequently the whole velocities required are as the times wherein the given force acts; wherefore, both times and accelerating forces being different, the velocities generated will be as the forces and times of acting, jointly.

“ Cor. 1. *The momenta generated in unequal bodies are alſo conjointly as the forces and their times of action.*—This is evident, becauſe momenta in unequal bodies may be ſubſtituted for proportional velocities in equal bodies, throughout the whole reaſoning.

“ Cor. 2. *The momenta loſt or deſtroyed in any times are likewiſe conjointly as the retarding forces and their times of action.*—For, whatever momenta any force generates in a given time would an equal force deſtroy in an equal time, by acting in a contrary direction.

“ And the ſame is true of the increaſe or decreaſe of motion, by forces that either conſpire with or oppoſe the motions of bodies.

“ Cor. 3. *The velocities generated or deſtroyed in any times are directly as the forces and times, and reciprocally as the bodies or maſſes.*—For, ſince the compound ratios of the bodies and their velocities are as thoſe of the forces and times, the velocities are as the forces and times divided by the bodies.

“ Propoſition. *In motions uniformly accelerated, when the* *force and body are given, the ſpace deſcribed during a certain time is the half of that which the body, moving uniformly, would deſcribe in an equal time.*

“ Since the velocities are as the times of deſcription, when the body and force are given, the velocities which a given body is found to have ſucceſſively for the duration of each conſecutive interval form an arithmetical progreſſion, g, $2g$, $3g$, &c. of which the laſt term is gt, or v, the number of terms being t, that is to ſay, being marked by the number of ſolicitations of the accelerating force. And ſince each of the velocities is nothing elſe than the ſpace which the body would deſcribe uniformly during the correſponding interval, the total ſpace deſcribed during the time t, will therefore be the ſum of the terms of this arithmetical progreſſion; which, becauſe g and v are the extremes, and t the number of terms, will be expreſſed by $\frac{1}{2}t\,(g+v)$. Or, if s be the total ſpace deſcribed by the body, then will $s=\frac{1}{2}t\,(g+v)$. Conceive now that the accelerating force acts (as by hyp.) without intermiſſion, or, which comes to the ſame, imagine that the time t is divided into an indefinite number of infinitely ſmall parts, or inſtants, and that at the beginning of each inſtant the accelerating force gives an impulſion to the body. Then g being infinitely minute in relation to v, which is the velocity acquired during the indefinite number of inſtants denoted by t, muſt be omitted in the equation $s=\frac{1}{2}t\,(g+v)$, which will become ſimply $s=\frac{1}{2}t\,v$, the ſpace actually deſcribed.

“ This granted, imagine that at the end of the time t the accelerating force ceaſes to act; then, by the firſt law, the body will perſevere in its motion with the velocity v it has acquired; but in uniform motions, the ſpaces deſcribed are as the times and velocities jointly; therefore the body moving with the velocity v, during the time t, will deſcribe a ſpace $s'=tv$; which is evidently double the ſpace $\frac{1}{2}t\,v$, deſcribed by the body in an equal time, by the conſtant action of the accelerating force.

“ Propoſition. *The ſpaces deſcribed by a body uniformly accelerated are as the ſquares of the times.*

“ Since the velocities acquired increaſe as the time expired, if ϕ be the velocity at the end of one ſecond, then the velocity acquired after a number t of ſeconds will be ϕt: thus we have $v=\phi t$. The equation $s=\frac{1}{2}v\,t$, found in the preceding propoſition, becomes therefore $s=\frac{1}{2}\phi t^2$. If, in like manner, we repreſent another ſpace by S, which is deſcribed by uniform acceleration during the time T, we ſhall have $S=\frac{1}{2}\phi T^2$; hence we ſee, that $s:S::\frac{1}{2}\phi t^2:\frac{1}{2}\phi T^2::t^2:T^2$.

“ Cor. 1. Becauſe the velocities acquired are as the times, we have alſo *the ſpaces deſcribed as the ſquares of the velocities.*

“ Cor. 2. *Therefore either the velocities or the times are as the ſquare roots of the ſpaces deſcribed from the commencement of the motion.*

“ Cor. 3. All that has been ſhewn applies equally to motions *uniformly retarded;* provided that by the times, we mean thoſe which are to elapſe before the extinction of the velocity; and by the ſpaces, thoſe which remain to be deſcribed until the body is brought to reſt.” See ACCELERATION.

Of forces acting irregularly, we ſhall not take any notice in this place; firſt, becauſe they are not materially illuſtrative of the general theory; and, ſecondly, becauſe they are very different from each other: whence they are better examined under other articles, to which they more particularly belong. The unbending of ſprings, the motion of a veſſel upon water, when it firſt ſpreads its ſails to the wind, &c. are inſtances of forces acting irregularly.

The principal accelerating forces, which occur in nature, are the *central forces, viz.* thoſe attractive forces which are directed to a centre. Thus, the force of gravity, which conſtantly draws bodies towards the centre of the earth, is of this nature. Such alſo is the force which retains the planets of our ſolar ſyſtem within their orbits, and which is directed to a common centre, ſituated not much diſtant from the centre of the ſun; and a ſimilar force retains the ſatellites in due diſtances from their primary planets.

The great difference between the forces which produce motions uniformly varied, and the central forces, is that the former do not take place in nature, and the latter become more powerful nearer the centre of attraction, and leſs ſo farther from it. In ſhort, their power generally is inverſely, as the ſquare of the diſtance from the centre of attraction. Yet we have above added the demonſtration of the particulars belonging to the former, becauſe they are more eaſily underſtood, and more eaſily, as well as ſafely, applied to the phenomena of the aſcent and deſcent of bodies, and to other phenomena upon the ſurface of the earth, within the limits of our obſervation, as will be preſently ſhewn. As for the particulars relative to the central forces, compriſing their decreaſe and increaſe of power, according to the diſtances, &c. they will be found under the article CENTRAL FORCES.

The obſervations which ſhew, that the phenomena of aſcending and deſcending bodies upon the ſurface of the earth, may be referred to the action of uniformly accelerating forces, are clearly expreſſed by Mr. O. Gregory in the following manner: “ Gravity being that force which ſolicits all bodies to deſcend in vertical lines, or thoſe which are perpendicular to the ſurface of the earth, it would follow that, if that ſurface, as compoſed of land and ſea, were perfectly ſpherical, the directions of gravity would all concur at its centre. The earth, however, is not perfectly ſpherical; yet its variation from that ſhape is ſo trifling, that, with reſpect to the objects which fall under our obſervation, it need not be regarded. We have obſerved that the directions of gravity may be conſidered as parallel: that it may be ſeen to what extent this remark may be applied, let it be conſidered that a circle whoſe radius is 20,935,200 feet, will have more than 6000 feet for the meaſure of a minute of a degree, and upwards of 100 feet for that of a ſecond; ſo that *the directions of gravity at two places on the earth's ſurface, a mile aſunder, will not vary one minute from paralleliſm.*”

“ As to the magnitude of the gravitating force, ſtrictly ſpeaking, it is different at different diſtances from the equator, and at different diſtances from the centre of the earth: but the quantities of thoſe differences, ſo far as they depend upon the variety of ſituation on the earth's ſurface, are very ſmall, and need not yet be attended to; and the differences reſulting from different diſtances from the centre of the earth, will not be ſenſible in any caſes reſpecting the fall of bodies. Thus, if two bodies were ſituated, the one at the ſurface of the earth, and the other at a mile above it, the difference in the attractions to which they would be ſubjected, would be nearly one part in 2000 of the whole attraction; ſo that as a mile is greater than any altitude, or any depth from the ſurface, with regard to which we ſhall have to trace the effects of falling or riſing bodies, we may conſider the force of gravity as conſtant. We conſider, therefore, this force as acting inceſſantly, and acting equally at each inſtant upon every particle of matter. Now it is clear, that if every particle of a body receive the ſame velocity, the aggregate of the body will move with the ſame velocity as would have been impreſſed upon a ſingle molecule: conſequently, the velocity which gravity impreſſes upon any maſſes whatever, does not depend upon the magnitude of that maſs; but it is the ſame with reſpect to the ſmalleſt maſs as the greateſt. It is true, we do not, when bodies of different maſſes and denſities deſcend through the air, obſerve them all to fall from the ſame heights in equal times; but this is occaſioned by the reſiſtance of the medium, and when that is taken away, as in the receiver of an air-pump, the moſt denſe and the moſt rare bodies fall through equal ſpaces in equal times."

It is therefore evident, that the particulars which have been demonſtrated above relative to the effects of forces acting uniformly, may be ſafely applied to the aſcent and deſcent of bodies near the ſurface of the earth. According to thoſe particulars, when bodies ſimply fall from a ſtate of reſt, the velocities acquired are as the times; and the whole ſpaces deſcribed will be as the ſquares of the times. Thus if

the times be as the numbers	1,	2,	3,	4,	5,	6,	&c.
The velocities acquired will be, as	2,	4,	6,	8,	10,	12,	&c.
The whole ſpaces, as	1,	4,	9,	16,	25,	36,	&c.
The ſpace for each time, as	1,	3,	5,	7,	9,	11,	&c.
Their conſtant differences		2,	2,	2,	2,	2,	&c.

Now it has been found by means of accurate experiments, that a heavy body in the latitude of London falls nearly $16\frac{1}{12}$ feet in the firſt ſecond of time from its quieſcent ſtate, and has then acquired a velocity which, if uniformly continued, would carry it over twice $16\frac{1}{12}$, or, $32\frac{1}{6}$ feet, in the next ſecond; but the action of gravity upon the body continuing, the motion will be ſuch that at the end of the next ſecond of time, the body will altogether have paſſed over 2^2, or four times $16\frac{1}{12}$, *viz.* $64\frac{1}{3}$ feet, and will have acquired a velocity of twice $64\frac{1}{3}$ feet *per* ſecond, and ſo forth.

From theſe data, and the particulars demonſtrated above, we have the following real ſpaces, velocities, &c. deſcribed by bodies falling from a ſtate of quieſcence near London.

If the times, in ſeconds, be	1,	2,	3,	4,	&c.
The velocities acquired in feet will be - - - -	$32\frac{1}{6}$	$64\frac{1}{3}$	$96\frac{1}{2}$	$128\frac{2}{3}$,	&c.
The ſpaces in the whole times	$16\frac{1}{12}$	$64\frac{1}{3}$	$144\frac{3}{4}$	$257\frac{1}{3}$,	&c.
The ſpaces for each ſecond	$16\frac{1}{12}$	$48\frac{1}{4}$	$80\frac{5}{12}$	$112\frac{7}{12}$,	&c.

Theſe particulars, however, are ſuch as would take place in vacuo; but in the air, the reſults are conſiderably different; that difference evidently ariſing from the reſiſtance of that medium. The differences which have been obſerved between the theoretical calculations, and the reſults of actual experiments, may be ſeen under the article DESCENT *of Bodies*.

It has been ſhewn above, that in the caſe of ſimple impulſes, when a body receives two impulſes at the ſame time, but in directions oblique to each other, the body will thereby be obliged to move with an equable motion along the diagonal of a parallelogram, whoſe ſides are the directions of the two impulſes. But when one of the forces which impell a body is a ſimple impulſe, and the other is a continued preſſure, or a force uniformly accelerating, then the body is obliged to move with a changeable velocity, in a curve line; the nature of which differs according to the nature of the acting forces. A bullet fired horizontally out of a gun is an inſtance of this caſe; for, the force of the gun-powder impels it horizontally, and the force of gravity draws it downwards with an accelerating velocity; therefore the bullet moves in a curve, which, were it not for the reſiſtance of the air, would be nearly a parabola, as the great Galileo firſt demonſtrated.

Any other body projected in any other direction, does likewiſe move in a curve of a ſimilar nature; excepting indeed when it is projected either perpendicularly upwards, or perpendicularly downwards; for in either of thoſe caſes the body will evidently move in the perpendicular line, though not with a uniform velocity.

Let a body A, *fig.* 4, be impelled from A towards H, with ſuch a force as would enable it to move along the equal ſpaces A B, B F, F G, &c. in equal portions of time; for inſtance, each of thoſe ſpaces in a ſecond of time. Let at the ſame time an accelerative force continually draw the ſame body A towards the centre C, in ſuch a manner as by itſelf wou'd enable it to deſcend along the unequal ſpaces A I, I K, K L, in equal portions of time, *viz.* each ſpace in a ſecond. Then, in conſequence of the actions of both thoſe forces, the body A will be obliged to move along the curvilinear path A N O P, &c. Through B, draw B C in the direction of the centre of attraction; and through I draw I N parallel to A B. Then it is evident that at the end of the firſt *ſecond* of time the body will be at N. Now if at this period the attractive force ceaſed to act, the body would proceed in the direction N R, by the firſt law of motion. But ſince the attractive force continues to act, the body at the end of the ſecond *ſecond* of time will be at O, for the ſame reaſon as above: at the end of the third *ſecond*, it will be at P, and ſo forth. The courſe then, A N O P, is not ſtraight, but conſiſts of the lines A N, N O, O P, &c. forming certain angles.

If inſtead of finding the place of the body A at the end of every ſecond, we had determined it for each thouſandth part of a ſecond, then each of the lines A N, N O, &c. would have been reſolved into a thouſand ſmall lines inclined to each other. But ſince the attractive force acts conſtantly and unremittedly, therefore the path of the body A is not a polygonal courſe conſiſting of an infinite number of ſides; but a continued curve which paſſes through the points A, N, O, P, &c. as is indicated by the dotted line.

Upon theſe principles the movements of projectiles in military affairs are calculated, and are determined within a uſeful difference from the truth; for the variable obſtruction of the air, and other interfering circumſtances, prevent any very accurate determination of thoſe particulars. See the article PROJECTILES.

In the above inſtance of the two forces of different kinds acting upon the ſame body, we ſuppoſed that the attractive force was ſufficient to draw the body towards the centre of attraction. But if it be ſuppoſed that the equable motion ariſing from the ſimple impulſe be ſo great in proportion to the attractive force, that the latter, though capable of drawing the body from its rectilinear courſe, is, however, not able to bring it nearer to the centre of attraction, than a certain limited diſtance; in that caſe the conſequence will be, that the body will continue to move in a curvilinear path round and round the centre of attraction, without actually coming to it. Now this ſort of motion is called an *orbital motion*; or that curve path is called an *orbit*; and ſuch are the motions of the planets in orbits round the common centre of attraction in our ſolar ſyſtem. See the article ORBITS.

The deſcent of bodies ariſing from the force of gravity is, in many caſes, modified by certain circumſtances, which frequently and neceſſarily occur, and on which account they are in need of examination. Thus the deſcent of bodies upon inclined planes is one of thoſe caſes; for inſtead of deſcending in a ſtraight line perpendicular to the ſurface of the earth, the body is obliged to roll along the ſurface of the plane in an oblique direction. The vibrations of pendulums are likewiſe of this kind, and ſo on. The principal of thoſe caſes will be mentioned in the ſequel.

When a body is placed upon an inclined plane, the gravitating power which draws that body downwards, acts with a force ſo much leſs than if the body deſcended freely and perpendicularly, as the elevation of the plane is leſs than its length.

If a body be placed upon an horizontal plane, the force of gravity acting in a direction perpendicular to that plane, cannot draw the body one way more than another, therefore the body remains motionleſs; but if the plane be inclined, then the body will run down along the ſurface of it, and with greater velocity, in proportion as one end of the plane is more elevated above the horizon. When a plane is inclined to the horizon, and a body is laid upon it, the action of gravity is not entirely, but partially counteracted by the plane. From the centre A of the body, which is laid upon the inclined plane, *fig.* 5, draw A G perpendicular to the horizon, and A F perpendicular to the plane. Then the whole force of gravity, which is repreſented by the line A E, is reſolved into the two forces, A F, and E F, whereof A F being perpendicular to the plane, is that part of the gravitating power which is loſt, or which is counteracted by the inclined plane; and E F repreſents the other part of the gravitating power, which urges the body downwards along the ſurface of the plane. Therefore the force of gravity is diminiſhed, in the proportion of A E to E F. But the triangles A E F, E D G, and B D C, are equiangular, conſequently ſimilar: therefore A E is to E F, as D B to B C; that is, the whole force of gravity is to that part of it which urges the body downwards along the ſurface of the plane, as the length of the plane is to its elevation.

The extenſion, which is deſcribed by a body deſcending freely from reſt towards the earth, is to the extenſion which it will deſcribe upon the ſurface of an inclined plane in the ſame time, as the length of the plane is to its elevation.

The gravitating force which draws a body downwards along an inclined plane, is only diminiſhed by the intervention of the plane; but its nature is not otherwiſe altered, ſo that it ſtill acts conſtantly; in conſequence of which the motion of the body is continually accelerated, and the ſpaces it deſcribes are alſo proportional to the ſquares of the times; but thoſe ſpaces are ſhorter than if the body deſcended freely and perpendicularly; *viz.* they are to the latter as the elevation of the plane is to its length.

A body deſcending from a certain height to the ſame horizontal line, will acquire the ſame velocity, whether the deſcent be made perpendicularly, or obliquely, over an inclined plane, or over many ſucceſſive inclined planes, or, laſtly, over a curve ſurface.

It has been ſhewn above, that the velocity of a body deſcending freely in conſequence of a conſtantly acting force, is as the product of the force multiplied by the time; and we have juſt ſhewn, that, upon an inclined plane, the force of gravity is diminiſhed in proportion of the elevation of the plane to its length; whence it evidently follows, that the time of the body's running down an inclined plane muſt be increaſed in the inverſe proportion; *viz.* that as the force is diminiſhed, ſo the body is drawn downwards in longer time; that is, leſs forcibly.

Now, if the times increaſe in proportion as the force decreaſes, it evidently follows, that the product of the time by the force is always the ſame; *viz.* the velocity which a body acquires by falling from a given height is always the ſame, whether it falls perpendicularly, or along any inclined plane. And it is evident, that the effect muſt be the ſame when the body falls from the ſame height along a ſucceſſion of inclined planes, or along a curve; for the whole height may be divided in parts each equal to the altitude of one of the inclined planes, and the ſame thing may be ſhewn at the end of each. And as a curve line may be conceived to conſiſt of an infinite ſucceſſion of inclined planes, the application to it needs no further illuſtration.

In the preceding explanation of the motion of a body upon an inclined plane, we have ſuppoſed the bodies, to be ſpherical, and the planes, as well as the bodies, to be perfectly ſmooth. But in practice this is not to be expected; for the ſmootheſt bodies, in moving over one another, are, in ſome meaſure, affected by friction. The air, likewiſe, oppoſes its uſual reſiſtance, &c., in conſequence of which, the motions of bodies, upon inclined planes, will be found in practice to differ conſiderably from the reſults of theoretical calculations. For farther particulars reſpecting this ſubject, ſee the article INCLINED PLANE.

Treating of the deſcent of bodies, we ſhall here barely mention a remarkable property of a curve, which, at firſt ſight, can hardly be believed; for it ſhews that a body, deſcending from a ſuperior to an inferior place, not in the ſame perpendicular, will arrive at the lower place ſooner by going along a certain curvilinear path, than along a ſtraight one. In ſhort, *if two points be given in a vertical plane, but not in the ſame line perpendicular to the horizon, a body will deſcend from the upper point of the lower in the ſhorteſt time poſſible, if it be cauſed to move along the arch of a cycloid, which paſſes through thoſe points, and whoſe baſe is an horizontal line that paſſes through the upper point.*

On this account, the *cycloid* has been called *the line of ſwifteſt deſcent.* See CYCLOID.

When a body is ſuſpended by a flexible ſtring, or by a pin, which paſſes through a hole in it, and is fixed to a ſteady ſupport; or, in ſhort, whenever a body hangs down from any point, ſo as to be capable of ſwinging about that point, it is called a *pendulum*, or *pendulous body*; and as pendulums are of a moſt extenſive uſe in mechanics, their properties have been inveſtigated with great attention, both theoretically and experimentally. In the examination of the chief properties of pendulums, which will now be ſtated, we muſt ſuppoſe the pendulum to conſiſt of a globular body, faſtened to the end of a ſtring, the other end of which is fixed to a pin; the ſtring is ſuppoſed to have no weight, and to be perfectly flexible, ſo that the pendulum may move with perfect freedom about the point of ſuſpenſion. In its natural ſituation, ſuch a pendulum hangs ſtraight downwards, in the direction of the centre of the earth; but if it be moved out of that direction, and be then let go, it will begin to ſwing, going backwards and forwards, and will continue that motion for a conſiderable time. Each of theſe motions, from one ſide to the other, is called a *vibration*, or an *oſcillation*; and the particulars which become the objects of examination in pendulums, are the times in which the vibrations are performed under given lengths of pendulums, the velocities, which the pendulum alternately acquires and loſes in the courſe of vibration, the momenta, &c. The propoſitions which follow will be ſufficient to ſhew the connection between the vibrations of pendulums, and the other kinds of motion which are conſidered in dynamics. But farther particulars muſt be ſought for under the article PENDULUM.

If a pendulum be moved out of its perpendicular direction C B, *fig.* 6, *to the ſituation* C A, *and there be let go, it will, of itſelf, deſcend towards the perpendicular* C B; *then it will aſcend on the oppoſite ſide to* C D, *nearly as far from the perpendicular, as the place from which it began to deſcend; after which it will again deſcend towards the perpendicular, and thus it will keep moving forwards and backwards for a conſiderable time; making the vibrations continually ſmaller and ſmaller until it ſtops; which is owing to the obſtruction of the air, and a little ſtiffneſs of the pendulum-ſtring; for, without theſe obſtructions, the pendulum would continue to perform vibrations of the ſame length for ever after.*

The body A will deſcend along the arc A B with an accelerated motion, in the ſame manner as if it deſcended over a curve ſurface A B; for it is evidently the ſame thing whether a body deſcends along ſuch a ſurface, or is confined by the ſtring C A, ſo as to deſcribe the ſame curve. By the time the body A arrives at the loweſt point B, it will acquire the ſame velocity as if it had deſcended perpendicularly from E to B, (from what has been ſaid reſpecting inclined planes.) This velocity (abſtracting the reſiſtance of the air, &c.) would carry the body A beyond the point B, with a retarded motion, in an equal portion of time, as far from B as A is from it. The body A will then deſcend again, with an accelerated motion, towards B, and ſo on. For, ſince the velocity of the pendulum in its aſcent is retarded by the ſame uniformly acting power, which accelerates it in its deſcent; *viz.* by the force of gravity; there muſt be the ſame time employed in deſtroying, as in generating it.

That, *ceteris paribus*, the weight of the pendulum cannot alter its time of vibration, may be eaſily derived from what has been ſaid above, reſpecting the fall of bodies; *viz.* that, abſtracting the reſiſtance of the air, all kinds of bodies will fall from a ſtate of quieſcence, through a given extenſion, in the very ſame time.

The velocity of a pendulum, in its loweſt point, is as the chord of the arc which it has deſcribed in its deſcent.

Thus, the body A, deſcending from A to B, will, when at B, have acquired a velocity which is proportionate to the chord of the arc A B, or to E B.

In eſtimating the length of a pendulum, a peculiar circumſtance occurs, which is not obviouſly perceived, and the determination of which demands peculiar attention. When the pendulum conſiſts of a ſpherical body, faſtened to a ſtring, a perſon unacquainted with the ſubject might, at firſt ſight, imagine, that the length of the pendulum muſt be reckoned from the point of ſuſpenſion, to the centre of the ball. But this is not the caſe; for the real length of the pendulum is greater than that diſtance, the reaſon of which is, that the ſpherical body does not move in a ſtraight line, but it moves in a circular arc; in conſequence of which, that half of it which is fartheſt from the point of ſuſpenſion, runs through a longer ſpace, than the other half which is nearer to the point of ſuſpenſion; hence, the two halves of the ball, though containing equal quantities of matter, move with different velocities, and, therefore, their momenta are not equal. Now, it is, in conſequence of this inequality, that the *centre of oſcillation* (for ſo is the point denominated from which the length of the pendulum to the point of ſuſpenſion muſt be reckoned,) does not lie between the two hemiſpheres; *viz.* in the centre of the ball; but it lies within the lower hemiſphere, which has the greateſt momentum. It evidently follows, that if the ball of the pendulum could be concentrated in one point, that point would be the centre of oſcillation; ſo that the centre of oſcillation is that point wherein all the matter of the body, or bodies, that may be joined together to form a pendulum, may be conceived to be condenſed. The method of determining the ſituation of the centre of oſcillation in any pendulum, will be found under the article CENTER *of Oſcillation*. See alſo OSCILLATION.

In a pendulum thus vibrating about a point of ſuſpenſion as has been mentioned above, whether it be a body faſtened to a ſtring, or an oblong ſolid like a rod, &c. the ſame point of oſcillation is likewiſe called the *centre of percuſſion;* for this reaſon, that if a body be oppoſed to the pendulum whilſt vibrating, at that point, it will receive the greateſt ſtroke poſſible. And if the obſtacle be oppoſed to any other part of the pendulous body, the ſtroke will be leſs powerful. This point does not coincide with the centre of gravity, as one might at firſt ſight be eaſily induced to believe; nor does it coincide with the centre of oſcillation in all caſes. In ſhort, the centre of percuſſion cannot be ſaid to be the ſame thing as the centre of oſcillation; but is that point in a body revolving about an axis, at which, if it ſtruck an immoveable obſtacle, all its motion would be deſtroyed, or it would not incline either way: ſo that if at the inſtant of the impact the ſupports of the axis were annihilated, the body would remain in abſolute reſt. The method of determining the ſituation of the centre of percuſſion in all caſes, will be found under the article CENTER *of Percuſſion*. See alſo PERCUSSION.

During the preceding illuſtration of the various ſpecies of motion, whether uniform, accelerated, or retarded, and whether rectilinear or curvilinear, the impelling force has been generally conſidered as if it acted in the direction of the centre of gravity of the body; ſo that every part of the body might acquire the ſame velocity; or as if the whole body were concentrated in a ſingle point. But in a great many inſtances the application of one or more forces is made out of the line which paſſes through the centre of gravity of the body, or of a ſyſtem of bodies; in conſequence of which that body, or that ſyſtem, acquires a rotatory motion.

According to the various forms of bodies either ſingle or in connection, and according to the various applications of a force or forces in different parts, a vaſt variety of caſes of this rotatory motion may be eaſily conceived; and the principal of theſe caſes will be found deſcribed in the preſent work according to the references that follow. In theſe caſes of rotatory motion, the particulars which are principally deſerving of mathematical inveſtigation, are the following two points or centres, which we ſhall barely define in this place.

The centre of gyration, which is that point in a body, or ſyſtem of bodies, in which, if all their matter were condenſed, the ſame angular velocity would be generated in a given time, that would be generated in the whole body or ſyſtem, by the ſame force ſimilarly applied. See CENTER *of Gyration* and GYRATION; and

The *centre of ſpontaneous gyration*, or of *ſpontaneous rotation*, which is that point about which a body begins to revolve at the inſtant in which it is ſtruck by a force acting out of the direction of its centre of gravity. Place a ſtick upon a ſmooth horizontal table, with one extremity out of the table. Strike that end in an horizontal direction, and immediately after the ſtroke, the above-mentioned extremity of the ſtick will begin to move in the direction of the ſtroke, whilſt its other extremity moves in the contrary direction. Now it is evident, that between thoſe two parts of the ſtick there muſt be a point about which thoſe parts begin to revolve; and that is the centre of ſpontaneous rotation. See CENTER *of Rotation* and *Spontaneous* ROTATION, or *Spontaneous* GYRATION.

The various movements that are produced by the action of forces differently applied, in the endleſs variety of direction, of combination, of duration, and of power; can only be examined by reducing them into claſſes, according to the peculiarities which a certain number of them ſeem to have in common. In this manner we have, in the preceding pages, taken a general view of the whole, and have explained the principal properties of each kind of motion, ſo far as it ſeemed neceſſary to point out their extent and their general connection. But the reader has at the ſame time been referred to other articles for more ample and more ſatisfactory information. The only part of the ſubject which remains to be added for the completion of this article, is the application of the ſubject to uſeful purpoſes; with this view, therefore, we ſhall now add ſuch general remarks as may ſuffice to manifeſt the vaſt importance of the general application.

Two very remarkable and very extenſive objects are anſwered by the ſubject of dynamics. It enables the human being to comprehend and to explain the phenomena of nature, and it furniſhes him with uſeful machines, by the uſe of which he becomes capable of accompliſhing ſuch wonderful effects, as would otherwiſe be utterly out of his power.

Sir I. Newton firſt conceived the grand idea of a general connection between the bodies of the univerſe. He thought that the celeſtial objects were actuated and connected by a general and mutual gravitation. Willing to prove the truth of the ſuppoſition, he firſt endeavoured to inveſtigate the laws of ſuch forces, or gravitating powers. One truth naturally developed another truth, until an ample demonſtrative theory was formed. His next ſtep was to examine how far the aſtronomical obſervations were conformable to that theory; and he was delighted to find an admirable coincidence, which confirmed the truth of the ſuppoſition. Subſequent mathematical improvements, farther diſcoveries, and much more accurate obſervations, have rapidly advanced the whole ſubject, ſo much ſo, that the preſent generation is thereby enabled to calculate and to foretel the niceſt, aſtronomical phenomenon; whence immenſe advantages are derived, eſpecially in navigation.

With reſpect to mechanical application, the reader may be pleaſed to conſider how limited is the power of the bare limbs of a man; how great are the powers of the natural world; and what aſtoniſhing effects the human being can accompliſh by employing thoſe natural powers in a proper way. The immenſe force of the wind regularly applied, gives motion to powerful mills, and to other machinery; it drives very large and heavy veſſels acroſs the ſea, &c. A ſtream of water is likewiſe applied to diverſe uſeful purpoſes, many of which are ſo common as to be known to every body, So is the force of ſteam; the expanſive force of gun-powder; the ſtrength of animals; and ſo forth.

The uſe of machines, then, is for the purpoſe of applying natural powers to our advantage, or to perform that which the bare application of thoſe powers could not poſſibly accompliſh. A man, for inſtance, wiſhes to remove a ſtone of a ton weight from any particular place; his ſtrength, unaſſiſted by art, is inadequate to the purpoſe; but he takes a pole, or lever, which being applied in a proper manner, actually enables him to remove the ſtone. The vibrations of a pendulum are performed nearly in equal portions of time; therefore, by ſetting a pendulum in motion, and counting the vibrations, a man might meaſure time; but the motion of the pendulum requires to be renewed at times, and the counting of the vibrations requires a conſtant attendance, the performance of which would be an inſufferable hardſhip. But all this hardſhip is removed by the contrivance of a clock, to which a man applies his power all at once, by raiſing a weight, or winding up a ſpring; then the power thus imparted to the ſpring, or weight, is gradually communicated to the pendulum, ſo as to keep it in motion during a day, a week, a month, and even a longer time. The other parts of the mechaniſm ſerve to reckon and to indicate the number of vibrations, under the denominations of ſeconds, minutes, and hours.

The number of machines that have been invented, that have been uſed, and that are actually in uſe, is really immenſe, and new ones are daily conſtructed. But all thoſe machines conſiſt of certain parts or ſimple mechaniſms variouſly combined and connected with each other. Thoſe ſimple mechaniſms are commonly called the *mechanical powers*, and their number is not above ſix or ſeven. They are *the lever, the wheel and axle, the pulley, or ſyſtem of pulleys, the inclined plane, the wedge*, and *the ſcrew*.

Several writers on mechanics reckon the balance amongſt the mechanical powers; but other authors do not; for in fact, there is no power gained by the uſe of the balance; and this gain of power undoubtedly is the characteriſtic property of the mechanical powers. There are ſome who exclude the inclined plane from the number of mechanical powers; whilſt others conſider it as one of the principal, and reckon the wedge and the ſcrew as only ſpecies of it.

In each of thoſe ſimple mechaniſms, a force or power is applied at one end, in order to overcome a reſiſtance at the other end. Thus with a lever, a man thruſts the end of a pole under the weight B, *fig.* 7, reſts part of the pole, or lever, upon a firm obſtacle, or prop, or fulcimer C, and applies his hand to the other end A of the lever. Then by lowering the end A of the lever, the weight will be raiſed, (ſuppoſing that the power of the man and the weight of B are not too diſproportionate.) Now in this caſe the man's hand is the force or moving power, the weight B is the reſiſtance which is to be overcome, and the pole is the lever, or the mechanical power, by which the man is enabled to raiſe the weight; which effect he could not have produced by the immediate application of his natural ſtrength.

Inſtead of applying a man's ſtrength to the end A of the lever, a weight may be applied to the ſame end, which, by a proper adjuſtment of the lever, may be made to raiſe the weight B much greater than itſelf.

If it be aſked how it happens, that a ſmall weight at A can lift up a much larger weight at B; the anſwer is, that by the motion of the lever the weight at A, which acts as the force or power, deſcribes a much larger ſpace than the weight B; and there is this general principle which holds good in all the mechanical powers, and which is demonſtrated under the article *Mechanical Powers;* namely, that as long as the product of the weight at A, multiplied by the ſpace through which it moves, exceeds the product of B multiplied by the ſpace through which it moves; A will preponderate, and of courſe will lift up B. Suppoſe, for inſtance, that the weight at A be equal to 40 pounds, the weight B 300 pounds, the length A C twelve feet, and C B one foot. Then, ſince the arcs which the two extremities of the lever and the two weights deſcribe, are as the diſtances A C and B C; multiply the weight A, *viz.* 40 pounds, by 12, which is the diſtance A C, and the product is 480; and multiply the weight B of 300 pounds by the diſtance B C of one foot, and the product is 300. Now, ſince 480 exceeds 300, the weight A muſt preponderate, &c. If the two products had been equal, the whole would have remained balanced and at reſt.

The like illuſtration may be applied to all the other mechanical powers, as well as to machines of all kinds, whether ſimple or complicated; for in every one of them the following particulars muſt be indiſpenſably found, *viz.* 1ſt. One or more bodies muſt be moved one way, whilſt one or more other bodies move the contrary way. One of thoſe bodies, or ſet of bodies, is called the *power*, and the other is called the *weight;* or they may be called *oppoſite powers.* 2dly. If the product of the weight of one of thoſe powers, multiplied by the ſpace it moves through in a certain time, be equal to the product of the weight of the oppoſite power multiplied by the ſpace it moves through in the ſame time; then the oppoſite momenta are equal, and the machine remains at reſt, or in a ſtate of equilibrium. But if one of thoſe products exceed the other, then the former will preponderate, and the parts of the machine muſt move in the direction of the preponderating power. In the above computation, however, a deduction muſt be made on account of friction, imperfection of workmanſhip, &c. which ſometimes amounts to a conſiderable quantity; but there are no general rules by which ſuch deductions may be made with tolerable accuracy.

The complicated machines, which contain two, or more, and ſometimes a great repetition of the ſimple mechanical powers, cannot conveniently be collected under general and comprehenſive claſſes. Their number, their various uſes, the different powers which actuate them, their ſizes, and their effects, render the particular deſcription of each machine too extenſive and nearly impracticable. Yet it is to be wiſhed that all ſorts of machines were regularly deſcribed and delineated in a ſort of general mechanical repoſitory; for though ſeveral of thoſe machines may not have anſwered the purpoſes for which they were intended, they are nevertheleſs of uſe to mechanical perſons, who are contriving other machines for ſimilar purpoſes.

In the examination of machines, it is peculiarly entertaining to obſerve how different the powers are from the effects of ſome of them, and by which means thoſe effects are produced. Certain machines are formed to produce a regular effect from the application of an irregular power. Thus at the Albion Mills, (which were erected ſome years ago near Blackfriars bridge, and were afterwards unfortunately deſtroyed by fire,) the alternate ſtrokes of the piſton of a ſteam-engine were made to produce the regular rotatory motion of grinding-mills. In other machines a regular power is cauſed to produce an irregular, or an interrupted effect. Sometimes a power once applied acts gently during a conſiderable period of time; and at other times the accumulation of weak powers is made to produce powerful effects at ſtated times.

It is not only the production of a certain effect from a particular power, that ſhould be obſerved in machinery; but the manner by which the object is attained ſhould be carefully examined; for the ſimplicity of the means, the ſafety, and the durability of the machine, are the particulars which form the beauty of the contrivance, and upon which the ſkill of the contriver principally reſts.

DYNAMOMETER, (from δυναμις, *power*, and μετρεω, *I meaſure*, meaning a meaſurer of power,) is the name of an inſtrument intended for meaſuring the muſcular ſtrength of men and other animals. An inſtrument of this kind was, ſome years ago, invented by Mr. Graham, and was afterwards improved by Dr. Deſaguliers; but it was too bulky, and too limited in its uſe; ſo that it was ſoon neglected. Mr. Le Roy of the Academy of Sciences at Paris, conſtructed, ſoon after, a much more uſeful inſtrument for the ſame purpoſe. It conſiſted of a metal tube about a foot long, placed vertically on a foot like that of a candleſtick, and containing in the inſide a ſpiral ſpring, having above it a graduated ſhank terminating in a globe. This ſhank, together with the ſpring, ſunk into the tube more or leſs, in proportion to the weight which preſſed upon the globe at the top of the ſhank, and the graduation of the latter indicated the quantity of it. Therefore, when a man's ſtrength was to be tried by means of this inſtrument, the man needed only preſs upon the above-mentioned globe with all his power, and the graduation of the ſhank indicated the quantity of that power, *viz.* it ſhewed the number of pounds weight to which it was equivalent.

Mr. Regnier, at Paris, at the inſtigation of Meſſrs. Buffon and Gueneau, contrived another ſort of dynamometer. It conſiſted chiefly of an elliptical ſpring a foot long, and rather narrow. It was covered with leather, that it might not hurt the hand which compreſſed it. The ſtrength of this ſpring was ſuch as to exceed that of any animal to which it might be applied; and it contained an index with a mechaniſm which indicated how much it was compreſſed; or, which is the ſame thing, it indicated the quantity of the power which compreſſed the ſpring. Therefore, when a perſon wiſhed to meaſure his power by means of this machine, he was obliged only to compreſs the elliptical ſpring with all his force, and to obſerve the quantity of that force as pointed out by the index of the machine. (See le Journal de l'Ecole Polytechnique, vol. ii.) Both the uſe and the conſtruction of the laſt deſcribed machine were much extolled; but, upon a ſtrict examination, it does not appear that it was ſuperior to Le Roy's contrivance.

Since the above was made public, nothing peculiarly uſeful has been offered for the purpoſe of meaſuring the ſtrength of animals. Yet upon the whole it ſeems, that the common well known ſpring ſteel-yard, though not intended expreſsly for that purpoſe, is the beſt inſtrument for meaſuring the ſtrength of men and other animals. In principle, it is nothing more than Mr. Le Roy's contrivance; but under a much more commodious form. It has a ring at one end, and a hook at the other. By endeavouring to pull thoſe parts from each other, a graduated rod comes out of the external tube, and ſhews the force which has been applied to it. Therefore, by faſtening the ring to an immoveable object, and the hook to a man, or horſe, &c. by means of a rope or otherwiſe, the ſtrength of the man or other animal may be eaſily aſcertained. See SPRING STEELYARD.

It certainly is a deſirable thing to know the various muſcular power of men and animals, eſpecially of ſuch as are to be employed for work of various kinds; and upon the whole a pretty good eſtimate may be obtained from the uſe of the above-mentioned machine. Yet, it muſt be obſerved, that a determination of this kind is influenced by a variety of circumſtances, which tend to render the reſult inaccurate or equivocal. For inſtance, a man is much ſtronger than another man in his hands, whilſt that other man is much ſtronger than the former in his legs. One can carry a great weight upon his head; another can pull a great weight after him, that is, drag it over the ground, and ſo forth. Nearly the ſame thing may be remarked with reſpect to other animals. But the moſt material circumſtance is the duration of the exertion, *viz.* certain men, and eſpecially ſuch as are young and well fed, but not much uſed to work, are capable of immenſe exertion during a minute, or an hour, or even a day; but they are incapable of enduring a longer duration of labour; whilſt others go on with a uniform daily exertion during weeks and years. The ſame variety in the length of the exertion takes place in other animals, eſpecially ſuch as are more commonly uſed for labour, *viz.* horſes, mules, oxen, camels, &c.

Fig. 1. *Plate* XXVI. *Mechanics*, repreſents one of the whippletrees, to which two horſes or oxen can be applied, the cover of the mechaniſm being removed to explain its internal ſtructure. A A is the main whippletree, having a hook at *a* to back it to the plough, &c., and two others to connect it with two ſhort whippletrees B, B, by which the cattle draw; the hook *a* is faſtened to a ſtraight bolt *b*, ſliding freely through holes in two pieces of iron plate *d*, *f*; a pin is put through the end of the bolt to prevent it being drawn quite through at *e*; a circular plate of iron is pinned faſt upon the bolt *b*, between which, and the fixed plate *d*, a ſpiral ſteel ſpring is placed, which has a ſtrong tendency to elongate itſelf, and draw the hook to the machine: *h* is a ſhort rack faſtened to the iron plate *e*, and turning a ſmall pinion on the back of the index *i*, which points out the diviſions on the arc *k*. The diviſions are made by ſuſpending weights from the hook *a*; theſe compreſs the ſpring in proportion to their weight, and the rack moves the index *i*; the value of each weight being marked on the arc *k* at the place pointed out by the index:

of courſe, when the horſes are harneſſed to the whippletrees B, B, and the plough, or carriage, to the hook *a*, the motion of the index denotes the force of their draught.

Fig. 2. is another machine on the ſame principle as the laſt, but is contrived ſo as to require a very delicate ſpring, which is found to be more ſenſible than a large one, and to keep its elaſticity longer: this is accompliſhed by having the hook *a* formed into two eyes at the other end, to receive the pivots of the lever *b*, whoſe fulcrum, or fixed centre, is at *d*; at the other end of the lever it is connected by a ſhort iron link *e*, to a ſecond lever *f*, of which *g* is the fulcrum: *h* is the ſpring barrel, exactly the ſame as the other machine, but much ſmaller, being only to weigh about 50*lb.* inſtead of 5 *cwt.*; its ſpindle is attached to the lever *f*, and is moved thereby when the hook *a* is drawn: the ſpindle of the ſpring has a rack *i* faſtened to it, which moves a ſmall pinion, on whoſe arbor the index to the dial-plate is fixed: the dial-plate is in this machine a whole circle, deſcribed in the figure by a dotted circle, with large diviſions for hundred weights, and ſubdiviſions for the quarters. By means of the levers the power exerted on the hook is ſo far diminiſhed, that the ſmall ſpring of 50*lb.* will ſerve to weigh a quantity equal to 6 *cwt.*; and by increaſing the ſpring a little, and altering the levers, by throwing the hooks nearer the centres, and lengthening the levers, it may be made to do for 12 *cwt.* The mechaniſm is covered over with an iron box, to defend it from injury.

This machine is the invention of Mr. Robert Salmon, Woburn, Bedfordſhire, and they are now manufactured by Mr. Shepherd, implement-maker, Woburn.

This article is alſo the moſt proper place to deſcribe a method, employed by Mr. Salmon, to meaſure the force requiſite to give motion to a threſhing and flour mill at Woburn-Park farm, belonging to the duke of Bedford. The mill was originally worked by a horſe-wheel, adapted for eight horſes or oxen, though it is now worked by a ſteam-engine; but the horſe-wheel ſtill remains. It is repreſented in *fig.* 3, where A A is the main vertical ſhaft, having pivots at both ends, one of which works in a braſs ſocket, ſupported on beams, *a*, *a*, laid on the ground; and the other in a braſs bearing, bolted to the *a* beam, which is framed between two girders, B, B, of the floor above. D is the rim of the wheel, containing the cogs; it is compoſed of three thickneſſes faſtened together, and is ſupported by ſixteen arms, F, from the enlarged part of the ſhaft at E, and braced by ſixteen beams, L, extending from the lower part of the ſhaft to the middle of the arms. The horſes or oxen draw from upright pieces of wood, *a*, *a*, bolted to the arms, F, and braced by long iron bars from the adjoining arms. Eight of the arms are furniſhed in this manner, for the oxen to work the wheel: they walk upon a circular road at G G, on the level of the ground, while the ſhaft is ſunk in a pit walled round, to give a greater length of ſhaft, that the oblique braces may have more effect.

The method in which Mr. Salmon applied a dynamometer to this wheel was as follows: a piece of board, *b*, was extended between and nailed to the two uprights, *a*, *a*, by which the oxen drew; in the middle of the board a large pulley, *g*, was fitted, turning very freely, and upon as ſmall a pivot as was conſiſtent with ſtrength; another pulley, *d*, was ſuſpended from the arm of the wheel near the centre; a ſmall ſoft rope was paſſed over both pulleys, hanging ſtraight down from the pulley, *d*, and terminating in a double hook, and after paſſing round the pulley, *g*, was tied to the middle of a ſhort round ſtick. Four of the arms were fitted up in this manner, and two men were placed at each, holding the ſtick in their hands behind them. Mr. Salmon placed himſelf in the pit, being provided with a number of weights, ſome of which he hooked on the hooks at the end of the rope. He then directed the men to proceed forwards, in the track formed by the feet of the cattle, drawing the rope after them. Their action raiſed the weights, and cauſed the wheel to follow; but where the weights were drawn up towards the pulley *d*, Mr. S. added more weight, until it was ſo adjuſted that the wheel moved round with its proper velocity, without the weights riſing or falling above any point at which they were placed. The ſum of theſe weights now ſhewed the power required to move the mill; and the motion might be continued as long as was neceſſary to obtain a fair reſult. By this method, any ſudden jerk or exertion, which the men might make, would not be communicated to the wheel, as it would only draw up the weights, which would deſcend again, when the men relaxed their ſtrain.

The mill was employed in threſhing; and as this is a very unequal kind of work, it was often neceſſary to hook on more weights, to overcome the reſiſtance occaſioned by feeding the machine: for it muſt be obſerved, that no more power could be applied to the wheel than the ſum of the weights, as it was only through the medium of horſes that the men exerted any power at all upon the wheel.

The velocity of the wheel alſo depended upon the weights, for the heavier they were the quicker it would follow the men, who were directed to move at ſuch a pace, as the wheel ſeemed to take, that the weights might not deſcend by their going too ſlow, or aſcend by their going too faſt. The wheel's velocity was meaſured by a watch which Mr. S. had in his hand; and each turn of the wheel was denoted to him, by a nail which was drove in the rim of the wheel ſtriking a piece of tin-plate nailed up againſt the wall. If he found by the watch the wheel was moving too ſlowly, he applied more weight, or *vice verſâ*, until the proper weight was found. Mr. Salmon made many experiments in this manner, on the force required to thraſh different kinds of corn, of which we ſhall give the reſults under Threshing Mill.

DYNASTY, a term in *Hiſtory*, ſignifying a race, or ſucceſſion of kings of the ſame line, or family. The word is formed from the Greek, δυναϛια, or δυναϛευω, *to be powerful, to be king.*

We find frequent mention in ancient hiſtory of dynaſties of Perſians, Aſſyrians, Medes, &c. The ancient Chronicon of Egypt mentioned by Syncellus, gives us an account of three different dynaſties; that of the gods, that of the demi-gods or heroes, and that of men or kings. The two former are repreſented as continuing thirty-four thouſand two hundred and thirty-one years, in order to favour the high antiquity of the Egyptians; the laſt as commencing with the reign of Menes, the firſt king of Egypt, and terminating with Nectanebus II. under whom the kingdom was conquered by Artaxerxes Ochus; and this is ſaid to have laſted two thouſand three hundred and twenty-four years. Manetho has left us an hiſtorical chronology of Egypt, divided into thirty dynaſties, comprehending a ſpace of more than five thouſand three hundred years to the reign of Alexander: but it is certain, that theſe were collateral and not ſucceſſive.

DYOTA, in *Chemiſtry*, from δις, *double*, and ȣς, *ear*, a pelican, or circulating veſſel with two ears, in ſhape reſembling a man ſtanding with his arms bent outwards, and with his hands on his ſides.

DYPTYCHA, or rather Diptycha. See Diptycha.

DYRAS, in *Ancient Geography*, a river which had its ſource in mount Oeta, and diſcharged itſelf into the Maliac gulf, between Anticyra and Anthéle.

DYRNITZ, or Tyrnitz, in *Geography*, a town of Germany, in the archduchy of Auſtria; 17 miles S. of St. Polten.

DYRRACHIUM, now Durazzo, in *Ancient Geography*, a town of Illyria, with a port on the Adriatic ſea, oppoſite to Brunduſium. It was formerly called Epidamnus, but the Romans changed it to Dyrrachium. (Pliny, iii. 26.) According to Strabo, this city was founded by a colony of Corcyræans. It is mentioned by Cicero, Pliny, Pauſanias, Pomponius Mela, &c. Its port was much frequented in the time of the Romans, by all thoſe who had occaſion to paſs from Brunduſium to Greece. At the mouth of the Adriatic gulf, the ſhores of Italy and Epirus incline towards each other; and the ſpace between Brunduſium and Durazzo, the Roman paſſage, is no more than 100 miles: at the laſt ſtation of Otranto, it is contracted to 50; and this narrow diſtance had ſuggeſted to Pyrrhus and Pompey the extravagant idea of a bridge. The city, being the weſtern key of the empire, was, previouſly to its ſiege, A.D. 1081, guarded by fortifications, and alſo by George Palæologus, a patrician, victorious in the oriental wars, and a numerous garriſon of Albanians and Macedonians, who had, in every age, maintained the character of ſoldiers. Accordingly, the courage of Robert Guiſcard was aſſailed, in the proſecution of his enterpriſe, by every form of danger and miſchance. His fleet was ſcattered by an unexpected ſtorm; and the diſaſter was ſo ruinous, that both his ſailors and ſoldiers were much diſpirited. Unſucceſsful in their firſt naval engagement, a ſally from the town, to which they laid ſiege, carried ſlaughter and diſmay to the tents of the Norman duke. A ſeaſonable relief was conveyed to the town; and as ſoon as the beſiegers had loſt the command of the ſea, the iſlands and maritime towns withdrew from the camp the ſupply of tribute and proviſion. The camp was ſoon afflicted with a peſtilential diſeaſe; 500 knights periſhed, and the liſt of burials comprehended 10,000 perſons. Under theſe calamities, the mind of Guiſcard alone was firm and invincible; and while he collected new forces from Apulia and Sicily, he battered, or ſcaled, or ſapped the walls of Durazzo. The beſieged were equally valiant and induſtrious in concerting meaſures of ſelf-defence. A moveable turret, ſufficient for containing 500 ſoldiers, had been rolled forward to the foot of the rampart; but the deſcent of the door or draw-bridge was checked by an enormous beam, and the wooden ſtructure was inſtantly conſumed by ardent flames. In the mean while the emperor Alexius, the founder of the Comnenian dynaſty, made a haſty peace with the Turks, and undertook in perſon the relief of Durazzo. Guiſcard, unalarmed, waited in battle-array the nearer approach of the enemy. Alexius, contrary to the advice of his wiſeſt captains, reſolved to riſk the event of a general action, and exhorted the garriſon of Durazzo to aſſiſt their own deliverance by a well-timed ſally from the town. After the firſt attack, the army of Guiſcard was reduced to 15,000 men. Many of his troops betook themſelves to flight; but when the Norman duke was on the verge of ruin, his wife, Gaita. by her ſingular valour and addreſs, ſucceeded in rallying the flying troops, and gave a turn to the battle, which rendered Robert completely victorious over an army five times more numerous than his own. After this deciſive battle, the ſiege of Durazzo was diligently proſecuted. At the dead of night, ſeveral rope-ladders were dropped from the walls; the light Calabrians aſcended in ſilence; and the Greeks were awakened by the name and trumpets of the conqueror. Yet they defended the ſtreet three days againſt an enemy already maſter of the rampart; and nearly ſeven months elapſed between the firſt inveſtment and the final ſurrender of the place, A. D. 1082. Gibbon's Hiſt. vol. x.

DYRZELA, a town of Aſia, in Piſidia. Ptolemy.

DYSÆ, in *Mythology*, inferior goddeſſes among the Saxons, being the meſſengers of the great Woden, whoſe province it was to convey the ſouls of ſuch as died in battle to his abode, called *Valhal*, *i. e.* the hall of ſlaughter; where they were to drink with him and their other gods *cereviſia*, or a kind of malt liquor, in the ſkulls of their enemies. The Dyſæ conveyed thoſe who died a natural death to Hela, the goddeſs of hell, where they were tormented with hunger, thirſt, and every kind of evil.

DYSÆSTHESIÆ, in *Medicine*, from δὺς, *ægrè*, and αἰσθάνομαι, *ſentio*, implying an imperfect faculty of perception or ſenſation, is a term employed by Sauvages to deſignate the firſt order of the ſixth claſs of his noſology; and by Cullen, as the denomination of the firſt order of the fourth claſs in his arrangement of diſeaſes. In both theſe ſyſtems the ſame diſeaſes are included under the term, *viz.* thoſe maladies of the organs of ſenſe, which impede their functions: ſuch as cataract, amauroſis, &c. producing *blindneſs*; the varieties of *deafneſs*, depraved *taſte*, *ſmell*, and ſo forth.

DYSART, in *Geography*, a royal borough, in the ſhire of Fife, Scotland, was incorporated about the beginning of the 16th century; at which time it is mentioned as one of the principal trading towns in the ſhire. Its traffic declined about the commencement of the laſt century; but began to recover in the year 1756, and is now very extenſive; 36 veſſels being employed from this port in foreign trade. About 750 looms are worked here in the manufacture of checks, of which 795,000 yards are annually made. Ship-building alſo is carried on to a conſiderable extent: and upwards of 17,000 buſhels of ſalt are made yearly. But the principal trade is the exportation of coal, which abounds in this neighbourhood: upwards of 20,000 tons are annually raiſed, of which nearly 5000 are ſent to Denmark and Holland, whence wood is imported in return. The borough, with the three villages of Porthead, Galaton, and Borland, contain nearly 5385 inhabitants; the lower claſſes of whom are moſtly employed in making nails; ſome are engaged in the weaving, &c. of check-cloth, and ſome are occupied in ſhip-building. The ground on which the town ſtands, riſes gradually from the ſea for about a mile in extent, when it ſlopes again to the river Orr. Near Porthead, on a free-ſtone rock, ſtand the ruins of an ancient fortification called *Raven's Craig*, the property of which has belonged to the family of St. Clair ever ſince the time of king James II.— Sinclair's Statiſtical Account of Scotland, vol. xii.

DYSCINESIÆ, in *Medicine*, from δὺς, and κινέω, *moveo*, *I move*, ſignifying impeded or depraved motions, ariſing from diſeaſe in the moving organs, is the denomination given by Sauvages and Cullen to the third order of the ſixth claſs and the fourth claſs of diſeaſes in their reſpective noſological ſyſtems. The diſeaſes of *ſtammering*, *loſs of voice*, *dumbneſs*, *ſquinting*, and other *local* diſorders of motion, are included under Dr. Cullen's order, to which are added palſy, *hemiplegia*, and *paraplexia* in the order of Sauvages.

DYSCRASY. See Crasis.

DYSECÆA, from δὺς and ἀκούω, *I hear*, the ſame with Deafness, which ſee.

DYSENTERY, the *Flux*, or *Bloody Flux*, *dyſenteria*, from δυς, and ἔντερον, *inteſtinum*, the *bowels*, is a diſeaſe principally characterized by frequent mucous or bloody diſcharges from the inteſtines, while the proper fæces are retained, together with griping, and ſtraining at ſtool, and ſome fever.

The

DYSENTERY.

The word *dyſentery*, as uſed by the ancients, had no very preciſe ſignification. Originally its import was *an affection of the bowels* in general, and we find Hippocrates uſing it, not only to ſignify all ulcerations, but all hæmorrhages of the inteſtines (even thoſe which are critical and ſalutary), and likewiſe every kind of flux, with or without blood. (Prorrh. 2. et Epidem. lib. ii.) It would ſeem, however, that, after his time, ſome of the other Greek authors, whoſe works are loſt, were ſenſible of this want of preciſion, and therefore reſtricted the meaning of the word to an *ulceration* of the bowels, attended with gripes and *teneſmus*, (or ſtraining,) and with mucous and bloody ſtools. For a diſeaſe with theſe ſymptoms Celſus calls *tormina*, and ſays it is the *dyſenteria* of the Greeks; and Cœlius Aurelianus, retaining the Greek name, deſcribes the dyſentery much in the ſame manner with Celſus. (See Celſ. De Med. lib. iv. cap. xv.—Cœl. Aurel. de Morb. Chron. lib. iv. cap. vi.) Yet Galen returns to the looſer acceptation of the word, ſometimes defining a dyſentery, *an ulceration of the bowels*, at other times mentioning four ſpecies of that diſtemper, all with bloody ſtools; but of which only one agrees with the *tormina* of Celſus, or the dyſentery of the moderns. Aretæus confines the term to an *ulceration* of the bowels. But, although this notion of the conſtant ulceration of the bowels, in conjunction with dyſenteric ſymptoms, prevailed in all medical writings until the time of Sydenham and Willis; and although it be true, that the bowels are liable to be ulcerated in the true dyſentery; yet it has been fully aſcertained, by the diſſections of the moderns, that ulceration is accidental, and not eſſential to the diſeaſe; and that inſtances even of fatal dyſentery, (conſequently of the diſeaſe in its moſt ſevere and protracted forms,) in which the inteſtines were ſound, are more numerous than thoſe accompanied by ulceration. For this aſſertion, we have the authority of Morgagni, Bonetus, Cleghorn, and Pringle; the firſt of whom alleges, and it is now generally underſtood, that ulceration takes place only in the advanced or chronic ſtates of the diſeaſe.

Dyſentery appears to be the ſame diſeaſe under all circumſtances of its occurrence, except in the degree of violence; which, as in other diſeaſes, neceſſarily varies with the ſeaſon, the conſtitution of the patient, and the degree of expoſure to the exciting cauſes. Sir John Pringle affirms, that all the epidemic dyſenteries, which he witneſſed in the army, were the ſame; and that he was aſſured by Dr. Huck, and other army phyſicians, that this diſeaſe appeared, in different countries and climates, in Germany, Minorca, America, and the Weſt Indies, with the ſame ſymptoms, and yielded to the ſame remedies; and, farther, that the epidemic deſcribed by Sydenham, as having occurred in London, in 1669 and the following years, was ſimilar to the reſt, as well as to the ſporadic caſes which he had met with in private practice, both in England and Scotland. The following is a detail of the ſymptoms and progreſs of the diſorder.

The dyſentery ſometimes begins, as Sydenham obſerves, with cold ſhiverings, ſucceeded by heat, and other febrile ſymptoms; but in other caſes theſe feveriſh ſenſations are not felt, but a griping and twiſting of the bowels, or ſtitches in the ſides, or only a pain about the pelvis, with a conſtant fruitleſs ſtraining to ſtool, and much flatulence, while the body is coſtive; ſometimes, though more rarely, ſome degree of diarrhœa is the firſt appearance. In whatever way the diſeaſe begins, it ſoon puts on its characteriſtic appearances. The diſpoſition to evacuate the inteſtines becomes more frequent and urgent, but in indulging it, little is voided, except a watery or ſlimy matter, and the *teneſmus* becomes conſiderable. From this time, until the favourable turn of the complaint, formed and natural excrements ſeldom appear, except when a purge operates well, and carries them down, and then they are in the form of *ſcybala*, or hardened, ſeparate balls. When theſe are voided, whether by the efforts of the conſtitution, or by the interference of art, a remiſſion of all the ſymptoms, and more eſpecially of the frequent ſtools, griping, and *teneſmus*, ſucceeds. Theſe *ſcybala* are of a firm texture, and round ſhape, having been formed in the cells of the *colon*, or great inteſtine, where they have lain in all probability from the beginning. The excrementitious diſcharges moſt commonly conſiſt of a mucous matter, ſtreaked or mixed with blood, and often with a ſerous or watery fluid, and fragments of a membranous appearance, conſiſting of coagulated lymph, but often taken for abraſions of the internal coat of the bowels: ſometimes a pure and unmixed blood is voided in conſiderable quantity. The *ſerum*, ſir J. Pringle obſerves, is perhaps one cauſe of the irritation, and deſcends from the higher parts of the inteſtines, whilſt the *mucus* is moſtly ſecreted from the *rectum*, or lower gut, in ſtraining. Streaks of blood, he adds, denote the opening of ſome ſmall veſſels at the end of the *rectum*, but a more intimate mixture is a ſign that the blood comes from a higher ſource. If the diſeaſe advances into a chronic form, a purulent, and ſanious matter is often diſcharged, proceeding from ulcerated or gangrenous parts. The ſtools are all along diſtinguiſhed by a peculiar ſmell, different from that of common excrements; it is faint, and not rank at firſt, but towards the end, when the bowels begin to mortify, the fœtor is cadaverous and intolerable.

When the diſeaſe is formed, ſickneſs and vomiting frequently come on, and the appetite is generally loſt. Some degree of fever is always preſent; which is various in its kind. Sometimes it is manifeſtly of an inflammatory nature; and, eſpecially in warm climates, it is often of a remittent kind, and obſerves a diurnal or tertian period. Frequently, indeed, a flux in the beginning will have the appearance of the autumnal fever, and the patient will be feveriſh, with ſome diſorder in the ſtomach and bowels, for two or three days before the dyſenteric lax comes on; but after that, the fever ſenſibly gives way. This obvious diminution of the fever upon the appearance of the looſeneſs, ſeemed to juſtify the expreſſion of Sydenham, when he called the dyſentery "the fever of the ſeaſon turned in upon the bowels." But patients are beſides liable to a low fever, which ſir J. Pringle ſays, was commonly brought on by neglect of the caſe in the beginning, or by the uſe of opiates and other aſtringents before evacuations. But the moſt fatal ſort of fever, which ſo often attends the dyſentery of the army, though not eſſential to it, is the hoſpital or gaol fever, which at all times infects foul, ill-ventilated, and crowded wards. This fever, combined with the bloody flux, is generally mortal. Theſe febrile ſtates continue to accompany the diſeaſe during its whole courſe, when it terminates ſoon, in a fatal manner. In other caſes the febrile condition almoſt entirely diſappears, while the proper dyſenteric ſymptoms remain for a long time after.

Under theſe modifications, the dyſentery is of various durations in different inſtances. When the fever attending it is of a violent inflammatory kind, or when it is of a putrid nature, the diſeaſe often terminates fatally in a very few days, with all the marks of a ſupervening gangrene. When the febrile ſtate is more moderate, or diſappears altogether, the diſeaſe is often protracted for weeks, and even for months, and even then it often terminates fatally. More frequently, eſpecially when occurring out of camps, and military hoſpitals, it ceaſes gradually, after proper treatment, the frequency and ſlimy compoſition of the ſtools, the griping and teneſmus, all ceaſing, and natural ſtools returning. In other caſes, the diſeaſe, with moderate ſymptoms, continues long, and ends in a diarrhœa, ſometimes accompanied with lienteric ſymptoms.

In general the dyſentery terminates at the lower extremity of the gut, or, as Sydenham ſays, "the diſeaſe at laſt is driven to the *rectum*, where it ends in a *teneſmus*;" *i. e.* the colon remains longer diſeaſed than the ſmaller inteſtines, and the rectum is generally the laſt part that recovers. But the ſame phyſician obſerves, that the teneſmus remaining at the end of a flux, is not owing to an ulceration of the rectum; but that part he ſuppoſes to be the laſt depoſitary of the irritating mucus of the inteſtines. But ſir J. Pringle explains it more rationally by aſcribing this remaining teneſmus to the ſoreneſs of a part, which has been ſo much excoriated and inflamed during the courſe of the diſeaſe, and which, by the conſtant irritation of paſſing excrement, is ſtill kept from recovering.

It is the ſign of a bad caſe, ſays the laſt mentioned phyſician, when the firſt vomit and purge do not relieve; when the hectic fever increaſes; when the diſorder of the ſtomach is obſtinate; when the countenance alters much; when the pulſe ſinks and intermits; when the patient is reſtleſs without complaining of gripes. In the beginning a hiccup is little to be dreaded; but in the low and advanced ſtate, if obſtinate, it is commonly a ſign of a mortification. The diſeaſe, when fatal, ends in a proſtration of ſtrength, a ſore throat, or *aphthæ*, involuntary and cadaverous ſtools.

In the army, he adds, in the moſt favourable event, thoſe men, who have been ſent to an hoſpital, can be of little more ſervice for the reſt of the campaign; for no ailment is more apt to return upon errors in diet, or expoſure to cold. Not that theſe returns are ſo much relapſes into the true dyſentery, as they are diarrhœas, but with more of the dyſenteric ſymptoms than are common in the white-flux.

The *proximate cauſe*, or the actual condition of the inteſtines, upon which the ſymptoms above detailed depend, appears to be an inflammatory ſtate of the mucous membrane, which lines the inteſtines, eſpecially the great gut, together with a preternatural conſtriction of their muſcular fibres. The exiſtence of theſe two circumſtances is ſufficient to explain the ſymptoms. The retention of the natural fæces in the cells of the colon, eſpecially in an inflamed ſtate internally, will account for the non-appearance of natural excrement, and the conſtant deſire to go to ſtool, for the pain and griping, and ſtraining; which laſt will explain the production of ſtreaks of blood, and in part the ſecretion of mucus, which the inflamed lining membrane ſo copiouſly pours out.

Accordingly *diſſection* has generally diſcovered conſiderable conſtrictions in the colon, where gangrene had not deſtroyed the texture and form of the parts; and the proofs and conſequences of inflammation were invariably detected. Theſe are a preternatural thickening of the coats of the inteſtines; internal ulcerations in the colon and rectum; and abraſion or rather corruption of the villous coat into a ſlimy greeniſh ſubſtance; gangrene of the rectum and colon, ſometimes extending the whole length of both; and occaſionally a ſort of puſtular appearance, reſembling the ſmall-pox, in thoſe parts. The ſmall inteſtines are generally found inflated, but ſeldom in a diſeaſed condition in any other reſpect.

Dyſentery is to be diſtinguiſhed from *diarrhœa*, chiefly by the *teneſmus*, or fruitleſs and diſtreſſing efforts at ſtool, by the abſence of natural feculent matter in the diſcharges, and the ſmallneſs of the evacuation and frequent attempts; as well as by the febrile condition, which accompanies theſe ſymptoms, in the acute and early ſtages. From *colic* and *cholera*, in both which there is pain and griping, and in the latter, fever, it is eaſily diſcriminated; by the conſtipation and acuteneſs of pain in colic, and by the profuſe evacuations of bilious matter by ſtool in cholera, without teneſmus.

The *exciting cauſes* of dyſentery have been differently ſtated by different phyſicians. The army phyſicians have attributed the diſeaſe to the combination of heat and moiſture, or an alternation of theſe with cold; becauſe it uſually appears in camps and in warm countries towards the end of ſummer and in autumn, after great and continued heats, and at the ſame time with the autumnal remittent and intermittent fevers. Willis obſerves, that the ſummer of 1670 (which preceded the autumn in which the flux was at its greateſt height) was remarkably hot; and ſir J. Pringle ſtates, that in the ſummer of 1762, the heat and drought were of long continuance, and in the autumn the dyſentery prevailed in London extenſively, ſo that he believes more caſes then occurred, than in all the ſixteen years that he had previouſly reſided here. He farther remarks, that when, at that period of the year, the men are expoſed to night-damps and fogs, eſpecially after a hot day, or lie wet upon the ground, or in wet clothes, part of them will be ſeized with the autumnal fever, and part with the dyſentery, and perhaps ſome of them will have a diſorder compounded of both.

Dyſentery, however, is *contagious* in camps and hoſpitals. "In the camp," ſays Dr. Pringle, "the contagion paſſes from one, who is ill, to his companions, in the ſame tent, and from thence perhaps to the next. The foul ſtraw becomes infectious. But the greateſt ſources of infection are the privies, after they have received the dyſenteric excrements of thoſe who firſt ſicken. The hoſpitals likewiſe ſpread it; ſince thoſe who are admitted with the flux, not only give it to the reſt of the patients, but to the nurſes and other attendants of the ſick." This is moſt concluſive evidence of its ſtrongly contagious nature, under thoſe circumſtances. But we have alſo evidence of the limited extent of the influence of this, as of other contagious *effluvia*. (See Contagion.) "In general the contagion does not ſuddenly ſpread. For whole towns and camps are never ſeized at once, from the impurity of the atmoſphere, but the infection is carried from one to another by the *effluvia*, or clothes, or bedding, &c. of the tainted perſon, as in the caſe of the plague, ſmall-pox, and meaſles." At Nimeguen, the Jews, who had little intercourſe with the reſt of the people, eſcaped the epidemic dyſentery. (See Degner. Hiſt. Dyſent. bilioſo-contagios. cap. i. § 35.) Dr. Cullen has aſſerted that dyſentery is always contagious; he believed that cold never produced the diſeaſe, except when the contagion had been previouſly received; and that a ſpecific contagion was the ſole exciting cauſe of dyſentery. (Firſt Lines, § 575.)

This poſition we are diſpoſed to conſider as erroneous. Sydenham makes no mention of any contagion, attending the epidemic dyſentery, which he has deſcribed; and Willis, who ſpeaks of the ſame epidemic, expreſsly aſſerts that it was not infectious. It is a common diſeaſe in this metropolis, in a ſporadic form, and during the laſt autumn (1808) was prevalent to a conſiderable extent; yet we do not recollect to have once obſerved it to paſs to a ſecond perſon in any family; while its origin could be often ſatisfactorily traced to expoſure to cold and moiſture. In this reſpect, too, the analogy of Catarrh corroborates the notion of its being under one form contagious, and under another ſimply the effect of the operation of cold. The common ſporadic examples of catarrh, which we witneſs every day, are ſo notoriouſly the effect of this agent, that the diſeaſe itſelf is denominated *a* Cold, by a figure of ſpeech. Yet there can be little doubt, that, under the form of INFLUENZA, the catarrh is an infectious diſeaſe.

Many writers have aſcribed the dyſentery to the uſe of fruit, or to the overflow of bile, or to both theſe cauſes. But their opinions have erroneouſly ariſen from the circumſtance, that the ſeaſon of the prevalence of dyſentery is uſually that, in which fruit is abundant, and bilious diſeaſes occur; namely, the end of ſummer, and the autumn. Sydenham, however, who conſiders fruit as a cauſe of CHOLERA, never mentions it as the occaſion of the dyſenteries, which were epidemic in London in his time; and Degner, another diligent obſerver, expreſsly ſays, that fruit had no ſhare in producing the flux which raged ſome years ago at Nimeguen. Sir J. Pringle is decided in his denial of the effects of fruit in exciting dyſentery. He obſerves that the ſoldiers could not afford to procure fruit; and beſides he ſtates that the worſt flux, which prevailed in the army, in which he ſerved in the Low Countries and in Germany, began in the end of June, when there was no other fruit but ſtrawberries, which the men never taſted; and that it nearly ceaſed about the firſt of October, when the grapes were ripe, and ſo plentiful in open vineyards, that the men eat what quantity they pleaſed. As to the bile, it is certain that occaſionally a cholera terminates in a dyſentery; but this is very rare, and is often to be attributed to the unſeaſonable interruption of the diſcharge by aſtringents, and ſtrong opiates. Where the bowels are very irritable, any unuſual determination to them may bring on dyſentery.

Cure.—It has been juſtly obſerved, that there are few acute diſeaſes leſs indebted to the natural efforts of the conſtitution for a cure, or in which the apparent indications are more deceitful, than dyſentery. The conſtant flux ſeems to require the adminiſtration of ſtrong aſtringents, and the great pains and gripings in the bowels appear to demand the free uſe of opiates: and yet theſe remedies, unleſs employed with much caution, or corrected by others, tend much more to confirm than to remove the diſeaſe. On the other hand, purges and emetics, under ſuch a ſtate of irritation and perpetual diſcharges, would appear to be inadmiſſible, and have been condemned; yet later experience has ſhewn them to afford the chief means of cure.

We ſhall follow ſir J. Pringle in treating of the method of cure, under three different ſtates of the diſeaſe: namely, firſt, in the *acute* ſtate of the diſeaſe, or while it is recent; ſecondly, in the *chronic* ſtate, or when the diſorder is of a bad kind, has continued long, and has much impaired the ſtrength, injured the inteſtines, and induced a hectic fever; and, thirdly, when the patient, although recovering, is kept low by a *teneſmus*, or ſome other remains of the diſeaſe, or becomes ſubject to frequent returns of a looſeneſs, from the weakneſs of his bowels.

I. In the *acute* ſtate.—In very ſtrong habits, and where inflammatory ſymptoms, either acceſſory, or belonging to the diſeaſe itſelf, run high, a moderate bleeding may be premiſed. This, however, is very rarely neceſſary, eſpecially in ſporadic caſes; and the repetition of it may be conſidered as generally unneceſſary or hurtful. The principal object of cure, in a recent caſe of dyſentery, is to obtain a full evacuation of the inteſtinal canal, by which means the *ſcybala*, or hardened excrement, or the morbid ſecretions into the canal, may be removed; at the ſame time to take care that the inflammatory condition of the mucous membrane, lining the paſſages, be as little affected by the irritation of the proceſs as poſſible. This evacuation indeed is ſometimes contrary to the inclinations of the patient, who conceives that his bowels are already too much griped and purged; and *à priori* it might juſtly be ſuppoſed, that any additional irritation, from a purgative ſubſtance, would be hurtful, did we not recollect that we thus remove a much greater irritation, the hardened fæces, which actually cauſe or keep up the diſeaſe.

It is deſirable, therefore, to adopt the mildeſt means of evacuation, which are adequate to the full effect. Emetic ſubſtances, eſpecially antimonial preparations and ipecacuanha, have been much employed for this purpoſe, adminiſtered in ſuch a way as to act upon the bowels. The *vitrum ceratum antimonii*, *glaſs of antimony*, or vitrified oxyd of antimony melted with wax; was ſtrongly recommended (ſee Edin. Medical Eſſays, vol. v.) as a cure for dyſentery, and uſed by ſir J. Pringle, and many other practitioners, with ſucceſs. It always occaſioned vomiting, and generally purging, with which laſt operation its ſucceſs was obſerved to be particularly connected. But the uncertainty and occaſional violence of the effects of this medicine have cauſed it to be generally laid aſide by practitioners. A vegetable emetic was introduced by PISO, as a ſpecific againſt dyſentery, namely, the ipecacuanha root. He relied on its purgative quality, however, though he adds, that it ſtill had a better effect when it vomited alſo. (See Gul. Piſon. Hiſt. Nat. et Med. Indiæ Occid. lib. ii. cap. ix.) Sir John Pringle uſed this as his firſt medicine in the commencement of dyſentery, and found it moſt certainly ſucceſsful, when given in divided doſes, of five grains each, at the intervals of an hour. Three doſes generally brought on a purging; no drink being allowed until that effect was produced, and then ſome gruel was taken to promote it.

But ſince it has been clearly aſcertained, that the ſalutary operation of theſe and ſimilar medicines, conſiſts entirely of their cathartic effects, and that thoſe ſubſtances, which poſſeſs a purgative quality only, are equally efficacious and more certain in their operation, the latter are now generally employed. Various cathartic medicines have been adopted upon theoretical principles, or from obſervation, in the treatment of dyſentery. Rhubarb was formerly much uſed, becauſe its purgative operation was followed by an effect of aſtringency, upon which principle, by the way, PISO recommended the ipecacuanha; but, on the contrary, it ſeems deſirable that we ſhould uſe a purgative, which may leave the body open. Among the mildeſt and moſt certain means of procuring evacuations from the bowels, are the neutral ſalts, eſpecially the ſoluble tartar, or *tartrite of potaſs*, and the Epſom ſalt, or *ſulphate of magneſia*, well diluted, and with the addition of cinnamon, or peppermint water, in divided doſes of a ʒ; or two drachms every hour or two, till an evacuation is procured. The caſtor oil, *oleum ricini*, *ſenna*, and *manna*, have been uſed with ſucceſs; and calomel alone, or with rhubarb, is an efficacious medicine: ſir J. Pringle uſed to adminiſter five grains of calomel with thirty of rhubarb. But he juſtly obſerves, "that we are to attend leſs to the doſe than to the effects, which are not to be judged of by the frequency, but by the copiouſneſs of the ſtools, and by the relief which the patient finds from the gripes and *teneſmus* after the operation; and that, as on the one hand, the phyſician ought to avoid all the rough and ſtimulating purges, ſo on the other he is not to ſpare thoſe of a lenient kind, eſpecially rhubarb, which is commonly under-doſed." Rhubarb, however, is much condemned by other writers.

But it is neceſſary to remark, that the cure cannot always be readily effected by purgatives alone. The irritation which they occaſion, under the tender ſtate of the internal coat of the inteſtines, in dyſentery, tends, in many inſtances, to counteract the good effects of the removal of the *ſordes*. It has been the cuſtom, therefore, with practitioners in general, to give an opiate in the evening, after the purgative operation was accompliſhed; to repeat the purgative, at the interval of a day or two, interpoſing opiates, eſpecially in the evening of the day of purgation; or to alternate purgatives and opiates, until the ſtate of the bowels become natural. It is ſingular, that our great phyſician, Sydenham, recommends the interpoſition of cathartics only in the epidemic dyſentery, when the diſeaſe aſſumes a more ſevere form; and uſed opiates alone for the cure of the milder or ſporadic caſes of the diſorder. This is certainly inconſiſtent with the obſervation and experience of ſucceeding phyſicians: for even in the mildeſt inſtances of dyſentery, opium, while it gives a temporary relief to the pain and teneſmus, is obſerved but to poſtpone their ſevere occurrence, and to protract the complaint, which it rather confirms than removes, by retaining "the enemy within the bowels." In the more uſual forms of the diſeaſe, the general voice of experience has decided, that opiates, given previous to or without purgation, aggravate the diſeaſe. Indeed ſir George Baker, and ſome other authors, ſtrongly condemn the uſe of opiates, until the ſtools have become natural, in conſequence of the full evacuation of the bowels: they affirm that opiates, like other aſtringent medicines, gives riſe to *tympanites*, by retaining the fæces and morbid ſecretions within the inteſtines.

We are ſatisfied, however, from obſervation, and we have no leſs authority in our favour than the practice of the late Dr. Warren, (ſee Medical Tranſactions of the Coll. of Phyſ.) that opiates may be uſed, from the firſt appearance of the diſeaſe, with advantage, provided an evacuation be procured at the ſame time, by the combination of purgative medicines with them. The conjunction of opium with cathartics is an uſeful practice in extremely irritable conditions of the bowels; it retards, but ſcarcely diminiſhes, the operation of the purgatives, the irritation of which it in a great meaſure prevents. We have known inſtances of dyſentery, which had received but a temporary removal from the alternation of cathartics and anodynes, yield at once to the combination of them, eſpecially of opium with calomel. Dr. Cleghorn, after mentioning two modes in which dyſentery begins, obſerves, "in both caſes, when other means have failed, ſix or ſeven grains of calomel, with a grain of opium at night, (after the uſe of the *ſemicupium*,) and a purging apozem, made of ſenna, manna, and ſal catharticum, the next day proved ſucceſsful, and brought off a prodigious quantity of round, hard, fœtid lumps, to the great relief of the patient: nor is it eaſy to conceive," he adds, "how ſo much had been collected, or where it had lodged ſo long, as in ſome caſes I have obſerved; the patient having eat nothing for two or three weeks that could furniſh much excrement, and during that time had taken ſeveral glyſters and common cathartics, which brought away liquid ſtools." (On the Diſeaſes of Minorca, chap. v. p. 252.) In ſuch caſes, it is clear that the opiate aided, inſtead of impeding, the operation of the cathartic; probably by relaxing the conſtriction of the muſcular fibres of the bowels, which we have already noticed as conſtituting part of the diſeaſe, and which retained the hardened excrement, in ſpite of the operation of cathartics alone.

II. But if medicines have been altogether neglected, or improperly or unſucceſsfully adminiſtered, during the early and acute ſtage of the diſeaſe, the fever becomes more of a hectic form; the pulſe more feeble and ſmall; the ſtrength is conſiderably impaired; and the body more or leſs emaciated; while the griping and teneſmus remain, and the ſtools continue ſmall, frequent, and ſlimy; with various other appearances of the fæces, which require attention, as indicating the probable degree and mode in which the inteſtines are diſordered; ſuch as ſimply ſlimy or mucous evacuations, thoſe ſtreaked or tinged with blood, or containing ragged membranous appearances, ſcybala, or purulent and ſanious matter.

In this ſtage of the diſeaſe, evacuation of the offending matter from the bowels is ſtill the leading object of medicine; with this difference, that the mildeſt means are now more requiſite, and that it may be particularly uſeful to ſheathe the inflamed inteſtines from the acrimony of morbid and acrid ſecretions; to aid the operation of laxatives, by means of bland, mucilaginous, or oleaginous fluids; and to procure a reſpite from pain and ſpaſm by anodynes. For the former purpoſes, the caſtor oil has been particularly recommended, or any mild oil combined with tincture of rhubarb. Manna, and the mild neutral ſalts, ſometimes combined with oil or manna, have likewiſe been ſucceſsfully employed; and the neutral ſalts, with mucilaginous diluents, and opiates in conjunction, are well adapted to theſe purpoſes. Emollient and anodyne glyſters were found beneficial by ſir John Pringle in this ſtage of the dyſentery; ſuch as a decoction of linſeed, or of ſtarch, or fat mutton broth, in the quantity of from four to eight ounces, according as more or leſs could be retained. When the irritability of the lower bowels and teneſmus were ſo great, that thoſe glyſters were rejected, the tincture of opium was added. But ſir John acknowledges, that the parts were often ſo tender, as to render it impoſſible to adopt that practice. And in fact it not unfrequently happens, that the introduction of the pipe into the *anus* cannot be borne, in conſequence of the inflamed and excoriated ſtate of the *rectum*. In ſuch caſes, a pill of opium may be ſometimes introduced within the gut with great relief to the frequency of the motions, and to the griping and teneſmus.

The food and drink ſhould be contrived of a bland and demulcent nature. With this view, the diet may conſiſt chiefly of rice or barley-gruel, of ſago, arrow-root, panada, light pudding, or preparations of milk. Animal broths were at firſt allowed by ſir J. Pringle, when the patients were but ſlightly feveriſh; but experience taught him, that animal food in any form was in general improper. Objections have been made to the uſe of milk diet in dyſentery, in conſequence of an obſervation of the author juſt named, that ſome white ſubſtances, paſſed in the ſtools, and which have been called *corpora pinguia*, were found, in a caſe examined by Dr. Huck and himſelf, to be pieces of *cheeſe*. But it is much leſs difficult to ſuppoſe, that theſe cheeſy matters were the remains of that indigeſtible ſubſtance, which had lain in the inteſtines ſince the commencement of the diſeaſe, like the *ſcybala* mentioned by Dr. Cleghorn, than to believe that an actual cheeſe-making proceſs goes on in the alimentary canal, from the milk that is ſwallowed. We cannot but deem a milk-diet the moſt favourable to recovery, while the hectic fever is kept up in conſequence of ſlow inflammation, or ulceration, in the internal coat of the lower inteſtines.

For drink, in this ſtage of the diſeaſe, rice or barley-water, toaſt and water, linſeed-tea, or a decoction of ſtarch with gum-arabic, ſeaſoned with ſome ſimple cinnamon water and ſugar, have been employed; and preparations of wax have been long in repute for their virtues in dyſentery. Bates recommended a ſolution of it in ſpirits, and Diemerbroeck praiſes it when diſſolved in milk. In a ſpirituous form it is to be ſtrongly deprecated; and the oily and mucilaginous demulcents appear to be on the whole preferable to wax. M. Senac, phyſician to the French army, informed ſir J. Pringle, that after bleeding and adminiſtering an emetic of tartariſed antimony, he ſucceeded in curing dyſentery by giving one grain of that antimonial, diſſolved in a pint of common whey or chicken-water, every day, in divided draughts, which ſerved for all food, drink, and medicine, till the patient recovered.

For mitigating the griping pains, and relieving flatulency, ſtimulant *carminatives*, as they have been called, ought not to be employed. Fomentations or the warm bath are often ſerviceable for this purpoſe; but the ſymptoms are moſt effectually relieved by a free evacuation of the bowels, from a laxative combined with an opiate. Where morbid acidity prevails in the firſt paſſages, with heartburn, the abſorbent earths, ſuch as chalk and magneſia, are beneficial.

When the flux continues till the ſtrength is much impaired, and the pulſe ſinks, while the hectic heats remain, the danger is great: though there are ſtill hopes, as long as there are neither involuntary ſtools, nor *aphthæ*, nor a hiccup, and while the patient does not complain of great lowneſs and anxiety about the *præcordia*. If theſe ſymptoms are preſent, the caſe is moſt unfavourable, and ſcarcely admits of palliatives; ſince opiates have but little effect in eaſing the pain, or checking the frequency of the ſtools.

III. But if the general ſymptoms of the diſeaſe are removed, and the patient is chiefly kept low by the irritation of a teneſmus, or by frequent returns of a diarrhœa, from the weakneſs of his bowels, opiates, aſtringents, and bitters will be uſed with advantage. The teneſmus, in this caſe, is occaſioned principally by the increaſed ſenſibility and tenderneſs of the bowels, eſpecially of the *rectum*, which renders the paſſing of every matter, even the proper ſecretions, painful. The introduction of a pill of opium, with or without the extract of *cicuta*, is often in ſuch inſtances particularly uſeful. Sir J. Pringle recommends a preparation of mutton ſuet in milk, with a little finely powdered ſtarch, to be taken internally as food, under the ſame circumſtances. When the ſtomach and bowels are ſo enfeebled, that a *lientery* is occaſioned, the food being carried off imperfectly digeſted, the aſtringent vegetable ſubſtances, ſuch as logwood, *catechu*, *ſimarouba*, &c. with opiates, muſt be adminiſtered. Diaphoretic medicines, by tending to reſtore the exhalation from the ſkin, and thus to alter the determination of fluids to the inteſtines, are alſo frequently beneficial.

During this aſtringent courſe, attention to the diet will ſtill be requiſite. It ſhould ſtill be of a light, eaſily digeſtible, and nutritious quality, conſiſting much of milk, vegetable ſtarches, ſuch as ſago, ſalep, and arrow-root, rice, and the common *farinacea*; greens, and other laxative and flatulent articles, being ſparingly uſed or avoided. It has been remarked by the beſt writer on this ſubject, ſo often quoted, (Pringle,) that he has often known a cure obtained, when aſtringents have been of no avail, by a milk and farinaceous diet, without them.

Together with the uſe of theſe remedies, exerciſe in the open air, regularity of life in reſpect to the hours of eating, ſleeping, and riſing, and every other means of reſtoring the functions, ſhould be adopted: and nothing is more conducive to prevent relapſes of the flux, or of the diarrhœa, than warm clothing, eſpecially the uſe of flannel worn next the ſkin. See Pringle on Diſeaſes of the Army, p. iii. c. 6. Cleghorn on the Diſ. of Minorca. Cullen Firſt Lines, § 1067. See alſo an ample liſt of references in Cullen's Noſology, gen. 41.

DYSMENORRHŒA, painful menſtruation.

In ſome women, more eſpecially about the period of puberty, the diſcharge of the catamenia is preceded and accompanied by pain, ſometimes in a very violent degree, about the loins and pelvis, and other parts connected with the uterus. The ſtomach often ſympathiſes with this morbid condition of that organ, and nauſea, loſs of appetite, and even vomiting take place; and there is a general languor of the whole frame, ſometimes amounting to actual fainting. This diſorder occurs moſt commonly in delicate females, and the health is uſually indifferent in the intervals; occaſionally there is a ſlight diſcharge of the nature of *leucorrhœa*. Very rarely it has been obſerved that this pain and diſorder have attended every period of menſtruation through life.

The patient ſhould be kept quiet, or confine herſelf to bed, when the period returns; the bowels ſhould be kept gently open, and warm diluent drinks uſed freely. The two expedients, which afford the moſt effectual relief, are the uſe of opium, either internally or by glyſter, or both; and the warm bath, or ſemi-cupium, the good effects of which are partially obtained by fomentations to the lower region of the abdomen, and to the lower extremities. Dr. Hamilton, the preſent profeſſor of midwifery at Edinburgh, recommends the free uſe of the inſpiſſated juice of the hyoſcyamus, as a preferable narcotic in this painful complaint. He orders from two to four grains every hour, till the pain is mitigated. The earlier the medicine is adminiſtered the better, and the ſmaller the doſe of the medicine required to produce relief. Opium, however, has ſeldom failed, under our obſervation, to alleviate the diſorder. The following are the obſervations of Dr. Fothergill upon this topic.

Let the patient have by her a few pills of the *extractum thebaicum*, one grain each, made ſoft with a little of any kind of conſerve. She is to take one of theſe pills the moment ſhe finds the pain attending this diſcharge coming on. A pill may be taken every hour till the pain goes off; they ſeldom require more than two of theſe pills; one is often ſufficient, if given early; and it ought to be a conſtant rule obſerved in adminiſtering anodynes, to give them, when they are plainly indicated, early. It requires much leſs of an opiate to obviate pain than to quiet it when acute.

When the time is paſt, a courſe of chalybeate bitters, in ſmall doſes, may be continued till within a few days of the return; and the belly ſhould be kept open by ſome proper laxative: two or three grains of the *cathartic extract*, with half the quantity of *calx antimonii illota*, taken every night, will often ſucceed perfectly well. The anodyne muſt ſtill be in readineſs to take when the pain comes on, and to be taken to ſuch a quantity as to mitigate the pain, be the doſe what it may.

This excruciating pain ſeems to be ſpaſmodic, and to proceed from the extreme irritability of the uterine ſyſtem: the blood naturally determined hither, in order to its being diſcharged, by diſtending the very irritable veſſels, occaſions the ſpaſm; this produces a conſtriction of the veſſels; they become impervious, and the *niſus* to the diſcharge continuing, the pain becomes exquiſite and general, till the patient, worn out with the ſtruggle, is debilitated and ſunk; the fluids are then diſmiſſed, ſome eaſe ſucceeds, but the patient is often ſo reduced, as not to recover her uſual ſtrength before ſhe has another conflict to undergo.

Dr. Fothergill remarks that the *fluor albus* is frequently the conſequence of this ſtruggle, and that it would ſeem as if the uterus itſelf was ſo far a ſufferer as to be rendered by degrees leſs fit for fecundation. I think it has been obſerved by other phyſicians, he adds, as well as myſelf, that few of thoſe who have ſuffered much in the manner here deſcribed, have borne children. See Medical Obſervations and Inquiries, vol. v.

DYSODA, in *Botany*, from Δυςώδης, *fœtid*, a name given by Loureiro to the *Lycium foetidum*, which he rightly ſeparated from *Lycium*, but which Juſſieu has called *Seriſſa*, and the latter is now adopted. See Serissa.

DYSODIA, in *Medicine*, from δυς and ὄζω, *oleo*, is a genus

genus of diſeaſe conſtituted by Sauvages, including the variety of fœtid exhalation or bad ſmells ariſing from the body, as from ſores, bad breath, &c. See his Noſol. Meth. claſs ix. g. 35.

DYSOPIA, is the title of a *genus* of diſeaſe in Dr. Cullen's arrangement, ſynonymous with the *amblyopia* of Sauvages, and comprehending thoſe varieties of depraved or imperfect viſion, which require a particular quantity of light, a particular diſtance, or poſition of the objects. The term includes the *hemeralopes* and *nyctalopes* of authors, or thoſe who are blind except in twilight or in the broad day-light, and alſo the *ſhort ſighted*, &c.

DYSOREXIA, from δυς and ορεξις, *appetite*, or *deſire*, ſometimes uſed as ſynonymous with ANOREXIA, or loſs of appetite for food. Dr. Cullen has adopted the term, as the title of the ſecond order of his fourth claſs of *local* diſeaſes, including the deranged or erroneous appetites and deſires, as well as thoſe which are defective; ſuch as *Bulimia*, or canine appetite; *Polydipſia*, or exceſſive thirſt; *Pica*, or appetite for things not eatable; *Satyriaſis*, *Nymphomania*, *Anaphrodiſia*, &c.

DYSORUM MONS, in *Ancient Geography*, a mountain, which, in the time of Herodotus, ſeparated Thrace, towards the coaſt of the ſea, from Macedonia. It was at a ſmall diſtance from the lake Praſias, and from a ſilver-mine, which had ſometimes yielded a talent *per* day. Herod. l. v. 17.

DYSPEPSIA, DYSPEPSY, in *Medicine*, from δυς and πεπτειν, *to digeſt*, or *concoct*, a weakneſs or derangement of the function of digeſtion. See DIGESTION.

This weakened condition of the digeſtive power in the ſtomach is connected with a variety of complaints, which, together or ſeparately, mark its preſence in different inſtances: ſuch as NAUSEA; VOMITING; heart-burn, or CARDIALGIA; pain of ſtomach, or GASTRODYNIA; FLATULENCE; PYROSIS, or water-braſh; &c. which ſee reſpectively.

It is alſo often a prominent feature in what are denominated NERVOUS *diſeaſes*, in HYPOCHONDRIASIS, and ſome caſes of MELANCHOLY, of all which, in fact, the derangement of the digeſtive organs is frequently the exciting or proximate cauſe. It is alſo generally the precurſor of the paroxyſm of regular GOUT. See INDIGESTION, and the articles here alluded to.

DYSPERMATISMUS, from δυς, and σπερματισμος, *ſeminatio*, a ſlow, impeded, and inſufficient emiſſion of the ſeminal fluid, in the generative act.

The cauſes by which this impediment is induced may be arranged under a few heads. 1. Diſeaſes of the urethra, which narrow the canal; as thickening of the parietes, ſtrictures, ulcers with elevated edges, caruncles, or excreſcencies, fungous enlargements of the corpus ſpongioſum, &c. (See Sharpe's Critical Enquiry, chap. 4.) conſtituting the dyſpermatiſmus *urethralis* of the noſologiſts. 2. Nodes, or hard tumours, in the corpora cavernoſa (D. *nodoſus.*) 3. A contraction of the prepuce (D. *præputialis*, or *phymoſicus.*) (See Arantius de Tumor præter natur.) 4. Mucus lodged in the urethra (D. *mucoſus.*) 5. A too rigid extenſion of the virile member, contracting the canal of the urethra. (See Edin. Med. Eſſays, vol. i. art. 35.) (D. *hypertonicus.*) 6. A general epileptic convulſion (D. *epilepticus.*) 7. An imperfect extenſion of the member. (D. *apractodes.*) (See Etmuller de Morb. virorum. cap. 2. p. 469. Veſlingii Epiſt. et Obſ. Ep. 38. Foreſt. lib. xxvi. obſ. 18 and 19.) 7. The fluid being directed towards and flowing into the bladder. (D. *refluus.*) (See Petit. in Act. Acad. Chirurg. tom. i. p. 434.) This reflux of the ſemen into the bladder Mr. Sharpe aſcribes generally to a ſchirrus, or ſometimes a ſpongy enlargement of the verumontanum, with or without ulceration, or to an obſtruction in ſome part of the urethra. This ſpecies of the diſeaſe under conſideration is not very uncommon. See Sharpe *loc. cit.*. Sauvages Noſol. Method. claſs. ix. gen. 31.

DYSPHONIA, from δυς and φωνη, *voice*, a difficulty of ſpeech.

DYSPNŒA, from δυς, and πνέω, *I breathe*, a difficulty of breathing.

Difficulty of breathing originates from a great variety of cauſes, and is a ſymptom connected with a great number of diſeaſes. Whatever impedes the entrance of the air into the cells of the lungs, obſtructs the circulation of the blood through them, prevents their free expanſion, or narrows the cavity of the cheſt, will neceſſarily be an impediment to the act of reſpiration. When the difficulty of reſpiration is ſo great, as to render it neceſſary for the patient to maintain the erect poſture, it is termed ORTHOPNOEA.

1. Among the impediments to the free paſſage of the air into the cells of the lungs, which occaſion dyſpnœa, may be enumerated, the thickening of the membranes of the paſſages from inflammation, and the conſequent effuſion of mucus, or coagulable lymph, as in CATARRH, and CROUP, in which a frequent cough is excited by the irritation of theſe ſecretions, which enables the lungs to diſlodge them. In the *chronic catarrh* of old people, in the *Baſtard* PERIPNEUMONY, and in ASTHMA, theſe mucous ſecretions are moſt copious, and, by filling up the cells and tubes of the lungs, occaſionally produce actual ſuffocation. In the paroxyſm of aſthma, the difficulty of breathing appears to be augmented by a ſpaſmodic contraction of the *glottis*, which ſtill farther impedes the free paſſage of the air. Inflammation of the lungs, both in the form of PLEURISY and PERIPNEUMONY, is accompanied by dyſpnœa in conſequence of the congeſtion of blood, and the effuſions of ſerum, blood, or lymph, into the cells of the lungs, which, when the diſeaſe is violent, uſually enſue; and often deſtroy the patient by a fatal interruption to the breathing.

The cells of the lungs are compreſſed, and the admiſſion of air therefore prevented, by tumours, and collections of fluids, in their ſubſtance; hence dyſpnœa is occaſioned by the preſence of *pus*, conſequent on acute inflammation of the lungs, in the form of VOMICÆ; and by the preſence of tubercles, hydatids, ſteatomatous, or other tumours, and of ſerum effuſed into the cellular membrane, conſtituting the *anaſarca*, or *hydrops pulmonum*. See DROPSY *of the Lungs*.

2. Whatever obſtructs the pulmonary circulation to a conſiderable extent alſo occaſions dyſpnœa. If the blood is prevented from flowing freely back to the heart, a congeſtion is produced in the lungs, which neceſſarily compreſſes the cells and air-tubes; and if, on the other hand, the blood is impeded in its way to the air-cells, then it is imperfectly changed by the influence of the air, and the ſenſation of ſuffocation, and laborious reſpiration equally enſue. Polypous concretions about the heart, aneuryſms of the heart or great veſſels, oſſification of its valves, &c. contribute to produce theſe morbid ſtates of the circulation. See CARDIOGMUS and ANEURYSM.

3. Whatever prevents the free expanſion of the lungs neceſſarily impedes the function of reſpiration. Thus dyſpnœa, often orthopnœa, is a conſtant attendant on *hydrothorax*, when the water, effuſed into the cavity of the cheſt, occupies that portion of the cavity, which the expanded lungs would otherwiſe fill. (See DROPSY *of the Cheſt*.). When *vomicæ* burſt, and their purulent contents are poured into the ſame cavity, the effect produced on the lungs is the ſame as that of *hydrothorax*, but the dyſpnœa is not augmented by this proceſs, ſince the compreſſion of the lungs,

by the ſame quantity of matter internally, was nearly the ſame previouſly. (See EMPYEMA.) In a ſimilar way DROPSY *of the pericardium* compreſſes the lungs, and induces dyſpnœa: and BRONCHOCELE, or ſwelling of the thyroid gland, by externally compreſſing the *trachea*, or wind-pipe, ſometimes is accompanied with difficulty of breathing.

4. Whatever narrows and diminiſhes the cavity of the cheſt, neceſſarily likewiſe prevents the free expanſion of the lungs, and therefore produces the ſame effects on the reſpiration. Hence dyſpnœa is occaſioned by any large tumour, or fluid collection in the cavity of the abdomen, which preſſes the diaphragm upwards: ſuch as a copious ſecretion of fat in the *omentum*, and other parts, (ſee CORPULENCE); or ſchirrus, ſteatomatous, or other ſolid tumours; the gravid uterus, in the latter ſtages of pregnancy; *aſcites*, or DROPSY *of the belly;* TYMPANITES, or the diſtenſion of the abdomen by flatus; HYDATIDS, &c.

The dyſpnœa, occurring from theſe various cauſes, will require the different remedies for its relief, which are adapted to alleviate the diſeaſes, of which it is a part; and its nature will be diſcriminated by an accurate obſervation of the trains of ſymptoms, with which it may be accompanied, and which characterize thoſe diſeaſes, to which therefore we refer reſpectively.

DYSTŒCHIASIS, (from δυς, *bad*, ϛοιχος, *order*,) an irregular arrangement of the eyelaſhes.

DYSU'RIA, (from δυς, *difficultly*, and ȣρον, *the urine*,) a difficulty of diſcharging the urine.

DYTISCUS, in *Entomology*, a genus of COLEOPTERA, of the aquatic kind, diſtinguiſhed by having the antennæ ſetaceous; feelers ſix in number, and filiform; hind legs formed for ſwimming, fringed on the inner ſide, and nearly unarmed with claws. The ſpecies are inhabitants of ſtagnant waters, and from the peculiar ſtructure of their legs are able to ſwim extremely well; they are ſeldom obſerved on the wing, except in the night time, when they fly abroad in ſearch of other waters. The males have a horny concave flap or ſhield on the fore legs. The larvæ ſubſiſt on worms, aquatic inſects, and the fry of fiſh, the latter of which they deſtroy in vaſt numbers when firſt hatched from the egg. They ſeize their prey by means of their ſtrong forcipated jaws, and deſtroy it by ſucking out the moiſture. Linnæus included under the generic name of dytiſcus, the inſects which later writers comprehend under the two genera dytiſcus and hydrophilus. It is underſtood that Linnæus, aware of the impropriety of uniting thoſe two diſtinct natural families, intended afterwards to ſeparate them into two genera. Fabricius has ſince divided them; the character of his genus hydrophilus conſiſts in having four filiform feelers; the maxilla bifid; lip horny, and ſub-emarginate; and the antennæ clavated and perfoliated; and his dytiſcus ſix filiform feelers; the lip horny, truncated and entire, and the antennæ ſetaceous. Gmelin adopts the genus hydrophilus in his edition of the Syſtema.

Species.

LATISSIMUS. Black; margin of the wing-caſes dilated, with a yellow line. Linn. Fn. Suec. 768. Fabr. Spec. Inſ. *Dytiſcus ampliſſimus*, Müll. *Scarabæus aquaticus*, &c. Friſch.

Native of Northern Europe; the female ſulcated, male ſmooth and poliſhed.

COSTALIS. Black; band on the head; margin of the thorax, and coſtal ſtreak on the wing-caſes ferruginous. Fabr.

The head is black, and marked above the mouth each ſide with an impreſſed dot; wing-caſes ſmooth, with three remote punctured ſtriæ. In the female the colours more obſcure. Inhabits Surinam.

MARGINALIS. Olivaceous black; margin round the thorax and exterior margin of the wing-caſes yellow. Linn. Donov. Brit. Inſ. *Le Ditique noir à bordure*, Geoffr. *Hydrocantharus noſtras*, Ray.

Native of Britain, and other parts of Europe.

ROESELII. Greeniſh; ſhield, with the margin of the thorax and wing-caſes white, the latter glabrous, with three punctured ſtriæ. Fabr. *Dytiſcus diſpar*, Roſſo.

Inhabits waters in France.

PUNCTULATUS. Black; ſhield, margin of the thorax and wing-caſes white; wing-caſes with three rows of dots. Geoffr. *Dytiſcus punctatus*, Olivier.

Found in waters in England and Germany. The head is black with a brown frontal ſpot; body beneath black; legs teſtaceous.

LIMBATUS. Black; exterior margin of the thorax and wing caſes yellow; the latter very ſmooth. Fabr.

A native of China, in the Bankſian cabinet. The legs in this ſpecies are black, with the thighs of the anterior pair ferruginous; the abdomen black.

RUFICOLLIS. Black; front and thorax fulvous; wing-caſes with the exterior edge and ſtreak at the baſe teſtaceous, Fabr.

Inhabits Siam. The head fulvous with the margin black; wing-caſes glabrous; anterior legs yellow. Bankſian cabinet.

SULCATUS. Wing-caſes brown, with ten longitudinal villous grooves. Linn. Donov. Brit. Inſ. &c.

Native of Europe. The head is black; the mouth and eyes yellow; thorax black, with margin and character on the back yellow; margin of the wing-caſes yellowiſh; body beneath with the legs black.

FASCIATUS. Wing-caſes yellow, with two black bands and a black dot at the tip. Fabr.

Inhabits waters in India. The head is yellow; thorax yellow with a black dorſal line, and two ſmall red ſpots on the back; wing-caſes ſmooth with black future.

STRIATUS. Brown; thorax yellow, with an abbreviated black band; wing-caſes finely ſtriated tranſverſely. Linn.

Common in waters in Europe.

FUSCUS. Deep brown; margin of the thorax yellow; wing-caſes very finely ſtriated tranſverſely. Linn.

Found in waters in Europe. Reſembles ſtriatus, but is rather leſs. The head is black; wing-caſes impreſſed with two ſtriæ of dots; body black; legs ferruginous; thighs black.

LANIO. Black; mouth, two dots on the crown, and margin of the thorax rufous; wing-caſes brown. Fabr.

The head is brown; wing-caſes marked with two lines of impreſſed dots. Native of Madeira, deſcribed from the Bankſian cabinet.

CICURUS. Black, ſmooth; mouth, dot on the crown and margin of the thorax rufous; wing-caſes ſtriated with yellow. Fabr.

Found by Vahl at the Cape of Good Hope. The head is deep black, the ſpot between the eyes large; eyes ſilvery dotted with brown; thorax with a rufous dorſal line; body black.

VITTATUS. Black, ſmooth; wing-caſes with a yellow marginal fillet, and black ſpot at the baſe. Fabr.

Deſcribed from the Hunterian muſeum as a native of India. The head is black; mouth yellowiſh; thorax black; ſpot at the baſe of the wing-caſes large and oblong.

CINEREUS. Aſhy; margin of the wing-caſes and half the thorax yellow. Linn. *Le Ditique à corcelet à bandes*, Geoffr.

Common in waters in Europe. The head is black, mouth yellow, body beneath black with yellow ſpots on the ſides; legs black and yellow; antennæ yellow.

Griseus. Cinereous; wing-caſes with an indented black band. Fabr.

A native of India. The head is yellow with a tranſverſe frontal black ſpot; thorax grey with two tranſverſe black ſpots on the back; body beneath yellowiſh.

Sticticus. Paliſh; wing-caſes grey with an oblong impreſſed lateral ſpot of black. Linn.

Inhabits Africa. Wing-caſes marked with two very obſcure lines of brown dots.

10-Punctatus. Black and glabrous; wing-caſes with five white dots. Fabr.

Native of New Holland, deſcribed from the Bankſian cabinet. The antennæ are ſhort and ferruginous; head black with the front paliſh; thorax with a pale marginal ſpot each ſide; legs fuſcous.

Fuliginosus. Black; mouth and margin of the wing-caſes ferruginous; head immaculate. Fabr.

Inhabits waters in Germany. Body black; mouth and legs ferruginous.

Bipustulatus. Smooth, deep black; head with two red ſpots behind. Linn.

Native of the North of Europe. The red ſpots on the head are very minute.

Cinctus. Head and thorax yellow; wing-caſes black; margin entirely white. Fabr. An American ſpecies.

Bipunctatus. Deep black, thorax yellow, with two dots of black; wing-caſes varied with yellow and fuſcous. Fabr. Donov. Brit. Inſ.

Found in waters in Germany, and alſo in England. The head is black, the mouth ſubferruginous; the thorax yellow, with two black dorſal ſpots; wing-caſes ſmooth, glabrous, and fuſcous; and body black with ferruginous legs.

Fenestratus. Beneath ferruginous, above black; wing-caſes with two tranſparent dots. Fabr.

Deſcribed by Fabricius from a ſpecimen in the cabinet of Schulz, found in the vicinity of Hamburgh. The ſpecies has been ſince taken by Panzer in Auſtria, and in England. See Marſh. Ent. Brit. The head is black; mouth, antennæ, and two dots at the baſe ferruginous; thorax black with ferruginous margin.

Hybneri. Smooth, deep black; mouth and margin of the thorax ferruginous; wing-caſes with a marginal yellow line. Fabr.

Diſcovered in Germany by Hybner.

Stagnalis. Smooth, black; anterior part of the thorax ferruginous; wing-caſes brown with yellow lines. Fabr.

Inhabits ſame country as the former.

Transversalis. Deep black; anterior part of the thorax ferruginous; margin of the wing-caſes, and abbreviated ſtreak at the baſe yellow. Müll.

Found in Northern Europe.

Calidus. Deep black; wing-caſes as the baſe and exterior margin ferruginous; ſternum advanced and compreſſed. Fabr.

Native of South America, diſcovered by Smidt. The head is black; antennæ and mouth dull ferruginous; wing-caſes ſpeckled with yellowiſh.

Hermanni. Gibbous; head, thorax, and wing-caſes ferruginous at the baſe; wing-caſes truncated. Fabr. *Dytiſcus tardus*, Act. Berol.

The head is dull ferruginous, with the orbits of the eyes black; wing-caſes ſmooth; abdomen ferruginous with black tip. Found in Alſace.

Abbreviatus. Black; wing-caſes, with an abbreviated ſtreak at the baſe, and two dots yellow. Fabr.

Native of Germany.

Gibbus. Gibbous, ferruginous; wing-caſes black with pointed tips. Fabr.

Taken in ſtagnant water in Kiel by Schedſtedt. The head is ferruginous, and rather blackiſh at the baſe; the thorax ferruginous, with the poſterior edge black; wing-caſes ſmooth, the baſe and margin obſcurely ſpotted with ferruginous; body and legs ferruginous; and the abdomen black at the tip. There is a variety with the head and thorax entirely ferruginous.

Uliginosus. Deep black and gloſſy; antennæ, legs, and exterior edge of the wing-caſes ferruginous. Linn.

Found in waters in Europe.

Irroratus. Teſtaceous, ſpeckled with black; head and breaſt black. Fabr.

Inhabits America. The head is black, with teſtaceous mouth; thorax gloſſy, ſmooth, and ſhining; abdomen and legs teſtaceous.

Agilis. Black; mouth, thorax, margin of the wing-caſes, and the legs ferruginous. Fabr.

Native of Germany.

Maculatus. Black; thorax with pale band; wing-caſes black, ſpotted with white. Marſh. Linn. &c.

Found in waters in Europe.

Erythrocephalus. Ovate-oblong; head and legs rufous. Linn.

Native of Sweden and Denmark.

Planus. Ovate-oblong, flat, black; the ſhanks entirely rufous. Fabr.

Inhabits waters in Denmark. Lund.

Varius. Thorax rufous; wing-caſes ſtriated with cinereous and black. Fabr.

Diſcovered in Patagonia. The head is black; mouth and antennæ rufous; wing-caſes with numerous black ſtreaks, variegated with cinereous and black, and black ſuture. Cabinet of ſir Joſeph Banks.

Notatus. Fuſcous, with yellow thorax, and four black dots; wing-caſes with ſutural yellow ſtriæ. Fabr. *Dytiſcus notatus*, Bergſtr.

Native of waters in Germany.

Bicolor. Above deep black; wing-caſes ſtriated; beneath ferruginous. Fabr.

Found in Guinea.

Rufipes. Black; head and anterior part of the thorax ferruginous; wing-caſes black, with ferruginous ſtriæ. Fabr.

A ſmall ſpecies. The body is black; legs rufous.

Depressus. Thorax ferruginous, with two black dots at the baſe; wing-caſes fuſcous, with ferruginous ſpots.

Native of Sweden.

Dorsalis. Head, margin of the thorax, ſpot at the baſe of the wing-caſes, and unequal margin, ferruginous. Fabr.

Inhabits Kiel, and reſembles the following ſpecies.

Sexpustulatus. Deep black; head ferruginous; wing-caſes with three rufous ſpots; that at the baſe larger. Fabr.

A minute ſpecies found in the waters of Sweden.

Palustris. Smooth; wing-caſes with two lateral white blotches. Linn.

Native of Europe; the thorax is ferruginous.

Ovatus. Ovate, fuſcous; head and thorax ferruginous. Linn. *Dytiſcus ſphæricus*, Degeer.

An European ſpecies.

Picipes. Black; anterior part of the thorax ferruginous; wing-caſes lineated with yellow. Fabr.

This is a native of Germany. The head is black; the mouth ferruginous; body black; legs pitchy.

Lituratus. Black; wing-caſes with a pale blotch at the tip and baſe. Fabr.

An Italian inſect. The body is ſmall, depreſſed, and black; and the legs pitchy.

Chrysomelinus. Above cinereous, beneath black. Fabr.

A ſpecies of ſmall ſize, found in Germany.

Signatus. Black; head and thorax rufous, with black marks. Fabr.

Native of Patagonia, deſcribed by Fabricius from the Bankſian cabinet.

12-Pustulatus. Teſtaceous; wing-caſes black, with ſix teſtaceous ſpots. Fabr.

The head and antennæ are teſtaceous; the thorax teſtaceous; with the front and poſterior margin black.

8-Pustulatus. Black; front, ſides of the thorax, and four marginal dots on the wing-caſes, ferruginous.

A ſpecies of moderate ſize, found in Sweden.

Halensis. Black; thorax rufous; the baſe black in the middle, with a rufous dot; wing-caſes cinereous, ſtriated with black. Fabr. Hybner, &c.

A ſmall inſect, of a flattiſh form; the head rufous, and immaculate; black ſtreaks on the wing-caſes numerous, confluent, and approximate. The ſpecies inhabits Germany.

Rufifrons. Black; head, thorax, and margin of the wing-caſes, with a dot at the baſe ferruginous. Fabr.

Inhabits France.

Granularis. Black; wing-caſes with two yellowiſh lines; legs rufous. Linn. *Dytiſcus minimus*, Scop.

Native of Northern Europe.

Confluens. Black; head and thorax ferruginous; wing-caſes pale, with four black lines on the diſk. Fabr.

Inhabits Kiel in Germany. The legs in this ſpecies are yellowiſh.

Obliquus. Ferruginous; wing-caſes with five oblique brown ſpots. Fabr. *Dytiſcus laminatus*, Schulz.

The head, thorax, and body, ferruginous; the exterior fuſcous ſpot hamate; legs ferruginous.

Impressus. Oblong, yellowiſh; wing caſes cinereous, with ſtreaks of impreſſed dots. Fabr. *Dytiſcus impreſſoſtriatus*, Act. Hal.

Native of Europe. The body oblong, and tapering before.

Semipunctata. Oblong, ferruginous; head of the baſe black; wing-caſes duſky, at the tip punctured. Fabr.

Inhabits the Eaſt Indies, and is of a ſmall ſize.

Crux. Oblong, deep black; the whole body ferruginous with a black croſs. Fabr.

Found in Italy. This ſpecies is very ſmall, and gloſſy-black.

Geminus. Oblong, deep black; two dots on the thorax, two lines at the baſe, and dot at the tip white.

A minute ſpecies, found in Saxony.

Lineatus. Ferruginous; wing-caſes brown, with yellowiſh lines. Fabr.

Native of Alſace.

Inæqualis. Ferruginous; wing-caſes black, unequally ferruginous at the ſides. Fabr.

The head is ferruginous, with black orbits; thorax ferruginous; behind black; wing-caſes ſmooth and black; body beneath ferruginous.

Inhabits Sweden.

Pygmæus. Ferruginous, wing-caſes black; margin ferruginous. Fabr.

Native of Denmark. A ſmall ſpecies.

Reticulatus. Ferruginous; diſk of the wing-caſes black, reticulated with ferruginous. Fabr.

Small. Its native place unknown.

Crassicornis. Fuſcous; head and thorax yellow; antennæ thick in the middle. Müll. Zool. Dan.

The antennæ of this ſpecies are curious; the colour yellow; with the middle joints thickened, and apparently cleft; wing-caſes brown; with the baſe yellowiſh.

Flavipes. Flat, deep black; baſe of the wing-caſes, and the legs ferruginous. Fabr.

A ſmall ſpecies found in the Eaſt Indies.

Pictus. Ferruginous; thorax black; wing-caſes pale; ſuture and lateral ſpot black. Fabr.

Native of Germany. Hybner.

Nigrita. Deep black and immaculate; antennæ and legs ferruginous. Fabr.

Inhabits Germany. This ſpecies is very minute, broad, deep black, and immaculate; antennæ and legs large, and ferruginous.

Pusillus. Deep black; thorax and wing-caſes margined with white. Fabr.

Native of Italy.

Parvulus. Gibbous, black; thorax with a ferruginous band on the fore-part; wing-caſes with ferruginous ſpots. Fabr.

Inhabits Denmark, and is a ſmall ſpecies. The head is black; front and antennæ ferruginous; wing-caſes punctured with numerous rufous ſpots; body black; legs rufous.

Ovalis. Wing-caſes fuſcous, with pale lines; thorax ferruginous; abdomen deep black. Thunberg.

Native of Upſal.

Intricatus. Yellowiſh; above black-green; wing-caſes with excavated ſtriæ, edged and tipped with yellow; thorax yellow. Schall. Abh. *Dytiſcus ſemiſulcatus*, Müll.

Found in Saxony. In ſize and appearance reſembles the ſpecies punctulatus.

Versicolor. Fulvous; wing-caſes with oblong black ſpots. Schall.

Inhabits Saxony.

Schalleri. Black; head, thorax, and legs, ferruginous; wing-caſes fuſcous; outer margin rufous. Schall.

Native of Saxony, where it appears to be not very uncommon.

Laminatus. Fulvous; wing-caſes ſtriated with black dots; abdomen with two plates at the baſe. Schall.

A rare ſpecies, found in Saxony.

Aciculatus. Margin of the thorax and wing-caſes, and three ſpots on the abdomen yellow; wing-caſes with hollow decuſſating ſtriæ. Herbſt.

An inhabitant of India.

Fusculus. Black; wing-caſes ſmooth and brown; legs dull teſtaceous. Schranck.

Found in Upper Auſtria by Schranck, and by Geoffroy in France.

Oculatus. Head cinereous; poſterior margin, and two triangular ſpots in front black; wing-caſes piceous, edged with yellow. Herbſt.

Inhabits the environs of Berlin, and meaſures leſs than half an inch in length.

Ornatus. Black, beneath piceous; mouth, ſpots on the wing-caſes, and two round ones between the eyes, with the thorax and antennæ ferruginous. Herbſt.

Native of the vicinity of Berlin, and rather ſmaller than the laſt.

Unilineatus. Black; divided margin of the wing-caſes, and line half-way down yellowiſh. Schrank.

Inhabits Germany.

Dispar. Black, ſmooth; mouth yellow; wing-caſes variegated, and with the thorax piceous. Herbſt.

Inhabits Pruſſia, and with the ten following ſpecies has been met with in the vicinity of Berlin.

Sordidus. Black; antennæ ferruginous, with black tips; legs piceous; wing caſes deep-black. Herbſt.

Aquaticus. Cheſnut; eyes, wing-caſes, thorax, and belly black; margin of the thorax and band acroſs the middle cheſnut; wing-caſes obſcurely.

Parvulus. Beneath piceous; head and thorax fulvous; wing-caſes black; the margin and two ſtriæ half-way down yellow. Herbſt.

Piceolus. Beneath black; head and thorax cheſnut; wing-caſes piceous, with an obſcure fulvous margin. Herbſt.

Simplex. Black; head, margin of the thorax, and wing-caſes, with the antennæ and legs piceous. Herbſt.

Capricornis. Yellowiſh; belly and eyes black; middle joints of the antennæ much broader; wing-caſes brown with hollow dots. Herbſt.

Variolosus. Yellowiſh; beneath brown-yellow; eyes black; wing-caſes yellowiſh-green variegated. Herbſt.

Orbicularis. Black, ſmooth; antennæ and legs ferruginous; thorax and wing-caſes yellow-brown, pellucid with obſolete black ſpots. Herbſt.

Pedicularius. Smooth; beneath, thorax, and wing-caſes brown; head black; legs piceous. Herbſt.

Marginellus. Black; thorax edged with yellow; wing-caſes yellowiſh, regularly punctured with obſolete blackiſh ſpots. Herbſt.

Seminulum. Black, ſmooth; wing-caſes pellucid, cheſnut tipt with red; legs ferruginous. Herbſt.

Oblongus. Dull-black; head, antennæ, and legs ferruginous. Herbſt.

Zeylonicus. Black; thorax and wing-caſes margined with yellow; ſternum unarmed. Gronov.

Inhabits Ceylon.

Glaber. Brown; wing-caſes glabrous; belly and legs ferruginous. Forſt.

Native of England.

Nebulosus. Livid clouded with black; antennæ and legs ferruginous; belly black, edged with ferruginous. Forſt.

Inhabits England, and is the ſame ſize as the ſpecies uliginoſus.

Exsoletus. Livid; antennæ, head, thorax, abdomen, and legs pale. Forſt.

Inhabits England.

Danicus. Black: outer margin of the thorax, and the wing-caſes yellow. Müll.

This and the twenty following ſpecies are natives of Denmark.

Mülleri. Wing-caſes pointed, glabrous, and marked with two dots at the tip.

Lacustris. Yellowiſh; thorax edged with yellow; wing-caſes ſprinkled with dots.

Piceus. Black; body beneath, and margin of the thorax, and wing-caſes ferruginous.

Fœtiolus. Ferruginous; above black; exterior margin of the thorax and wing-caſes yellow.

Comma. Yellowiſh; above braſſy black; wing-caſes with the outer edge and line yellow.

4-Punctatus. Ferruginous; wing-caſes black, with a white band, ſpot, and four dots.

Biocellatus. Rufous; wing-caſes braſſy, with white ſpots diſpoſed longitudinally.

Erythromelas. Black; antennæ and tarſi rufous.

Roridus. Yellow; thorax with a black ſpot in the middle; wing-caſes ſpeckled with black

Rubripes. Black bronzed, poliſhed; antennæ, and legs, tip of the wing-caſes, and two dots ferruginous.

Quadricolor. Ovate, rufous; middle of the thorax black; wing-caſes brown; the lower margin and dot at the baſe yellow.

Cimicoides. Greeniſh; wing-caſes with a white lower margin, and a few white ſpots.

Velox. Ovate, rufous; wing-caſes with eight brown ſtriæ.

Nanus. Black; thorax yellow on the fore-part; wing-caſes with an abbreviated groove; legs piceous.

Rufifrons. Black; thorax yellow each ſide; wing-caſes yellow at the baſe and ſides; head and legs rufous.

Tricolor. Rufous; wing-caſes yellow, with a common black ſinuate ſpot on the diſk.

Exilis. Ovate, black; baſe of the antennæ and legs ferruginous; wing-caſes ſmooth.

4-Pustulatus. Black; wing-caſes with four longitudinal ſpots; legs rufous.

Flavicans. Black; above yellowiſh; thorax black behind; wing-caſes with black ſtriæ and ſpots.

Nævius. Fulvous, with ſcattered ſpots of black. Geoffr.

Native of France.

Fimbriatus. Brown; wing-caſes yellow anteriorly, and at the outer ſide. Geoffr.

Same country as the former.

4-Maculatus. Black; thorax yellow; wing-caſes ſmooth, with yellow ſpots and border. Geoffr.

This and the following ſpecies are natives of Europe.

Unistriatus. Black; ſpots, border, and ſingle ſtria on the wing-caſes yellow. Geoffr.

Bilineatus. Wing-caſes brown; body beneath fulvous; thorax fulvous with a double black line.

Seminiger. Body beneath entirely black; thorax and wing-caſes dull-brown, edged with rufous. Degeer.

Nubilus. Black; above with grey ſpots and ſtreaks; legs reddiſh-brown. Degeer.

Hyalinus. Greeniſh; wing-caſes hyaline with lateral whitiſh ſpots. Degeer.

Virescens. Teſtaceous, above greeniſh; outer edge of the thorax and wing-caſes yellow, the latter ſtriated; poſterior legs thicker. Degeer.

Testaceus. Teſtaceous, front and poſterior margin of the thorax brown, the middle livid; wing-caſes with a livid ſutural line and marginal ſpecks. Linn.

Niger. Black; margin of the wing caſes livid and longitudinally dotted with ferruginous.

Bilobus. Oblong-ovate; black; mouth bilobate; ſpot on the crown, thorax, ſutural line on the ſhells, baſe, and margin yellow.

Ferrugineus. Ferruginous; head and poſterior margin of the thorax black; anterior part of the two ſpots between the eyes, thorax, ſutural line and margin of the wing-caſes yellow.

Flavus. Yellow; mouth, two dots between the eyes, and outer margin of the thorax, and wing-caſes ferruginous.

Tricoloratus. Ferruginous; head, thorax, and wing-caſes ruſty brown; between the eyes two ferruginous ſpots; mouth and edges of the thorax and wing-caſes pale.

Denigratus. Black; mouth, two dots between the eyes, and abdomen yellow; the ſegments with a black ſpot each ſide; wing-caſes brown, with ſpecks, and exterior edges livid.

Unipunctatus. Black; antennæ ferruginous; wing-caſes with a teſtaceous dot each ſide behind the middle.

Biguttatus. Black; legs, tip of the abdomen, antennæ, mouth, two dots between the eyes, thorax, and wing-caſes teſtaceous; wing-caſes ſpotted with brown; thorax with two black dots in the middle.

8-Maculatus. Livid; thorax greeniſh; wing-caſes brown-livid, each with four connected livid ſpots and ſtreaks behind the middle.

Lividus. Livid; head narrow; thorax narrower before; wing-caſes with brown dots diſpoſed in rows.

4-Lineatus. Black; wing-caſes deeply punctured; browniſh with four yellowiſh branched lines, and outer margins; legs ferruginous.

Denticulatus. Piceous; mouth and antennæ ferruginous; ſhells glabrous, with pale bidentated band at the baſe; three ſpots and outer margin, with the anterior part of the thorax and legs pale.

Politus. Piceous, gloſſy, with paler wing-caſes. Marſh. Ent. Brit.

Inhabits England. The antennæ are rufo-ferruginous; head and thorax piceous, the latter paler at the ſides; legs ſame colour as the antennæ.

Humeralis. Head and thorax black; wing-caſes with an obſolete ferruginous ſpot on the exterior margin at the baſe. Marſh.

Found in England. The head and thorax deep-black and opake; antennæ filiform, black, and rufous at the baſe; ſpot at the baſe of the wing-caſes variable in ſize.

Melanocephalus. Black, and very glabrous; antennæ and legs piceous. Marſh.

Diſcovered by the biſhop of Carliſle in a garden at Ealing. The antennæ are filiform, black, and at the baſe rufous; legs rufo-piceous.

Ovalis. Ferruginous; wing-caſes fuſcous with ferruginous margin. Marſh.

This and the remaining ſpecies are natives of Britain.

Frontalis. Fuſcous; margin of the wing-caſes yellowiſh; head and thorax yellow ſpotted with black. Marſh.

Conspersus. Griſeous; head black, with two red ſpots behind. Marſh.

Parapleurus. Smooth, black; front and margin of the thorax ferruginous; margin of the wing-caſes yellow with black dots. Marſh.

Nigro-Æneus. Smooth, dull-braſſy; mouth and margin of the wing-caſes brown. Marſh.

Assimilis. Rufous; wing-caſes ſtriated yellow-griſeous, with ſix black ſpots. Marſh.

Interpunctatus. Rufo-ferruginous; wing-caſes with numerous black ſpots placed obliquely. Marſh.

Flavicollis. Rufous; wing-caſes yellow, teſtaceous, clouded with black; poſterior legs very long. Marſh.

Sparsus. Oblong-convex, ferruginous, and nitid; back of the thorax, and common diſk above dull; wing-caſes with ſcattered impreſſed dots. Marſh.

The antennæ, head, and legs rufous-ferruginous; thorax ſame colour, with ſometimes a fuſcous ſpot on the back; wing-caſes fuſcous, with paler margin; body beneath ferruginous.

DZAR Gurban, in *Geography,* a river of Ruſſian Tartary, which runs into the Irtiſch, 20 miles E. of Semipolatnoi.

DZIEWIENISZKI, a town of Lithuania, in the palatinate of Wilna; 30 miles S.S.E. of Wilna.

DZIWATOW, a town of Lithuania, in the palatinate of Wilna; 4 miles W. of Wilkomierz.

DZOHARA, in *Mythology*, an Arabian goddeſs, ſuppoſed to be the ſame with Venus.

DZOHL, an Arabian deity, ſuppoſed to be Saturn.

DZONMUREN, in *Geography*, a river of Ruſſia, which runs into Angara; 24 miles N. of Irkutſch.

DZURA, a Tartarian village of Ruſſian Siberia, in the government of Irkutſch. N. lat. 56° 4′. E. long. 124° 24′.

DZWINGROD, a town of Poland, in the palatinate of Kaminiec; 20 miles S.W. of Kaminiec.

E.

E, The fifth letter of the alphabet, and the ſecond vowel.

E is a letter that admits of ſome variety in the pronunciation, in moſt languages; whence grammarians uſually diſtinguiſh ſeveral E's, or kinds of E. In Engliſh, E has two ſounds; long, as, *ſcēne*, and ſhort, as *mĕn*. It is always ſhort before a double conſonant, or two conſonants, as *vĕx*, *blĕſſing*, *fĕll*, *dĕbt*, &c. E final has the peculiar quality of lengthening the preceding vowel, as *can*, *cane*; yet there are ſome inſtances in which it has not this effect; as *gŏne*, *gĭve*, *lĭve*, &c. It ſerves alſo to modify the foregoing conſonants; as *ſince*, &c. It is alſo ſounded at the end of proper names, as *Penelope*, and in monoſyllables that have no other vowel, as *the;* but in every other caſe it is mute. It was formerly uſed much more generally at the end of words than at preſent, and had probably a ſoft ſound like the French E feminine; and afterwards was made vocal or ſilent in poetry, as the verſe required, till at laſt it became univerſally ſilent. Camden calls it the ſilent E. Johnſon.

The Greeks have their ſhort and long E, *viz.* ε and η, epſilon and eta. The Greek η, or H, *eta*, or *ita*, was no original letter; but was added to the alphabet in after times. Of this we have proofs ſtill extant in the ancient monuments; particularly the Farneſe columns, brought to Rome from the Via Appia, where the *epſilon*, E, is uſed in lieu of the H: *e.gr.* ΔΕΜΕΤΡΟΣ ΚΟΡΕΣ, for ΔΗΜΗΤΡΟΣ ΚΟΡΗΣ. This letter is ſaid to have been added by Simonides.

The pronunciation of the η ſeems to have been varied; it having been ſometimes the ſame with the Latin E, ſometimes with I. Terentianus aſſures us of the former; and the Greeks themſelves for many ages have only uſed the latter. From the name of an animal of the Lutra ſpecies, denominated ΕΝΗΥΔΡΙΣ, that occurs on the Præneſtine pavement, the η, *eta*, evidently ſerves as an aſpirate to the υ, *upſilon*; and if this be authentic, the late learned profeſſor Porſon concluded, that this inſcription affords an additional proof that the η, *eta*, was anciently uſed and pronounced as we do our H. In reference to this ſubject, Mr. John Jones, author of the Greek grammar, &c. obſerves, that ſuch letters were formerly aſpirates, as they derived their origin from the ſtrong gutturals, which the Greeks borrowed from the Oriental tongues; and hence he traces the origin of the Æolic digamma. (See the letter F.) It is the tendency of every guttural, ſays this ingenious writer, when become habitual, to ſoften down in the rapidity of utterance into a mere aſpirate; of this he has given ſeveral inſtances. He adds, that the guttural, when ſoftened into an aſpirate, is apt to be dilated into a long vowel. Hence the reaſon why η, *eta*, in the ancient Greek, ſeems to have been accompanied with an aſpirate, as in ἧπαρ, though formerly as in the ΕΝΗΥΔΡΙΣ on the Præneſtine pavement, it expreſſed the full power of H, as profeſſor Porſon has remarked. On the ſame principle that a guttural ſoftened into an aſpirate, the aſpirate often melts into a gentle breathing, or becomes in pronunciation quite quieſcent. See Dr. Adam Clarke's Narrative of the laſt illneſs, &c. of profeſſor Porſon, p. 12, &c.

The Latins have an opener E, called *vaſtius;* ſuch was the ſecond E, in the word *here*, *maſter*; and another cloſer, as that in the adverb *here*, *yeſterday*. This latter E they frequently uſed promiſcuouſly with I. Thus for *here*, they wrote *heri;* and, in diverſe places, we meet with *ſibe*, *quaſe*, &c. for *ſibi*, *quaſi*, &c.

The Roman E was likewiſe ſometimes written, by corruption, *æ*; for which reaſon, F. Hardouin takes that medal of Gallienus, GALLIENÆ AUGUSTÆ, not to be any ſatirical medal, as others have imagined; nor to be a dative feminine, but a vocative maſculine, *Galliene Auguſte*, wrote with the *æ*.

It has been much diſputed how the Latins render the η in their language. The common opinion is, that they render it by an E; as in Δημητριος, Βητα, Ημερα, Θησευς, Θησαυρος, &c. which they rendered *Demetrius*, *Beta*, *Hemera*, *Theſeus*, *Theſaurus*, &c. Though there are perſons exceedingly well verſed in antiquity, who hold that they pronounced it like an *i*. Lud. de Dieu, one of the moſt learned grammarians of his age, obſerves as much in his animadverſions on Geneſis, vi. 24. Adding, that it is for this reaſon, that the Hebrews, *e. gr.* the paraphraſt Jonathan, expreſſes it by a *Hhirek*; μηϛαρ, מִסְטָר. J. Rod. Wetſtein proves the ſame in his learned oration on the true pronunciation of the Greek tongue, from an infinity of inſtances. To this purpoſe he cites a manuſcript Pſalter of the eighth century, where all the η's are expreſſed by *i*'s. In effect Wetſtein ſhews, not only that the Latins pronounced and wrote it as an *i*, which might happen from its being ſo eaſily confounded in writing with an *i*; but alſo that they rendered it by an *æ*, and *ai*; that it was often uſed for Υ and Ε Ι; and that in the time of Plato this letter has a kind of intermediate ſound between the ε and ι. See that author, and Voſſius de Idolol. lib. ii. cap. 16.

The French have, at leaſt, ſix kinds of E; the firſt pronounced like *a*; as in *emporter*, *orient*, &c. The ſecond, a final mute, in the laſt ſyllable of divers words not pronounced at all; as in *bonne*, *donne*, &c. The third, an imperfect mute, pronounced ſo much like the diphthong *ea*, &c. as in *je*, *de*, *te*. The fourth *e ferme*, or *e maſculine*, marked at the ends of the words with an accent *é*. The fifth is *e ouvert*, or *long e*, having the ſame ſound with *ai*, as in *mere*, *feſte*, &c. In the middle of words it is ſometimes marked with a circumflex, and in the end, with an accent *é*. The ſixth is an intermediate *e*, between the *ouvert* and *ferme;* as in *cabaret*, *lettre*, &c. Some add a ſeventh kind of *e*, not reducible to any of the former, as that in *grammarien*, *hiſtorien*, &c. And others admit of only three kinds, *viz.* the mute, open, and ſhut; but they make variations therein, which amounts to the ſame thing.

As to the figure of the letter E, we borrow it from the Latins, who had it from the Greeks, and they from the Phœnicians, by Cadmus, who firſt brought it them. Now the Phœnicians had the ſame characters with the Hebrews. Accordingly, the form of the ancient Hebrew *He* was the ſame with that of our E, as may be ſeen in the Hebrew medals, and the Jeſuit Souciet's Diſſertation thereon, p. 143. All the difference between them conſiſts in this, that the Hebrews, reading from right to left, turn their letters that way; whereas the moderns, reading from left to right, write their letters accordingly.

The little *e* was formed of the great one, by writing it faſt, and making the croſs ſtrokes at top and bottom without taking pen off paper, and then adding the ſtroke in the middle.

E, on the keys of an organ, or harpſichord, denotes the tones, *E*, *mi*, *la*.

On the compaſs in ſea-charts, &c. it makes the eaſt point, or wind. E. eaſt; E.S.E. eaſt-ſouth-eaſt; N.E. north-eaſt, &c.

In the calendar, E makes the fifth of the Dominical letters.

Among authors, *e. gr.* ſtands for *exempli gratia*, *for inſtance*. In ſeveral dictionaries we find it noted, that the letter E, among the ancients, was a numeral letter, ſignifying 250, according to the verſe.

> "E quoque ducentos & quinquaginta tenebit."

But it has already been obſerved, that this uſe of numeral letters was unknown among the earlieſt people. Iſidore Hiſpalenſis, an author of the ſeventh century, ſays as much in expreſs terms, in the firſt book of his Origines, cap. 3. In effect, it was firſt introduced in the times of barbariſm and ignorance.

EACHARD, John, in *Biography*, was deſcended from a reſpectable family in the county of Suffolk, and born about the year 1636. He finiſhed his ſtudies at Catherine hall, Cambridge, where he took his degrees, and was admitted fellow of his college. This was in the year 1658, and in 1670 he publiſhed, but without his name, a treatiſe which paſſed through many editions, entitled, "The Grounds and reaſons of the contempt of the Clergy and Religion enquired into; in a letter to R. L." This work was attacked by Dr. John Owen, on account of the author's repreſentations and uncandid remarks levelled at diſſenting miniſters. In the following year he publiſhed "Mr. Hobbes's State of Nature conſidered, in a dialogue between Philautus and Timothy, &c." In a ſhort time afterwards he publiſhed ſome further remarks on the writings of Mr. Hobbes, in "A ſecond Dialogue between Philautus and Timothy." Mr. Eachard was a powerful opponent when his weapons were thoſe of wit and raillery, but his talents were ill calculated for ſerious argument, which cauſed the remark of Dr. Swift, "I have," ſays he, "known men happy enough at ridicule, who upon grave ſubjects were perfectly ſtupid; of which Dr. Eachard of Cambridge, who writ 'The contempt of the Clergy,' was a great inſtance." Mr. Eachard was choſen maſter of Catherine hall in the year 1675, and in the following year he was created doctor of divinity by royal command. He died in the year 1697, having twice ſuſtained the honourable office of vice-chancellor of the univerſity. A complete edition of his works was publiſhed in 1774, in three vols. 12mo. Biog. Britan.

EADISH. See Eddish.

EAGER Wine. See Wine.

EAGLE, in *Architecture*, is a figure of that bird anciently uſed as an attribute, or cognizance of Jupiter, in the capital and friezes of the columns of temples conſecrated to that god.

EAGLE, *Aquila*, in *Aſtronomy*, is a conſtellation of the northern hemiſphere, having its right wing contiguous to the equinoctial.

For the ſtars in this conſtellation, ſee Aquila and Constellation.

There are alſo three ſeveral ſtars, particularly denominated among the Arab aſtronomers; *Naſr*, *i. e.* eagle. The firſt, *Naſr Sohail*, the Eagle of Canopus, called alſo *Sitarch Jemen*, the ſtar of Arabia Felix, over which it is ſuppoſed to preſide; the ſecond *Naſr Althair*, the Flying Eagle; and the third *Naſr Alvake*, the Reſting Eagle.

Eagle, in *Heraldry*, is the ſymbol of royalty, as being, according to Philoſtratus, the king of birds; and for that reaſon dedicated, by the ancients, to Jupiter.

The eagle is the arms of the emperor, the king of Poland, &c. It is accounted one of the moſt noble bearings in heraldry, and, according to the learned in that art, ought never to be given, but in conſideration of ſingular bravery, generoſity, &c. On which occaſions, either a whole eagle, or an *eagle naiſſant*, or only the head, or other parts, agreeable to the exploit, may be granted.

The eagle is ſometimes repreſented with one head, and ſometimes with two, though never more than one body, two legs, and two wings opened, or ſtretched out, in which poſture it is ſaid to be *ſpread* or *diſplayed:* ſuch is that of the empire, which is blazoned a ſpread eagle, ſable, diademed, langued, beaked, and membered, gules.

The reaſon why eagles are generally given in heraldry diſplayed, is partly, becauſe, in that poſture, they fill up the eſcutcheon better, and partly, becauſe it is imagined a poſture natural to the eagle, when it plumes its feathers, or faces the ſun. However, there are eagles borne in other poſtures; and ſome monſtrous ones, with human, or wolves, heads, &c. The late authors only ſay *diſplayed* to expreſs the two heads; and ſay *an eagle*, without any addition, when it has but one. The kingdom of Poland bears gules, an eagle argent, crowned and membered, or.

The eagle has been borne, by way of enſign, or ſtandard, by ſeveral nations. The firſt who ſeem to have aſſumed the eagle, were the Perſians, according to the teſtimony of Xenophon. Afterwards it was taken by the Romans; who, after a great variety of ſtandards, at length fixed on the eagle, in the ſecond year of the conſulate of C. Marius; till that time, they uſed, indifferently, wolves, leopards, and eagles, according to the humour of the commander.

Several among the learned maintain, that the Romans borrowed this cuſtom from Jupiter, who had appropriated the eagle as his own badge, in commemoration of its ſupplying him with nectar, while he lay concealed in Crete, for fear of being devoured by his father Saturn. Others hold that they borrowed it from the Tuſcans, and others from the Epirots. The Roman eagles, it muſt be obſerved, were not painted on a cloth, or flag; but were figures in relievo, of ſilver or gold, borne on the tops of pikes; the wings being diſplayed, and frequently a thunderbolt in their talons. Under the eagle, on the pike, were piled bucklers, and ſometimes crowns. Thus much we learn from the medals. See Feſchius in his Diſſert. de Inſignibus. And Lipſius, De Militia Romana, lib. iv. dial. 5.

Conſtantine is ſaid to have firſt introduced the eagle with two heads, to intimate, that though the empire ſeemed divided, it was yet only one body. Others ſay, that it was Charlemagne, who, reſuming the eagle as the Roman enſign, added to it a ſecond head; but that opinion is deſtroyed, by an eagle with two heads, noted by Lipſius, on the Antonine column; as alſo by the eagle's only having one head on the ſeal of the golden bull, of the emperor Charles IV. The conjecture, therefore, of F. Meneſtrier appears more probable, who maintains, that as the emperors of the Eaſt, when there were two on the throne at the ſame time, ſtruck their coins with the impreſſion of a croſs, with a double traverſe, which each of them held in one hand, as being the ſymbol of the Chriſtians; the like they did with the eagle in their enſigns; and, inſtead of doubling their eagles, they joined them together, and repreſented them with two heads: in which they were followed by the emperors of the Weſt.

F. Papebroche wiſhes, that this conjecture of Meneſtrier were confirmed by ancient coins; without which, he rather inclines to think the uſe of the eagle with two heads to be merely arbitrary; though he grants it probable that it was firſt introduced on occaſion of two emperors in the ſame throne.

The eagle on medals, according to M. Spanheim, is a ſymbol of divinity and providence; and, according to all other antiquaries, of empire. The princes, on whoſe medals it is moſt uſually found, are the Ptolemies and the Seleucides of Syria. An eagle with the word "conſecratio," expreſſes the apotheoſis of an emperor.

EAGLE, *Aquila*, Αετος, in *Ornithology*. See FALCO.

EAGLE-*Flower*, in *Botany*. See BALSAMINE.

EAGLE, *Black*, in *Heraldry*, was an order of knighthood inſtituted in 1701, by the elector of Brandenburgh, on his being crowed king of Pruſſia.

The enſign of this order is a gold croſs of eight points, enamelled blue; in the centre of which are the letters F. R. in cypher; and in the four angles the eagle of Pruſſia, enamelled black. On collar-days it is worn pendent to a rich collar of gold, compoſed of round pieces of gold, each enamelled with four cyphers of the letters F. R.; in the centre of the piece is ſet a large diamond, and over each cypher a regal crown, richly chaſed, intermixed with eagles diſplayed, enamelled black alternately, and holding in their claws thunderbolts of gold. The croſs is worn on ordinary days pendent to a broad orange-coloured ribbon, which is paſſed ſcarf-wiſe from the left ſhoulder to the under part of the right arm. The knights alſo have, embroidered on the left breaſt of their coats and upper garments, a ſtar of ſilver, ſhaped like that of the enſign of the order; and in its centre is an eagle diſplayed black, holding in his dexter claw a chaplet of laurel, and in the other a thunderbolt, with this motto round it; *Suum Cuique.*

EAGLE, *Red*, a very ancient order in Bareith, of which the margrave is ſovereign. It is eſtabliſhed both for military and civil perſons, but is generally conferred on officers who have obtained the rank of lieutenants-general. The badge is a medal of gold, of a quadrangular form, enamelled white, upon which is an eagle diſplayed red. It is worn ſcarf-wiſe, pendent to a broad red watered ribbon, edged with yellow.

EAGLE, *White*, an order of knighthood, inſtituted in Poland by Uladiſlaus V. ſurnamed Lokter, in the year 1325, on occaſion of the marriage of his ſon Caſimir, to the princeſs Ann, daughter of Gedimin, duke of Lithuania. This order was revived in 1705, by Frederic Auguſtus I, king of Poland, in order to conciliate the principal nobility, ſeveral of whom inclined to Staniſlaus. The badge of this order, worn by the knights, is a gold croſs of eight points, enamelled gules, bordered argent, cantoned with flames of fire; charged in the middle with a white eagle, bearing on his breaſt a croſs of the ſame, environed with the arms and trophies of the electorate of Saxony; and on the other ſide is a cypher of the king's name, with this motto, PRO FIDE, REGE, LEGE. The whole ſurmounted with a ſmall crown of diamonds. The collar is compoſed of golden eagles, crowned and chained. On all days, beſides ſtate-days, the knights wear the croſs at the extremity of a broad blue ribbon ſcarf-wiſe. They have it alſo embroidered on the left ſide of their cloaks and coats.

EAGLE *Iſland*, in *Geography*, an iſland in the Atlantic, near the weſtern coaſt of Ireland, and county of Mayo. N. lat. 54° 17′. W. long. 9° 54′.

EAGLE *Iſland*, an iſland on the N.E. coaſt of New Holland, ſo called by lieutenant Cook, in 1770. It is low and ſandy, and covered with trees; and abounds with birds, chiefly ſea-fowl. An eagle's neſt was found upon it, and alſo that of another bird, of an enormous ſize, built with ſticks upon the ground, and no leſs than 26 feet in circumference, and two feet eight inches high. The Indians viſit this iſland, probably to eat turtle, many of which were obſerved upon the iſland. N. lat. 14° 40′. W. long. 214° 30′.

EAGLE-*Owl*, in *Ornithology*. See STRIX.

EAGLE, *Sea*, in *Ichthyology*. See RAJA *Aquila*.

EAGLE-*Stone*, in *Natural Hiſtory*. See ÆTITES.

EAGLES, in *Coinage*, a name found very frequently in the ancient hiſtories of Ireland, and uſed to expreſs a ſort of baſe money that was current in that kingdom in the firſt years of the reign of Edward I., that is, about the year 1272. There were, beſides the eagles, lionines, roſades, and many other coins of the ſame ſort, named according to the figures they were impreſſed with. Simon's Hiſt. Coins.

The current coin of the kingdom was at that time a compoſition of copper and ſilver, in a determined proportion, but theſe were ſo much worſe than the ſtandard proportion of that time, that they were not intrinſically worth quite half ſo much as the others. They were imported out of France, and other foreign countries. When this prince had been a few years eſtabliſhed on the throne, he ſet up mints in Ireland for the coining of ſufficient quantities of good money, and then decried the uſe of theſe eagles, and other the like kinds of baſe coins, and made it death, with confiſcation of effects, to import any more of them into the kingdom.

EAGLET, or EAGLON, a diminutive of eagle, properly ſignifying a young eagle.

The eagle is ſaid to prove his eaglets in the brightneſs of the ſun; and if they ſhut their eye-lids, he diſowns them. In *Heraldry*, when there are ſeveral eagles on the ſame eſcutcheon, they are called eaglets.

EAHEINOMAUWE, in *Geography*, the moſt northern of the two iſlands of which Staaten Land, or New Zealand, conſiſts; the other being called Tovy Poenammoo. Theſe iſlands are ſituated in the South ſea, between the latitudes of 34° and 48° S., and between the longitudes of 181° and 194° W.; and they are ſeparated from each other by a ſtrait, or paſſage, which is about four or five leagues broad. Eaheinomauwe has a much better appearance than Tovy, or Tavai, Poenammoo; for though it is not only hilly but mountainous, even the hills and mountains are covered with wood, and every valley has a rivulet of water. The ſoil in theſe vallies, and in the plains, many of which are not overgrown with wood, is in general light, but fertile. Thoſe who viſited it with lieutenant Cook in 1770, were of opinion, that all kinds of European grain, plants, and fruit, would flouriſh here in the utmoſt luxuriance. The winters are ſuppoſed, from the ſtate of vegetation, to be milder than thoſe in England, and the ſummer was experienced not to be hotter, though it was more equally warm. The country appears to be capable of ſupplying, in great abundance, not merely the neceſſaries, but the luxuries of life. In Eaheinomauwe there were ſeen no quadrupeds but dogs and rats, the latter of which are very ſcarce. The ſpecies of birds are not numerous; and of theſe no one kind, except, perhaps, the gannet, is exactly the ſame with thoſe of Europe. Inſects are not more plentiful than birds. But every creek of the ſea ſwarms with fiſh, which are not only wholeſome, but equally delicious with thoſe in our part of the world; the higheſt luxury of this kind, with which the Engliſh were gratified, was the lobſter, or ſea cray-fiſh. The foreſts in this iſland are of vaſt extent, and are full of the ſtraighteſt, cleaneſt, and largeſt timber Mr. Cook and his friends had ever ſeen. The plants were very various, as well as numerous. Of about 400 ſpecies, there were not many which have hitherto been deſcribed by botaniſts. There is one plant, which ſerves the natives inſtead of hemp and flax, and which excels all that are applied to the ſame purpoſes in other countries. For other particulars, we refer to the article New Zealand.

EALDERMAN, or Ealdorman, among the Saxons, was of like import with earl among the Danes. Camden's Britan. p. 107.

The word was alſo uſed for an elder, ſenator, or ſtateſman. Hence, at this day, we call thoſe aldermen, who are aſſociates to the chief officer in the common-council of a city, or corporate town. See Alderman.

EA-OO-WEE, or Middleburg, in *Geography*, one of the Friendly iſlands, in the South Pacific ocean, firſt diſcovered by Taſman in January 1642-3, and by him called Middleburg. This iſland, and Ton-ga-ta-bu, or Amſterdam, are ſituated between the latitude of 21° 29′ and 21° 3′ S., and between the longitude of 174° 40′ and 175° 15′ W. Ea-oo-wee, which is the ſouthernmoſt, is about 10 leagues in circuit, and of a height ſufficient to be ſeen 12 leagues. The ſkirts of this iſle are moſtly taken up in the plantations, and eſpecially the S.W. and N.W. ſides. The interior parts are but little cultivated, though, ſays captain Cook, very fit for cultivation. The want of it, however, greatly added to the beauty of the iſle; for here are, agreeably diſperſed, groves of cocoa-nut and other trees, lawns covered with thick graſs, here and there plantations and paths leading to every part of the iſland, in ſuch beautiful diſorder, as greatly enlivens the proſpect. The anchorage, named by Cook "Engliſh road," (being the firſt who anchored there,) is on the N.W. ſide in S. lat. 21° 20′ 30″. The bank is a coarſe ſand, extending 2 miles from the land, on which are from 20 to 40 fathoms water. The ſmall creek before it affords convenient landing for boats, at all times of the tide; which here, as well as at the other iſlands, riſes about 4 or 5 feet, and is high water on the full and change days about 7 o'clock. Van Diemen's road, where captain Cook anchored, is under the N.W. part of the iſland, between the moſt northern and weſtern parts. This iſland, as well as Ton-ga-ta-bu, is guarded from the ſea by a reef of coral rocks, which extends from the ſhore about 100 fathoms. The produce and cultivation of this iſle is the ſame as at Ton-ga-ta-bu or Amſterdam (which ſee); with this difference, that a part only of the former is cultivated, whereas the whole of the latter is. The lanes or roads neceſſary for travelling are laid out in ſo judicious a manner, as to open a free and eaſy communication from one part of the iſland to the other. Here are no towns or villages, the houſes being moſtly built in the plantations, which are neatly conſtructed. The floor is a little raiſed, and covered with thick ſtrong mats; the ſame ſort of covering ſerves to encloſe them on the windward ſide, the other being open. Before moſt of them are little areas, which are generally planted round with trees, or ſhrubs of ornament, whoſe fragrancy perfumes the air in which they breathe. Their houſehold furniture conſiſts of a few wooden platters, cocoa-nut ſhells, and ſome neat wooden pillows, ſhaped like four-footed ſtools or forms. Their common clothing, with the addition of a mat, ſerves them for bedding. For further particulars we refer to the article Friendly *Iſlands*.

EAR, in *Anatomy* and *Phyſiology*, the organ which, by a ſenſation peculiar to itſelf, renders us capable of being affected by ſound. By this term we underſtand, therefore, not only that part which is prominent from the head, but the whole of the organ of hearing. Adapted in an eminent degree to the purpoſes it is deſigned to execute, it offers an inviting ſubject to ſuch as are diſpoſed to inveſtigate the minute mechaniſm of an organ, which contributes remarkably to ſome of our moſt exquiſite and refined enjoyments. Whoever has witneſſed and attentively obſerved the diſtreſſing effects ariſing from a loſs, or diminution of its ſenſibility, will readily acknowledge that ſuch deprivation throws us at a diſtance from our fellow-creatures, and, in the preſent ſtate of ſociety, renders us more ſolitary beings than the loſs of ſight itſelf. Though the rapid glance of the eye, the immenſe diſtance to which it enables us to carry our perceptions, and the extended circle it embraces, have given riſe to ſome of our moſt pleaſurable and magnificent ſenſations; though it has brought us acquainted with objects which ſeemed ever placed far beyond our reach; ſtill the more humble ſenſe which we are now conſidering, the more confined dominion of the ear, has contributed moſt efficiently to the every-day happineſs of life. It enables us to hold communication with our fellow-creatures; to improve and exalt our underſtandings by the mutual interchange of ideas; and thus to increaſe the circle, not only of our phyſical, but of our moral relations. The charms of eloquence, the pleaſure reſulting from the concord of ſweet ſounds, inexplicable perhaps as it remains, are other ſources of intellectual enjoyment, which contribute to place this ſenſe among the moſt delightful as well as the moſt important we poſſeſs. Whatever, therefore, by explaining its ſtructure, or examining its functions, can lead us to improve its natural, or reſtore its diſordered ſenſibility, cannot be a ſubject of trivial moment. Our more immediate object is to conſider the human ear, obſerving only, that the ſtructure of the organ, being ſuited to one great end, is in all caſes fundamentally the ſame; its different forms and varieties depending on the peculiar economy and abode of each individual creature. There are ſome parts, eſſential to the perception of ſound, which are always preſent, be the ſenſe of hearing delicate or imperfect; there are others which are found only in particular claſſes of animals. In thoſe which approach neareſt to the human form, it differs from that of men only in the relative ſize of the different parts. The ſenſe of hearing is ſtill perhaps the ſame, the propagation of ſound is ſubject to the ſame laws; and we muſt look for the variety of effect, not only to the organs, but to the centre to which all our ſenſations tend.

It will be found convenient to make ſome leading diviſions of the ſubject, under which we may arrange our ideas in more diſtinct order, and from which we may ſet forth with greater freedom, when about to examine the powers and ſtructure of the ear. The neceſſity of ſuch arrangement will be obvious to any one who wiſhes to diſtinguiſh between poſitive truths, and the probable application of them, to the elucidation of different phenomena. With this view, we ſhall, in the firſt place, lay before the reader what may be regarded as demonſtrable facts, and then endeavour to explain the application of theſe, as far as it can be made out by reaſoning and probable conjecture. Whatever may be thought of ſuch inferences, the ſeries of facts will remain the ſame. They will ever form a ſolid baſe, however light and imperfect the ſuperſtructure raiſed on it by opinion; however rapidly it may vaniſh before the illuminating glance of ſome happier genius, or fall at the touch of more patient and inductive reaſoning. Theſe facts conſiſt in a knowledge of the ſtructure of the ear in different animals; in the power poſſeſſed by them of perceiving ſounds; and further, in the degree of that power enjoyed by man. Of the manner in which this faculty of diſtinguiſhing ſound is produced, we know but little; and in our endeavour to account for it, we muſt in many inſtances take our leave of poſitive truths, and be contented to truſt ourſelves to the more doubtful guidance of analogical reaſoning and rational conjecture. There is a barrier placed in our road, beyond which nothing is clearly ſeen: if we paſs it, the chance is that we ſtumble, if we do not fall. We have very little knowledge of the impreſſions which ſounds make on other animals. We know that they hear; and in many inſtances we ſcarcely know more. If we could determine that there was a difference in the ſenſibility, and that this diverſity was dependant on one particular ſtructure of the organ, as compared with another, we ſhould gain an important point, and be able to draw ſome probable concluſions as to the part which each portion of the organ bears in tranſmitting and modifying ſound. We know the degree of perfection in the organ as it exiſts in man; ſo we know that many animals, who come near him in its ſtructure, poſſeſs powers of nearly equal extent. We are convinced, moreover, that animals, with one part of the organ only out of many, are ſtill capable of being affected by ſounds. If, in addition to this, we knew the intermediate gradations of the faculty, as enjoyed by ſucceſſive claſſes, when more and more parts are ſuperadded to this ſimple ſtructure; if we could preciſely determine the degree of perfection proportional to each alteration, and improvement in the apparatus, the path would be clear, the barrier thrown down: we ſhould deduce known effects from demonſtrable cauſes; we ſhould go from what is known to what is unknown, without the riſk of miſſing our way; we ſhould be enabled to aſſign the poſitive importance of each piece of the apparatus, and mark out clearly its relative functions. As theſe, however, are at preſent unknown, and, for the cauſes mentioned, likely to remain ſo, we muſt be contented with the endeavour to explain the phenomena, as we obſerve them in the more complicated ſtructure, as they occur in creatures who can give an account of their ſenſations: in ſhort, as we notice them in man. And if we conſider the difficulty of accounting for the endleſs variety of the effects of ſound on the human ear, where our knowledge is the moſt complete, we ſhall be the leſs diſpoſed to examine it in other animals, where the variety may be equal, but where our inductions have nothing better to reſt on than conjectural ſuppoſition We ſhould have to inveſtigate an obſcure ſubject in creatures, who could not convey to us any ideas of their ſenſations, or, at leaſt, any ſuch preciſe ideas as would lead us to well-founded inferences. The reſult of all that we can at laſt draw from our inveſtigation would be this, that in the different gradations we obſerve a variety of organs, of which ſome parts are conſtant, others found only in particular claſſes, and differing in their conformation even in theſe. The obvious inference is, that the part univerſally found is the eſſential means by which we perceive ſounds; that the additional apparatus is intended to facilitate its tranſmiſſion, or to modify its action. Having gained this ſtep, we again are ſtopped, totally unable to explain the mode by which this part ſo conſtantly met with is enabled to excite in us the idea of a ſound. All that we know is this, that there are ſome ideas, which have admittance only through one ſenſe, which is peculiarly adapted to receive them; and if the nerves, which convey them from without to the brain, are ſo diſordered as not to perform their functions, there is no other way in which they can be perceived by the underſtanding. In this paucity of facts, we muſt make the moſt of thoſe we poſſeſs; and for the better underſtanding them, ſhall regard them as they concern the ſtructure of the ear, or as they are connected with its power of diſtinguiſhing the properties of ſounds. This arrangement leads us to conſider the method we have choſen to follow, in analyſing the functions of the organ. We firſt take the ear to pieces, if I may uſe the expreſſion, and deſcribe the delicate and admirable ſtructure of it in man, beginning from without, and proceeding till we arrive at the immediate ſeat of ſenſation: we next give the hiſtory of its powers, as aſcertained by obſervable phenomena: and, laſtly, we *endeavour* to connect theſe truths, to trace the progreſs of ſound as affecting the different portions of the ear, and to determine the ſum of its action on each; to notice the manner in which the idea of ſound is admitted to the brain, and explain the mode in which it becomes modified, during its propagation from without, by the mechanical action of the tranſmitting parts; and to aſſign the relative importance of each part, by noticing the effects produced by an alteration or deficiency of them in man, and by conſidering their conformation in other animals. This comparative view will extend, however, only ſo far as may be neceſſary to aſſiſt us in explaining phenomena.

Before we can attempt to explain the manner in which the perception of ſound is accompliſhed in man, it will be requiſite to give a deſcription of all the parts deſtined to collect, tranſmit, and modify the pulſes of it, as well as of thoſe on which they are finally impreſſed. And in thus conſidering the ear as an organ of ſenſe, we ſhall include all the parts which are in anywiſe ſubſervient to its functions, and which, in conjunction with the ear, go to form the whole of the organ of hearing. For the convenience, however, of anatomical purpoſes, it will be neceſſary to make a diviſion of the ear into different portions; a diviſion which, though an arbitrary one, will greatly facilitate the deſcription. Of the diviſions in common uſe, we ſhall adopt, as the moſt natural, that which makes three portions of the ear: the firſt including the *external ear*, or *auricle*, and the parts exterior to the membrana tympani; the ſecond, the *cavity* of the *tympanum*, and the parts connected with it; and the laſt, the parts uſually comprehended under the general term of *labyrinth*.

The ears are two in number, and, like all the organs deſigned to receive the impreſſions of ſurrounding agents, are ſymmetrical, or exactly reſembling each other in ſtructure. The deſcription of one, therefore, may with great facility be applied to either; and as the plates repreſent throughout the formation of the left ear, we ſhall ſuppoſe ourſelves to be explaining the ſtructure of the ſame ear in the following account. The deſcription of that part of the ear, which is formed in bone, will be found in the hiſtory of the temporal bone, under the article CRANIUM; and as a knowledge of it is abſolutely neceſſary in comprehending the following view, we ſhall, inſtead of puzzling the reader by continual references, ſuppoſe him to be fully acquainted with this previous deſcription. As, in the account of the bony parts of the ear, no reference has been made to the plates deſigned to illuſtrate the anatomy of this organ; and as, in the following deſcription, the explanations are ſcattered, we have thought it beſt to collect them under one view, that we might the more readily bring ourſelves acquainted with the moſt important parts of its ſtructure. The firſt plate begins with figures of the external ear, and leads us gradually to the moſt interior parts; the laſt plate exhibiting all the parts in their relative poſitions with regard to each other, and to the reſt of the ſkull.

The formation of the ear, as well as of the eye, is very conſiderably advanced during the fœtal ſtate; ſome of the parts poſſeſſing, even in the early months, a volume nearly equal to that which they finally attain. After the deſcriptions of the different portions of the ear in the adult, we ſhall introduce that of each part, as it exiſted before birth, as well as of the gradual alterations it undergoes before it arrives at the form it is deſtined at laſt to maintain.

The organ of hearing, in its ſimpleſt form, conſiſts of the expanſion of a nerve, gifted with its peculiar ſenſitive qualities, over the ſurface of a delicate membrane. In man and the more perfect animals, there is an additional apparatus connected with this, the deſign of which is ſuppoſed to be that of collecting and modifying thoſe pulſes of ſound which are finally to be impreſſed on the nervous pulp. In man this apparatus conſiſts of a piece of cartilage, ſeated externally to the head, which contracts into a funnel leading to the internal parts. The bottom of this tube is truncated obliquely, and its aperture cloſed by a firm membrane ſtretched acroſs it, which ſeparates this external part of the ear from the ſucceeding, or middle portion of the organ. Beyond, or on the oppoſite ſide of this membrane, we meet with a ſmall cavity, hollowed out in bone, which has been termed the barrel of the tympanum. Of the ſeveral openings into it, there is one more particularly demanding our attention here. It is the internal aperture of a tube, the other extremity of which opens at the poſterior part of the noſe, behind and above the palate. By means of this communication, the external air is admitted into this barrel, and equipoiſes the weight of the atmoſphere on the other ſide of the membrane. Acroſs the cavity there is extended, though by no means in a ſtraight line, a ſeries of little bones, the exterior one of which is attached to the membrane we have juſt mentioned, the moſt internal of the ſet being firmly connected with another membrane, which, in conjunction with it, ſhuts up the entrance to a ſtill more deepened cavity, called the labyrinth of the ear. This laſt hollow, excavated as it were in the ſolid bone, conſiſts of a middle portion of irregular figure, and of different channels, which proceed from it in various directions, and, finally, return, with the exception of one only, to the ſame chamber. All theſe paſſages are lined by a membrane, on which the ſentient extremity of the auditory nerve is expanded in different ſhapes; from theſe it is collected into one trunk, and goes on to join a particular part of the brain, and thus completes the communication between the external agent and the ſenſorium.

External Ear.

Under this name we comprehend that part which projects from the head, and which, folded in various directions, is known by the name of the *auricle*, or *pinna*, of the ear; and the paſſage leading from it to the tympanum.

The pinna, itſelf inſenſible to ſounds, but adapted for the collection of thoſe which are to be tranſmitted to the tympanum, is placed at the ſide of the head immediately behind the articulation of the lower jaw. It is of a ſize varying much in different individuals, of an irregular, ovate, and flattened form, with its broader part above, tapering below; looſe and detached from the head behind, and continuous with the ſkin of the ſurrounding parts before. Its external ſurface, directed more or leſs forward in different ſubjects, is marked by ſeveral eminences and depreſſions, to each of which a ſeparate name has been affixed.

Beginning our deſcription from the external edge, we juſt notice the *helix*, which is the elevated convex fold forming the chief part of the outline of the ear. It riſes in the middle of the pinna, out of a hollow, termed the concha, and, paſſing forwards, immediately above the external meatus, it makes a turn upwards and backwards, ſweeping round to form the circumference of the pinna. Below, the fold is effaced, and gradually loſt in the ſmooth and flattened part above the lobule, which completes the figure of the ear in this part. From this curling in of the external edge of the pinna to conſtitute the helix, a groove, or furrow, is formed, which ſeparates it from the oppoſite eminence, the antihelix, throughout its whole length. The *antihelix* riſes gradually from this depreſſion, forming an elevated ſemi-circular fold, with its concavity towards the meatus, running lengthwiſe through the middle of the ear, ſurrounded nearly on all ſides by the helix. Towards the upper end, as it turns forwards, the fold divides into two crura, both of which ſink under the inverted edge of the helix, at its upper part: the ſuperior of theſe forms a leſs elevated and rounder convexity than the lower, which is pinched up into a narrower ridge. Below, the antihelix becomes gradually narrower, and terminates juſt above an eminence, called antitragus, from which it is ſeparated by a ſlight notch. As the antihelix ariſes in two ſeparate portions above, from under the helix, there is left a ſhallow depreſſion between them, called *foſſa navicularis*.

Anterior to, and below theſe folds, there are two eminences, called *tragus* and *anti-tragus*. The firſt of theſe, continuous with the ſkin of the face, juts out backwards, in an oblique direction, ſo as to cover, in a great meaſure, the opening of the meatus. The projecting edge, the line of which is perpendicular, is nearly ſtraight, and ſlants off above and below, ſo as to leave a channel, which ſeparates it from the helix above, and another deeper notch dividing it from the anti-tragus, below and behind. This laſt eminence, which may be regarded as a continuation of the lower end of the antihelix, is placed oppoſite to the tragus at the lower part of the ear, forming the inferior wall of the concha.

The *concha* is the large deepened excavation in the middle of the pinna, and is ſurrounded on all ſides by the projecting folds we have been deſcribing. Bounded before by the tragus, below by the anti-tragus, the chief portion of its circumference is made up by the ſemi-circular ſweep of the anti-helix, which ſuddenly ſhelves off into this hollow. It is divided acroſs unequally by the commencement of the helix, which thus makes a ſmall part of its anterior boundary above. That part of the concha above the beginning of the helix is continued into the furrow which ſeparates this eminence from the anti-helix: the lower diviſion leads on front into the meatus.

The portion of the ear ſituated below theſe parts, is termed the *lobule*: it is flat, and terminates in a ſoft rounded edge, varying much in figure in different individuals. It is the part which we ſee, in moſt nations, pierced for the admiſſion of ear-rings.

The internal ſurface of the pinna, facing the ſide of the head, is moulded into eminences and depreſſions correſponding, in an inverſe ſenſe, to thoſe obſerved on the oppoſite external ſurface, but not marked in ſo ſtriking a manner. The line of its connection with the head is a ſemi-circular one, with its concavity forwards, formed by the fold of the ſkin, as it paſſes between theſe parts. The convexity of the pinna, behind this line, is cauſed by the bulging of the cartilage in the part which correſponds to the depreſſion of the concha on the external ſurface.

The textures, which enter into the compoſition of the pinna, excluſive of thoſe which we find almoſt univerſally diſtributed, are, common integument, cartilage, muſcles, and ligaments. The ſkin covering the external ear is connected very cloſely to the parts it ſurrounds, by a denſe cellular tiſſue, containing ſcarcely any fat. It is more delicate than in the generality of parts; and is furniſhed with numerous ſebaceous glands, diſpoſed throughout its ſtructure. When the cuticle has been removed by maceration in water, we can diſtinctly ſee a vaſt number of rounded foramina, of different ſizes; theſe are the excretory ducts of glands, from which the greaſy ſubſtance that covers the ear is ſecreted: they are particularly large and diſtinct in the concha. The ſkin alone, covering a cloſe cellular tiſſue, filled with a delicate fat, compoſes the lobule of the ear, which does not appear to ſuffer any irritation from the continued preſſure of a foreign body, as an ear-ring, in its ſubſtance. On the internal ſurface and edge of the tragus, the ſkin is furniſhed with a few fine hairs, which project over the entrance of the meatus.

The cartilage on which the figure of the whole pinna, excepting the lobule, depends, has been neceſſarily deſcribed in conſidering the ſhape of that part, and we have only to notice any alteration in its form, which may be obſerved after the removal of the integuments. When this has been effected, we may perceive that the figure is broken in upon before by a deep notch, occupied by a ligament, between the upper edge of the tragus, and the oppoſite portion of the helix. Behind, the united extremities of the helix and anti-helix, inſtead of forming a continued rounded outline, terminating ſmoothly in the lobule, appear as a pointed projecting proceſs, ſeparated from the body of the cartilage by a ſmall interval, which, when covered by ſkin, appeared only as a groove. Between this proceſs and the anti-tragus, a tolerably ſtrong ligament is extended. In the diſſected cartilage, we obſerve, in a more ſtriking manner, the eminences and depreſſions correſponding, in an inverſe ſenſe, to thoſe on the external face, ſome of which were ſcarcely perceptible before the removal of the inveſting parts. We ſee now, alſo, the cartilage ſending in a proceſs, which goes to form a part of the commencement of the meatus externus, as we ſhall have occaſion to mention hereafter. The texture of the cartilage of the pinna reſembles that of the noſe and trachea, and has, by an eminent and much to be lamented anatomiſt, been deſcribed under the name of fibro-cartilage, as diſtinguiſhable, by its ſtructure and properties, from the cartilages entering into the compoſition of joints. It is flexible and exceedingly elaſtic, ſo as to aſſure, by conſtantly preſerving the ear open, a ready admiſſion to all ſounds, the reflection of which into the meatus is ſtill further favoured by its form.

The cartilage is fixed to the ſide of the head by three ligaments: an anterior one, ariſing from the root of the zygomatic proceſs of the temporal bones, and terminating in the baſe of the tragus, and the neighbouring part of the convexity of the helix: a ſuperior one, ariſing from the aponeuroſis covering the ſkull, and fixed to the upper part of the convexity of the concha: laſtly, a poſterior ligament attached by one extremity to the maſtoid proceſs of the temporal bone, by the other to the protuberance of the poſterior part of the concha. They would appear to be nothing, perhaps, but a denſe cellular ſubſtance.

The muſcles of the external ear may be divided into thoſe which move the whole pinna, and thoſe which act partially only on the diviſions obſerved on its external ſurface. In the firſt of theſe claſſes, which we ſhall conſider here, though it cannot be regarded as entering into the conſtruction of the pinna, we enumerate ſome ſmall muſcles, which are, however, very manifeſt in a muſcular ſubject, and which appear to have derived their names from their ſituation, with regard to the ear. They are, the *attollens auriculam*, the *anterior auriculæ*, and the *retrahentes auriculam*.

The *attollens auriculam*, temporo-auriculaire of Chauſſier, is a thin flat muſcle, ſituated on the ſide of the head, immediately above the external ear. It is the broadeſt of the muſcles of the ear, and of a triangular ſhape: the upper portions of its thin and ſcattered fibres ariſe in a curved line from the external ſurface of the aponeuroſis of the occipito-frontalis, rather below the rounded origin of the temporal muſcles; from theſe points they converge in their approach to the ear, (not in correſponding lines, however, from all parts, the anterior fibres being directed more backwards than the poſterior ones are forward,) and terminate in a flat tendon, which is fixed to the eminence on the inner ſide of the pinna, anſwering to the foſſa, which is obſerved between the crura of the anthelix. This muſcle lies immediately under the ſkin, and over the temporal faſcia, from which it is ſeparated by cellular tiſſue. It will elevate the pinna, and, perhaps, by ſtretching the part to which it is attached, tend to open the paſſage of the external meatus.

Anterior auriculæ, zigomato auriculaire. This very delicate muſcle, allied in form to the one we have been deſcribing, but much ſmaller in its dimenſions, is ſituated on the temple, immediately before the ear. It ariſes from the ſame ſurface of the aponeuroſis as the former, in that part of it which lies over the middle of the zygoma. Its origin is not always, however, diſtinct, nor eaſily determined. It proceeds from thence backwards, and a little downwards, and becoming tendinous as it reaches the ear, paſſes on under it to arrive at the inner ſide of that part of the helix, which has been deſcribed as dividing the concha into two unequal portions. It is covered immediately by the ſkin, and lies over the temporal faſcia and artery. Its action will be to draw that part of the helix forwards.

Retrahentes auriculam, maſtoido-auriculaires, appear as ſmall narrow muſcles, affixed, by tendinous origins, to the external and hinder part of the root of the maſtoid proceſs, immediately over the attachment of the ſterno-maſtoideus. From thence they paſs tranverſely towards the ear, and become fixed to the protuberance correſponding to the hollow of the concha. They are hardly to be reduced to any deſcription which ſhall anſwer, in every inſtance, as they vary in number and origin in different ſubjects. They are covered by the ſkin, and ſeparated from the temporal bone by cellular tiſſue. They will ſtretch the concha, and draw the pinna backwards.

From its connection with theſe muſcles, the auricle can be moved upwards, backwards, or forwards; and by their combined actions in any of the intermediate directions. It is doubtful if they have much power over the tube of the meatus, though they may exert their influence in opening the hollow of the concha. In removing the ſkin, to gain a view of theſe muſcles, conſiderable caution is requiſite; as they are delicate in ſome, and not in every caſe eaſily diſtinguiſhed from the ſurrounding parts. To ſee them more diſtinctly, the ear ſhould be drawn in different directions, ſo as to put them on the ſtretch; and they ſhould be ſtudied immediately as they are diſſected, as they ſoon become confuſed and indiſtinct. The muſcles we have mentioned as acting on the different eminences of the pinna, are placed at different points on its ſurface: they are extremely ſmall, ſo that ſome anatomiſts have denied altogether their exiſtence. The *tragicus* derives its name from the tragus on which it lies: placed on the external face of this eminence, which it almoſt entirely covers, it may be deſcribed as ariſing at its baſis and terminating at its ſummit by tendinous extremities. It is of a triangular ſhape, with the baſe below. Where the anti-tragus forms its greateſt projection there is attached to its exterior ſurface a ſmall muſcle called *anti-tragicus:* its fibres proceed obliquely upwards and backwards, and terminate at the lower and poſterior edge of the anthelix, to which they are fixed in the angle of that ſlit which we have deſcribed as exiſting in the cartilage between this laſt eminence and the anti-tragus. It is broader below, and tapers gradually to a tendinous point above. The ligament which we have mentioned as filling up the interval noticed above, lies externally to this muſcle, which is covered by ſkin on its internal ſurface. The *major helicis*, a narrow ſtrip of muſcle, ariſes from the edge of the projecting helix immediately above the tragus: it mounts a little forward, gradually leſſening in ſize, and is attached to the external edge of this eminence juſt where it begins to make its turn backwards. The *minor helicis* lies on the helix as it begins to ariſe from the hollow of the concha, its fibres paſs forwards and terminate on the edge of the helix oppoſite the end of the inferior crus of the anthelix. Theſe muſcles lie on the external ſurface of the pinna: there is ſtill another ariſing from the inner ſide, called the *tranverſus auriculæ*. It is placed between the convexities anſwering to the hollow of the concha and the groove between the helix and anthelix. Its fibres are ſhort, and can ſcarcely be diſtinguiſhed as muſcular: they occupy nearly the whole length of the ſpace correſponding to the riſing of the anthelix, ſo that the perpendicular meaſurement of this muſcle is conſiderable, though its tranſverſe one is ſhort. The more regular and more diſtinct of theſe muſcles are the tragicus and anti-tragicus. The diſtinct action of each of them has been deſcribed by different anatomiſts, and may be collected by reflecting on their attachments. The motions they produce, however, are at the beſt extremely obſcure, and in moſt inſtances not diſcernible. Their only actions can be thoſe of approximating, or drawing aſunder the different eminences of the ear, and the extent of ſuch movement we believe to be extremely minute. This has been ſuppoſed to ariſe from the oppoſition made by the elaſticity of the cartilage to the actions of theſe ſmall muſcular powers, which, it will be readily ſeen, do not exert their influence through the medium of moveable articulations, but act immediately on a reſiſting body, in which there is a conſtant tendency to preſerve one cuſtomary form. The integral action of theſe muſcles ſeems to be principally directed towards altering the form and dimenſions of the concha, around which they are partially diſtributed. We ſhall have occaſion to conſider the uſes of both the orders of muſcles we have been deſcribing, when conſidering the functions of the external ear in their relation to the ſenſe of hearing. In the mean time it muſt be allowed, that in man the action of many of theſe muſcles is extremely confined, and, in the majority of inſtances, ſcarcely perceptible. Whether this may ariſe from our habit of compreſſing them by our mode of dreſs, or from being ſeldom called into action in the quiet and regulated intercourſe of civilized life, is perhaps a matter of but little moment; our wants require accuracy, more than acuteneſs of ſenſe. There are, however, numerous recorded inſtances, as well as living examples of perſons in whom this power of moving the external ear has been maniſeſt and decided. We are told alſo, that among the more ſavage nations, whoſe predatory habits are ſuch as to render a watchful caution alive to catch every coming ſound neceſſary both for their preſervation and ſupport, there does exiſt a conſiderable power of moving the ear in different directions. The rapid movements of it in brutes, and the various directions of its opening in animals of different habits, have been the ſubject of frequent obſervation. The minute form and paleneſs of the proper muſcles of the human ear render the diſſection of them exceedingly troubleſome, more eſpecially if the ſubject be not ſtrongly muſcular: indeed, unleſs in theſe favourable circumſtances, our labour will be in vain; we ſhall to no purpoſe ſeek to diſtinguiſh them from the ſurrounding ſubſtance, to which, by their paleneſs, they are nearly allied.

The pinna in the fœtus poſſeſſes nearly the ſame external characters as in the adult. Its ſize does not bear the ſame proportion to the other parts of the ear as it afterwards reaches; it being of all the organ the part which is the leaſt advanced before birth. In the adult male the auricle is obſerved to be more rounded and full, as well as ſomewhat thicker than it is in the female. The national diſtinctions of the ears are derived chiefly from their ſize and ſituation. They are deſcribed to be, in Europeans, ſmaller than in the inhabitants of many other climates; amongſt whom we have accounts of their reaching a prodigious ſize. It is well known, that in ſavage nations they ſtand off farther from the ſide of the head; and in the idols of ancient Egypt they are conſtantly figured as being placed much higher than we now obſerve them. That ſuch a repreſentation was not the effect of ignorance, but of deſign, is deducible from the finiſhed workmanſhip we obſerve in the reſt of their conſtruction. Allowing then that it is taken from nature, it will be no more remarkable than the variety we notice ſo frequently in domeſtic animals, as to the ſituation of the external ear. The four-footed mammalia are the only animals beſides man who are provided with a projecting pinna: it is not conſtant, however, even among theſe, being deficient in many of thoſe who live either in the water or under ground. Its varieties of figure and poſition are familiar to all, and we have only to add, that they are provided with ſtrong muſcles adequate to move them in every neceſſary direction.

Meatus Auditorius Externus.

Having completed our deſcription of the pinna of the external ear, we proceed next to conſider the paſſage leading from it to the tympanum. The external meatus extends from the concha to the membrana tympani, by which it is ſeparated from the next cavity, or that of the middle ear. It takes its courſe immediately between the maſtoid proceſs and the glenoid cavity for the reception of the condyle of the lower jaw. The general direction is at firſt upwards and forwards, it then makes rather a ſudden turn downwards and backwards, and is continued nearly in an horizontal line till it reaches the membrana tympani. Conſidered in the whole of its courſe it would appear as forming a convexity pointing upwards, and a correſponding concavity directed downwards and forwards. A ſection carried at a right angle to its axis preſents an oval rather than a rounded opening. It gradually diminiſhes in ſize as it proceeds from the concha, being narrowed for about the middle third of its courſe, and enlarging again as it approaches the tympanum. Its uſual length is rather leſs than an inch: and it is always ſhorter above than below, behind than before, on account of the oblique direction of the membrana tympani. In conſidering the parts which enter into the conſtruction of the ſides of the meatus, our attention will be called to a ſolid or bony portion, a cartilaginous plate, incomplete in parts, its vacancies being filled up by the interpoſition of a fibrous ſtructure, and, laſtly, the common lining of the whole. The bony portion has been already deſcribed with the temporal bone, it occupies about one-half of the length of the meatus. The cartilaginous part of the tube is continuous with the baſe of the tragus, and the lower and anterior part of the concha as before mentioned. It is formed by a broad plate, proceeding inwards from theſe points, gradually decreaſing in breadth, and curling from below upwards and backwards in ſuch a manner as not to form a complete circle of cartilage, but to leave a vacancy between the circumvoluted edges towards the upper and poſterior part, which is filled up and completed by a fibrous expanſion. The cartilaginous tube thus conſtructed terminates in an oblique line, the lower part of which projects inwards in a pointed form, and is fixed either immediately or by the intervention of fibrous tiſſue to the rough edge obſerved at the inferior part of the termination of the bony meatus. When the membrane, which completes the tube from above, has been cut through longitudinally, ſo as to give one the liberty of making the cartilaginous plate flat, it appears of a triangular ſhape, its baſe towards the pinna, its apex towards the head, which, when folded up, will form the obliquely truncated tube we have been deſcribing. It will be ſeen from this that the pinna and the cartilaginous portion of the meatus are formed by a continuous piece of cartilage, which in the pinna lies extended by the ſide of the head, and gradually contracts into a tubular meatus. Near to the tragus there is a conſiderable cleft in this cartilaginous plate, filled by a fibrous ſubſtance: farther in, we find it again divided tranſverſely by another cleft, which does not however run to the full extent of its breadth. Beſides theſe two, we ſometimes meet with a third vacancy; and they are all known by the name of inciſures (*inciſuræ*). It is on this account, as well as from its being an incomplete tube, that it has been compared to the conſtruction of the trachea. The fibrous ſubſtance, which occupies the interſpace of the ſecond inciſure, has been deſcribed by Santorini as being covered by muſcular fibres, which have retained his name; the muſculus inciſuræ majoris Santorini, muſculus meatus auditorii of Douglas. Its action would be to contract the length of the tube. The fibrous portion, in conjunction with the ſkin, forms the upper part of the tube, where they complete the vacancy left between the edges of the cartilage. The fibrous plate is not very apparent, but may generally be diſtinguiſhed from the ſkin which lines the whole of the tube within. It is continued to the temporal bone, ſtretching itſelf on each ſide as it advances inwards, and ſerves to connect the oblique edge of the cartilage to that part. Between this expanſion and the ſkin lining the meatus we meet with numerous blood-veſſels encloſed in cellular tiſſue. The whole of the external meatus is covered by a production of ſkin, which dips into it after having inveſted the pinna, and becomes reflected over the membrana tympani at the bottom of the conduit. It varies ſomewhat in appearance, as well as in ſtructure, in different portions of its paſſage; and may be deſcribed generally as being conſiderably thinner the nearer it approaches to the tympanum. It is covered, more eſpecially towards the pinna, by a fine down, interſperſed by a few longer hairs of an equally delicate appearance.

Towards the commencement of the bony meatus, we obſerve, on removing the cuticle, the ſkin to be pierced by numerous ſmall openings lying cloſe to each other, which are the outlets for the ceruminous ſecretion we ſhall preſently notice. They are more particularly obſervable at the termination of the cartilaginous portion, where they form a zone of minute foramina. As we arrive at the membrana tympani, we find the ſkin become extremely delicate; and where it is produced over that membrane, it is diaphanous: whether it is only the cuticle which is thus produced, or whether the true ſkin alſo goes to form this external layer, is not perhaps exactly aſcertained. It adheres but looſely to the cartilaginous portion; as we proceed inwards, it becomes moſt cloſely and intimately united with the membrane covering the bone, ſo as not to be ſeparated from it. Still farther in, and where it covers the membrana tympani, it is ſeparable without any difficulty, ſo as to be detached in the form of a bag accurately complete at its bottom, ſo that if the membrana could be removed from within, this ſac would ſtill obſtruct the communication between the cavity of the tympanum and the internal meatus in the moſt perfect manner. It is of great ſenſibility, which has been aſcribed to the thinneſs of the cuticle in theſe parts.

In the cellular tiſſue which intervenes between the ſkin and membranous parts of the meatus, we find a conſiderable number of ſmall rounded and oval bodies, which are the ceruminous glands of the meatus: we find them, alſo, but not ſo cloſely ſtudded, between the ſkin and the cartilaginous portion of the tube: they each open by a peculiar excretory duct into the meatus, and give the porous appearance we before mentioned. They furniſh a yellow matter of ſome conſiſtence, extremely bitter and of an oily nature: it is known by the name of cerumen, or the wax of the ear. It acquires in many perſons conſiderable hardneſs if ſuffered to accumulate, and forms a ſolid body obſtructing the meatus. The uſe of this ſecretion is ſuppoſed to be that of affording ſome defence to the ſenſible covering of the meatus, as well as to bar the acceſs and neſtling of inſects.

In order to obtain a correct knowledge of the figure of the meatus, we muſt make ſections of it in different directions, or we may with eaſe procure a caſt of it in common plaſter. The ſections ſhould be made tranſverſely in different parts of the tube to gain a view of its ſhape and area, or longitudinally in the perpendicular and horizontal directions, to aſcertain its extent and curvatures. It is by theſe laſt ſections alſo, that we are enabled to obſerve the proportions which the bony and cartilaginous portions bear in the conſtruction of the meatus, its connexion with the concha, the openings from the ceruminous glands, and, laſtly, if the ſection be carried on through the petrous part of the temporal bone, the relative bearing of it to the internal part of the organ. Such ſections will be found eminently inſtructive, are eaſily executed, and require no particular directions for their performance.

The meatus externus in the fœtus poſſeſſes the ſame proportional length as in the adult. Its area alſo does not materially differ, excepting that it is comparatively larger towards its internal extremity from the magnitude of the circle for the membrana tympani, to the circumference of which it is affixed. The ſtructure of the tube, however, offers ſome more remarkable differences. The cartilaginous portion is nearly the ſame, only the inciſures are larger and more apparent, and the fibrous part occupies perhaps a greater part of the circle. The bony part, as has been already deſcribed, is abſolutely wanting; we have then only to examine here what ſupplies the deficiency. Above, the internal lining alone is obſerved, as forming the proviſional ſides of the meatus; below, in addition to this, we can plainly perceive a peculiar membranous ſheath formed of ſtrong parallel fibres which ariſe from the ring of the tympanum, and terminate in the cartilaginous part of the meatus. It is this expanſion of thick membrane which makes the diviſion between the meatus and the glenoid cavity, which in the adult is formed in bone; as the formation of the bone proceeds from within, it becomes gradually loſt. The animals who have no external ear, and ſtill poſſeſs an external meatus, are birds, and cetacea. In the former claſs the tube is ſhort and chiefly membranous, in the latter it is very long, proportionably ſmall, and inflected in various directions.

The middle Ear, or cavity of the Tympanum.

The middle diviſion of the ear is bounded externally by the membrana tympani, which ſeparates it from the external meatus, and internally, by the parts called the labyrinth: it lies under the union of the ſquamous with the petrous portion of the temporal bone, over the foſſa jugularis, with the maſtoid proceſs and its cells behind, part of the glenoid cavity and the Euſtachian tube before. The irregularity of its form will admit of no exact deſcription of its figure, the walls of which, it will be ſufficient to obſerve, are made up on both ſides by bone. It is only towards the meatus that we obſerve any conſiderable deficiency in this bony caſe, where it is interrupted by a large circular opening, which is, however, ſhut up by a membrane ſtretched acroſs it, called, from its ſituation, the membrana tympani. In this cavity our notice will be claimed by a variety of objects, which we believe to be ſubſervient to the tranſmiſſion and modification of thoſe ſounds which have impinged on the membrane from without. Here, however, it will be neceſſary again to refer the reader to the deſcription of the bony part of the organ, as, without a correct knowledge of that part of the ſubject, the ſtudy of this will be at laſt but incomplete and unintelligible. In the preſent place, we have to notice the membranes cloſing the different openings, the Euſtachian tube, the connections of the oſſicula, the muſcles employed in moving them, and, laſtly, the membrane which lines the whole of the cavity and the parts connected with it.

The *membrana tympani* is diſtinct from the linings of the external meatus and the cavity of the tympanum, from both of which, it may be ſeparated by maceration in water. It has been already mentioned as cloſing the internal end of the meatus, where it lies in an oblique direction, ſtretched acroſs the bony circle in the external ſide of the tympanum. Its obliquity is ſuch, that it forms a very acute angle with the lower portion, and an equally obtuſe angle with the upper ſide of the bony external meatus, to which latter, indeed, it is at firſt nearly parallel. The plane of its external ſurface, however, does not lie exactly oppoſite to the lower half of the meatus, but it is directed rather forwards, the internal ſurface looking proportionably backwards. The dimenſions of the membrane are rather larger than the circle to which it is fixed, which allows, therefore, of its relaxation, and of its being drawn into a wide cone, the apex of which is directed towards the cavity of the tympanum, thus forming a hollowed ſurface towards the meatus, and a correſponding projecting ſurface in the tympanum, which latter is ſtrongly united to the deſcending handle of the malleus, the motions of which it muſt in all caſes follow. The membrana tympani is cloſely fixed round its circumference to the bony circle which embraces it. It has, however, been a matter of diſpute among anatomiſts, whether there exiſted, in a natural ſtate, any deficiency in this union, at any part which would allow of the paſſage of air or any other fluid from the meatus to the cavity of the drum. The moſt exact reſearches of later days have, we believe, aſcertained, that no ſuch opening does exiſt in the natural ſtructure of the parts. There can be no doubt, however, that there is occaſionally a communicating foramen which allows of the paſſage of air, or ſmoke, through this intercepting membrane. The exiſtence of it is proved beyond contradiction, in thoſe perſons who have had the power of expelling, by the external meatus, the ſmoke of tobacco collected in the mouth, which muſt have paſſed by the Euſtachian tube into the cavity of the tympanum. We have been informed alſo, that in ſome of the northern Americans, this phenomenon has been obſerved pretty generally. The foramen has been particularly deſcribed by Rivinus, whoſe name it long bore. Whether it exiſt, however, or not, it would ſeem that the reflection of the ſkin over its external, and the membrane of the cavity of the tympanum over its internal ſurface, would effectually cloſe any deficiency left between the membrana tympani and the bone. The membrane itſelf is dry, and when theſe reflections are removed, totally tranſparent. It appears to poſſeſs no veſſels carrying red blood in its healthy ſtate in the adult, though in caſes of inflammation, and in the fœtus, it is ſenſibly vaſcular. It differs in ſtructure from any of the other membranes with which we are acquainted, preſerving its peculiar appearance long after the other animal parts of the body are diſſolved by putrefaction. Joined to this firmneſs and tranſparency, Mr. Home has of late conſidered it as poſſeſſing muſcular fibres, which paſs in all directions from the bony rim to the handle of the malleus. In the elephant this ſtructure, he ſays, "is viſible to the naked eye, as it is even in the human tympanum, when examined under favourable circumſtances. When viewed in a microſcope, the muſcular fibres are beautifully conſpicuous, and appear uniformly the ſame throughout the whole ſurface; the muſcular fibres appear only to form the internal layer of the membrane, and are moſt diſtinctly ſeen when viewed on that ſide." Its probable uſe we ſhall have to conſider hereafter. The membrana tympani thus formed, completely eſtabliſhes a barrier between the external meatus and the cavity of the tympanum; preventing the entrance of air or other fluids. The membrana tympani of the fœtus is more ſlanting in its poſition than that of the adult; and it is covered externally by a thin layer of white ſebaceous ſubſtance, called by ſome *pſeudo membrana*, by others *membrana* or *lamina mucoſa*. This ſeems to conſiſt merely of the ſecretion of the ceruminous glands, as the whole meatus is more or leſs covered by a ſimilar whitiſh ſubſtance. It may be ſeparated from the outer ſurface of the membrana in a diſtinct circular piece.

The *Euſtachian tube*, or trumpet, is a canal formed partly in bone, and partly in cartilage and membrane, extending from the cavity of the tympanum to the upper part of the pharynx, behind the poſterior opening of the nares; its direction, viewing it from the tympanum, is obliquely forwards, inwards, and downwards: about two inches in length, contracted and of a circular form at its commencement in the tympanum; it becomes gradually larger, with its ſides flattened into an elliptical canal, as it approaches the pharynx, into which it opens by a tranſverſe mouth with an elevated margin around it. The bony portion of the tube forms the third next the tympanum, the remaining two-thirds being made up of cartilage and membrane. The firſt of theſe commences in the anterior and ſuperior part of the tympanum, and paſſes on in the very ſubſtance of the temporal bone, to join the other portion. In this courſe it lies under the channel which contains the tenſor tympani, and externally and above the canalis carotideus, from both of which it is ſeparated only by a thin bony plate. The other two-thirds, regarded as an whole, reſemble a flattened cone, whoſe apex is continuous with this bony portion, into the irregular edge of which it is firmly implanted. From this origin, the tube paſſes obliquely forward, attaching itſelf to the neighbouring bones, and when arrived oppoſite the internal ala of the pterygoid proceſs, enlarges ſuddenly juſt before it terminates in an open mouth. The cartilage, which enters into the compoſition of this part of the tube, forms its internal ſide, or that next the meſial plane. It is of a triangular ſhape, and conſtitutes at firſt not only the inner ſide of the tube, but alſo the ſuperior part of its external ſide. The tube has, from this appearance, been deſcribed as if made up by two plates of cartilage united longitudinally at their ſuperior edges, of which the external plate is narrow, and the deficiencies ſupplied by membrane, whilſt the internal plate is continued from the fauces to the tympanum, forming throughout the inner half of the wall. This external plate is not always found, and in ſuch caſe it is the membranous portion which completes the circumference of the tube without. It is conſtructed chiefly by the membrane lining the tube ſtrengthened by ſome fibrous expanſions ariſing from the adjacent bones and enveloping it cloſely. The Euſtachian tube is lined internally by a continuation of the mucous membrane of the pharynx, which gradually loſes its redneſs as it approaches the cavity of the tympanum, becoming alſo more evidently delicate in its texture. This tube eſtabliſhes a communication between the tympanum and the external air, which thereby gains acceſs to the cells formed in the ſubſtance of the maſtoid proceſs, and already deſcribed as opening into the upper and poſterior part of the cavity. This air, however, or any other fluid, cannot penetrate into the internal ear, as the openings between them are cloſed by membranes in the living ſubject. The foramen rotundum is ſhut up by its peculiar membrane, which reſembles the membrana tympani in appearance: its plane is not parallel but oblique, in regard to the latter, as may eaſily be ſuppoſed if we conſider the direction of this opening. The foramen ovale alſo is cloſed by its membrane, to which the baſe of the ſtapes is firmly affixed, the latter not filling up the whole of the opening, but leaving a narrow border in which the tranſparent membrane is apparent.

From the conſideration of the barrel of the tympanum, we proceed to that of the parts which it contains. Theſe conſiſt of three ſmall bones, called the *oſſicula auditus*, ſome muſcles concerned in moving them, and a nervous cord croſſing the cavity tranſverſely.

The figure of the oſſicula has been already the ſubject of a particular deſcription; and we have here to examine the relations which they bear to the tympanum, and to each other, as well as their modes of connection; we then obſerve the poſſible degree and extent of their motions, as reſulting from theſe connections. With an accurate underſtanding of theſe points, we proceed to examine the muſcles or moving powers which can be brought to act on them, and attend more particularly to the ſpots at which they make their appearance in the tympanum, and the relative ſituation of theſe points with regard to the bones; as it is from them alone that we can eſtimate the line of direction in which they act. Poſſeſſing a correct knowledge of theſe facts, we may calculate the probable effects of their combined or individual action on the bones, and conſequently on the parts connected with them, the membrana tympani and the membrana feneſtræ ovalis. The handle of the malleus is attached, throughout the whole of its length, to a line in the upper half of the membrana tympani; the lower point of it being fixed to the apex of the cone we have deſcribed in the centre of it, from whence the attachment is continued to the circumference. Above, the neck of the malleus is tied to the bony ring of the tympanum; its head lying in a hollow of the ſuperjacent bone, to which it is fixed by a ſtrong ligament deſcending from above, and paſſing to its inner ſurface. Anteriorly the long proceſs is admitted into a fiſſure of the bone, from which it cannot be removed in the adult. The direction of the long axis of the malleus will be thus nearly perpendicular, and that of its long proceſs horizontal. In this ſituation, its double articular ſurface is directed backwards and inwards, the whole of its neck and head being above the frame ſupporting the membrana tympani; ſo that when viewed from without that opening, we can ſee its handle only. The articular ſurfaces of the incus lie cloſely embracing the correſponding ſurfaces of the malleus, to which it is attached by a capſular ligament, allowing ſome freedom of motion: its ſhort leg is directed backwards and a little downwards, ſo that its point reſts in a ſmall hollow at the commencement of the maſtoid cells, in the ſame horizontal line with the long proceſs of the malleus: it is further fixed in this ſpot by two diſtinct and ſtrong ligaments, which effectually prevent its ſtarting. The long leg deſcends in a line nearly parallel to that of the handle of the malleus, but behind it, and removed farther inwards from the membrana tympani; it does not, however, extend ſo far down into the cavity of the tympanum. From this poſition all that we can ſee of the incus below the circle of the tympanum is the inferior part of its long leg, as it turns inwards to be connected with the head of the ſtapes, to which it is united by a looſe capſular membrane. This laſt bone, as it lies in the feneſtra ovalis, has the long axis of its baſe nearly at right angles to the deſcending crus of the incus, and the manubrium of the malleus, and conſequently parallel to the long proceſs of that bone: the baſe has its convex edge uppermoſt, and is fixed firmly to the membrana feneſtræ ovalis: from the narrow ſtrip of membrane left between it and the rim of the feneſtra, it can have but a very circumſcribed and inconſiderable motion. Such are the relative poſitions and connections of theſe bones; and if we examine their poſſible motions, we ſhall find them limited to very narrow bounds. It will be found that they have but little action among themſelves, their motions being chiefly reſtricted to changes producible on the membranes of the tympanum. Of their individual action we ſhall ſay nothing; as, from their connections, we can hardly ſuppoſe one bone to be moved, without influencing the motions of the whole, which we ſhall therefore conſider in combination. The axis of motion of the integrant bones is in a line drawn from the point of the ſhort leg of the incus to the commencement of the long proceſs of the malleus; ſo that if the parts of the bones lying below this line be drawn inwards, the parts above muſt be carried outwards, and *vice verſâ*. From the connections, however, of the head of the malleus and the baſe of the ſtapes, their motions in theſe directions can deſcribe but very minute portions of a circle. The incus, having no muſcles, would appear in this inſtance to be perfectly paſſive, rotating on its ſhort leg as the ſtapes acts with advantage on its long proceſs, or the malleus on its articular baſe. Beſides this motion inwards and outwards, we are diſpoſed to admit of a ſlight motion of the bones backwards and forwards, in which, however, they do not move in parallel lines, there being two centres of motion, one in the point of the ſhort leg of the incus, the other in the head of the malleus, the revolving points being the manubrium of this bone and the long leg of the incus. But from the peculiar obliquities of their articular ſurfaces, which may be readily underſtood by examining the bones, if the handle of the malleus is drawn forwards, the long leg of the incus will be carried backwards, and communicate its motion to the head of the ſtapes: if the ſtapes be drawn backwards, it will carry with it the long leg of the incus, conſequently to which the handle of the malleus will be carried forwards and a little outwards. Theſe motions are, however, ſtill more limited than the former, in which the integrant bones are carried on their axes either inward or outward, and even by minute reſearch ſcarcely determinable.

The muſcles which can be brought to act on the oſſicula are four in number; three belonging to the malleus, the tenſor tympani, externus mallei, and laxator tympani; and one attached to the ſtapes, the ſtapideus.

The *tenſor tympani* ariſes from the upper ſide of the cartilaginous portion of the Euſtachian tube, juſt under the opening in the ſphenoidal bone, for the paſſage of the arteria meningea media; from thence it runs backwards towards the tympanum, forming a rounded fleſhy belly, terminating in a tendon: during this part of its courſe, it lies enveloped in a ſtrong membrane, in a canal formed for its reception above the bony portion of the Euſtachian tube: arrived at the extremity of this canal, its rounded tendon emerges into the tympanum, paſſing through a contracted circular opening at the end of the bony channel. On coming through this hole, it turns over its external edge, and goes towards the membrana tympani, in a line directed horizontally and a little backwards, to be inſerted into the ſhort proceſs of the malleus, as it lies turned towards the internal part of the tympanum.

The *externus mallei*, in ſhape like the tenſor tympani, ariſes by a ſmall origin from the exterior edge of the ſpinous proceſs of the ſphenoidal bone, from which it runs backwards and a little outwards towards the fiſſure in the glenoid cavity, along which its tendon proceeds, and becomes fixed to the whole length of the long proceſs of the malleus, as it lies in its particular groove at the anterior part of the cavity of the tympanum.

The *laxator tympani* is the ſmalleſt of the muſcles of the malleus: it riſes from the ſuperior and poſterior margin of the bony ring of the tympanum, from which point it deſcends to be fixed by a tendon into the handle of the malleus, near the root of its ſhort proceſs. The upper extremity of this little muſcle lies in a fold of the membrane of the tympanum, juſt where it begins to be reflected over the membrana tympani, and as it deſcends it paſſes a little forwards.

The *ſtapideus* ariſes in a ſmall cavern in the petrous portion of the temporal bone, near the aqueduct of Fallopius; paſſing through this, its tendon emerges into the tympanum through a ſmall circular hole, over which it turns and paſſes forwards and a little downwards and outwards, to be inſerted into the poſterior part of the neck of the ſtapes.

The action of this laſt muſcle and the tenſor tympani is not in the direction of their fibres, but in a line which forms an obtuſe angle with them, their powers acting by the intervention of a bony pulley. By obſerving the ſituation of this point in its relation to inſertion of the tendon of the tenſor tympani into the malleus, and bearing in mind at the ſame time the connections of the oſſicula, we ſhall find that the effect of its action will be to draw the membrana tympani inward, by which means it becomes proportionably tenſe. At the ſame time, by the joint rotation of the malleus and incus on their axes, the long leg of the latter will be drawn inwards, and ſomewhat forwards; and, from its connection with the ſtapes, muſt depreſs that bone, but more particularly the anterior end of its baſe, in the membrana feneſtræ ovalis. The action of this muſcle is the moſt extended of any of the four, and the moſt eaſily determined by examination. The point at which the tendon of the ſtapideus appears is ſituated rather above a plane, which ſhould be drawn through the baſe of the ſtapes, and more internal than its neck; ſo that it muſt proceed a little downwards, as well as forwards and outwards, to arrive at its inſertion. Its action would appear to us to be that of drawing the neck of the ſtapes towards this pulley; and in effecting this, it will neceſſarily draw with it the long leg of the incus, thereby carrying the handle of the malleus a little forwards and outwards, and relaxing in a ſlight degree the membrana tympani. The other effect of its action will be the depreſſing of the poſterior end of the baſis inwards, and drawing its anterior end proportionally outwards. For reaſons, however, before mentioned, this can produce but little viſible effect on the membrane of the feneſtra ovalis, which will allow but of little motion in the baſe of the ſtapes. The poſſible effects of the action of this muſcle has been a fertile field of conjectures, which we fear are not yet reduced to truths.

The *externus mallei* will draw the handle of the malleus forward and upward, and will conſequently ſtretch that half of the membrane which lies beyond the malleus, and relax that part which lies between the handle and its origin; at the ſame time, it will cauſe the long leg of the incus to rotate backwards, and carry with it the head of the ſtapes. It may poſſibly thus exert ſome power over the membrane of feneſtra ovalis.

The *laxator tympani* is deſcribed as drawing the handle of the malleus upwards and backwards, and thus relaxing that part of the membrane which lies between its inſertion into the malleus and its origin. It will ſtretch the part of the membrane lying on the anterior ſide of the malleus, and become in ſome meaſure the antagoniſt of the former muſcle.

The action of the muſcular fibres of the tympanum, as deſcribed by Mr. Home, would be to bring the broad cone of the membrana tympani into a plane ſurface, and thus antagonize the tenſor tympani, if the handle of the malleus could be affected by their action.

We have thus endeavoured to give the reader ſome account of the motions of the oſſicula, the greater part of which are demonſtrably evident on the recent ear of the adult; the others are ſo ſlight, as to oblige us to calculate rather on their probable, than aſſert their real degree. The general concluſion as to their actions will be, that they are all to be referred to the poſſible changes they can produce on the membranes of the tympanum, which conſiſt in their being rendered tenſe or relaxed. The degree to which this is effected by their intervention does not appear to be within the reach of experiment in the living ſubject; the examination of ſuch points in the dead muſt be neceſſarily liable to error. The effects of different degrees of tenſion or relaxation, in modifying the pulſes of ſounds, will be conſidered hereafter.

An object met with in the cavity of the tympanum yet remains to be noticed, which, though not ſubſervient to any purpoſes perhaps immediately concerned with hearing, muſt not be paſſed over. On looking into the tympanum, we obſerve a ſmall nervous cord croſſing it tranſverſely, called from its ſituation *chorda tympani*. On tracing it from behind, we find the nerve entering the tympanum at the baſe of the ſmall pyramidical eminence, whoſe apex gives paſſage to the tendon of the ſtapideus; from thence it paſſes obliquely acroſs between the long leg of the incus and the manubrium of the malleus, to which laſt it is ſo cloſely attached, that it cannot move without intereſting the nerve at the ſame time. As it croſſes it, however, near its upper end, and not far from the axis of motion, it cannot be drawn much in the motions of this bone. Having paſſed it a little above the inſertion of the tenſor tympani, it increaſes in ſize, takes an horizontal courſe forwards, and goes out of the cavity in company with the tendon of the externus mallei.

The facial nerve, in its paſſage through the aquæductus Fallopii, gives off two ſmall twigs, which ſupply the tenſor tympani and ſtapideus: during its ſtay in the ſame channel, it ſends off alſo the nerve we have been deſcribing, which, after its exit from the anterior ſide of the tympanum, forms a junction with the lingual branch of the inferior maxillary nerve.

The whole cavity of the tympanum is lined by a mucous membrane, which we have mentioned already as gaining acceſs to the ear through the Euſtachian tube; from the opening of which, it may be ſeen ſpreading in all directions. Internally, it covers the membranes of the feneſtræ; externally, it paſſes over the membrana tympani, forming its inner layer, and it is between theſe the handle of the malleus is confined in its ſituation. Behind, it enters the maſtoid cells, which it lines throughout. Before, paſſing from the Euſtachian tube, it is reflected over the glenoid fiſſure, the opening of which it cloſes towards the tympanum, ſurrounding in this place the long proceſs of the malleus, and the chorda tympani. In the middle of the tympanum it is ſeen paſſing over the oſſicula, forming between them and the walls of the tympanum numerous membranous proceſſes of conſiderable breadth. It thus completely covers the cavity of the middle ear, and the parts connected with it, having but one aperture of communication with the external air by means of the Euſtachian tube. It appears to be a mucous membrane, analogous in ſtructure to the membranes lining the ſinuſes, and like them, defends the parts it covers from the immediate contact of the air. When inflamed, or in the fœtal ſtate, it is of a marked red, and reſembles preciſely the ſurface of other mucous membranes, which it reſembles likewiſe in its offices. It is extremely ſenſible, by which character it may be ſtill further diſtinguiſhed from fibrous perioſteum.

The membrana tympani is ſo delicate in the fœtus, as not to allow us to make any diſtinction into layers. As it becomes firmer after birth, its direction is leſs oblique, and it is removed to a greater diſtance from the internal ſide of the tympanum. The Euſtachian tube increaſes gradually alſo in ſize as well as length, as the dimenſions of the cranium are enlarged. The oſſicula and bony walls of the tympanum undergo but trifling alterations, as the reader will have obſerved in the deſcription of thoſe parts. The mucous membrane pours out leſs of its ſecretion as the age advances: ſo that after the ſecond year, we ſeldom ſee in the healthy ſtate any of that whitiſh mucus which fills the tympanum in the fœtus, at which period the membrane is vaſcular and ſpongy.

The work of demonſtrating on the adult ear the poſitions and ſtructure of the parts we have been deſcribing, is one of conſiderable nicety and labour. The moſt uſeful views, perhaps, are thoſe which ſhew the relative ſituations of the important parts, with regard not only to the tympanum, but to the whole apparatus of the organ; and theſe may be obtained by ſections of the cavity in various directions. We ſhall mention only a few of the moſt uſeful here, as when by means of theſe the inquirer has obtained a correct knowledge of their relations, he will readily execute any further ſection without the aſſiſtance of written directions. We will firſt ſuppoſe him to have removed from the ſkull, by two tranſverſe ſections, the parts more immediately connected with this organ. If then a fine ſaw be carried in a plane, which ſhall extend horizontally from ſome part of the lower half of the external meatus to the lower edge of the internal meatus, he will obtain, in the upper ſection, a view of all the more important parts of the tympanum, without in any way injuring the ſituation of its contents, as he will have paſſed below the point of the handle of the malleus, and conſequently the baſe of the ſtapes. He will be able to obſerve the tendons of ſome of the muſcles, and the points at which they emerge, moſt of the openings of the tympanum, and the direction of its membranes. Having ſtudied this, he will learn what is yet wanting to complete the view of the ſubject, and proceed either on the ſame, or any ſections, to remove ſuch parts as obſtruct his reſearches. The moſt uſeful perpendicular ſection, is one carried in the direction of a plane paſſing perpendicularly through ſome part of the interior half of the meatus, towards the middle of the ſella turcica. In this inſtance the oſſicula will eſcape, and each half of the ſection contain parts of conſiderable intereſt. To obtain a view of the obliquity of the membrana tympani, we remove longitudinally the anterior half of the meatus, down to the bony circle which ſupports it: in the ſame piece we may open into the tympanum from before, and by dividing the Euſtachian tube through the whole of its length, gain a view of its general direction and ſtructure. The oſſicula ſhould be ſtudied in their fœtal ſtate, at the latter period of which time they are perfect in form, and can be removed without danger of breaking. Another method of obtaining a knowledge of the relative ſituations of the bony parts of the ſtructure of the internal, as well as middle ear, is by taking caſts of them in eaſily fuſible metals. The bone is encaſed in a covering of plaſter which ſurrounds every part but the opening of the external meatus: it is then heated red, and the heat continued till ſmoke no longer iſſues from the meatus: at this period ſome fluid metal, conſiſting of equal parts of lead, tin, and biſmuth, is poured into the opening, and the whole thrown into water. The plaſter and ſurrounding bone are, after this calcination, eaſily removeable by any ſharp inſtrument, and the metallic caſt expoſed, repreſenting accurately and completely, if the operation has been ſucceſsful, all the cavities of the ear in their relative ſituations and proportions. On account of the difficulties of the inveſtigation ariſing from the minuteneſs and delicacy of ſtructure, we have thought it neceſſary to give theſe few introductory hints as to the beſt mode of proſecuting the examination of the ear: and although we may fail in our firſt attempts, the ſucceſsful execution of them will be afterwards readily obtained, when directed by the acquired ſkill and corrected knowledge of the inquirer.

In our ſhort comparative notice of the external ear, we found man poſſeſſed of parts which were deficient in ſome other claſſes of animals: in the preſent caſe we ſhall find ſome of them approaching him more nearly in the ſtructure of this organ, inaſmuch as they have a tympanum exterior to the part which receives the auditory nerve, though varying much in conſtruction from that of the human ear. The membrana tympani is found in ſome of the reptiles, and more particularly in thoſe which inhabit chiefly the ſurface of the earth. In birds it is remarkably large: in the cetacea, and other orders of mammalia, it reſembles much that which we have been deſcribing in man. The cavity of the tympanum is wanting in all thoſe creatures who poſſeſs no membrana tympani; conſequently, in the claſſes of inſects, worms, fiſhes, and moſt of the ſerpent tribe. We find it in thoſe reptiles who are furniſhed with this membrane; in birds, where the cavity is increaſed by its continuity with the cells of the cranium; in cetacea and the other mammalia, in whom, however, it is not ſo large as it is in the human ſubject. The Euſtachian tube is found only in thoſe animals who are provided with the cavity and membrane of the tympanum, to which it would appear, therefore, to be ſubſervient. It has no exiſtence in the ſerpent tribe, who are furniſhed, however, with an oſſiculum. The oſſicula are not found in the three lower claſſes, or in ſome of the aquatic reptiles. In the other creatures belonging to this laſt tribe, and in the two upper claſſes, they are always to be ſeen. In the more perfect animals, as we call them, they are more in number, have articulated junctions, and are provided with muſcles which act by their intervention on the membrana tympani. The feneſtra ovalis is obſervable in all the animals in which we can diſtinguiſh an organ of hearing, with the exception of the ſpinous fiſhes and the genus ſepia. In thoſe who have no oſſiculum, it is cloſed by a membranous or cartilaginous operculum, whilſt in the contrary caſe it is more or leſs ſhut up by a bone adapted to its opening. The feneſtra rotunda is deficient in all thoſe creatures who do not poſſeſs that part of the internal ear called cochlea. There is ſome appearance of it in birds who have the rudiments of the cochlea: in the mammalia it is always conſpicuous, but the largeſt in thoſe animals who are furniſhed with the proportionably largeſt cochlea.

The internal Ear or Labyrinth.

We have now carried our reſearches from without, to the moſt internal part of the organ of hearing, deſigned for the reception of the terminations of the auditory nerve. The beſt mode of proſecuting our inquiries will be, firſt, to bring ourſelves acquainted with the bony labyrinth; then with the membranous parts it contains, or the additional apparatus on which the nerve is ſpread; and, laſtly, to trace the diſtribution of the nerve to the intimate receſſes of theſe moſt delicate parts. The bony cavities communicating with each other, into which this nerve is admitted, are known altogether by the name of *labyrinth*, and have been divided into three portions; a middle one, named *veſtibulum;* the common centre of the different cavities which compoſe the labyrinth; an anterior diviſion communicating with it, called the *cochlea;* and a poſterior one, conſiſting of the *three ſemicircular canals*. The detailed deſcription of theſe has been already given in that of the temporal bone, to which the reader is referred before he begins the ſtudy of the ſoft contents of the labyrinth. By a careful attention to what is there deſcribed, he will readily inform himſelf of the relative ſituation of the contained parts, as well as their form and connections, as theſe delicate parts are all exactly adapted to correſponding ſurfaces in the ſurrounding bony caſe. It has been found that all the cavities we have above-mentioned are lined by a fine membrane differing in its nature from that which forms the lining of the tympanum, and little known to us, until of late years. This ignorance of its form and ſtructure is the more to be wondered at, if we recollect but for an inſtant the acknowledged genius and induſtry of thoſe eminent men who have made the ear the ſubject of ſo many elaborate reſearches. Till lately, all that we knew of the contents of the bony labyrinth, conſiſted in ſome vague ideas reſpecting certain *zonæ ſonoræ*, as they were termed by Valſalva, connected with the ſemicircular canals, and a *ſeptumnerveum* dividing the veſtibulum into two halves. The looſe deſcriptions, however, which were given by different anatomiſts of theſe expanſions, lead one to ſuſpect that they were far from poſſeſſing any thing like a correct knowledge of the membranous labyrinth, as it has been ſince deſcribed by Scarpa. From repeated inveſtigations of the organ of hearing in different claſſes of animals, he was induced to ſuſpect that there exiſted in man a membranous labyrinth included in the oſſeous one. He had aſcertained the exiſtence of it in fiſhes, reptiles, and birds; and was led by analogy to expect a ſimilar apparatus in the human ear. After numerous trials, he fully confirmed his rational conjecture, and was enabled to obſerve the great ſimilarity which it bore to that he had remarked in the former claſſes. He diſcovered alſo an additional part, conſiſting of a membranous ſacculus placed in the cavity of the veſtibulum, the probable uſe of which we ſhall have hereafter to conſider. In examining the ſoft contents of the labyrinth, we ſhall begin with thoſe contained in the bony ſemicircular canals. Each of theſe bony channels encloſes another membranous tube, which is perfectly diſtinct from the perioſteum, and which ſhould be conſidered as the proper ſemicircular canal. Theſe membranous tubes are of leſs diameter than the bony caſe in which they lie, from which they are ſeparated by a delicate cellular tiſſue, forming the medium of connection between them. Each of the canals, at the part from which it commences in the veſtibule, dilates into an oval bag, which is known by the name of *ampulla*, correſponding preciſely in form to the dilatation we have already deſcribed in the beginning of each bony canal. It contracts again into a narrower tube as it proceeds, ſtill accommodating itſelf to the form of its bony caſe; and after making its ſemicircular curve, returns again to the ſame membranous ſac in the veſtibule from which it commenced. Theſe little canals are cylindrical, and pellucid as well as their ampullæ, which appear as ſmall oval expanſions of the membrane, juſt before the canal communicates with the ſac common to them all. One of theſe ampullæ lies in the ſinus ellipticus of the anterior or ſuperior bony ſemicircular canal: another is contained in the fovea orbicularis of the inferior bony canal. The third ampulla is encloſed in the ſinus infundibuli-formis of the exterior bony canal. The membranous canals proceeding from the two firſt of theſe ampullæ, after making their circuit, unite and form one common canal, communicating with the alveus communis in the veſtibule. The exterior membranous canal takes a ſolitary courſe throughout, and returns as it departed, by its own proper channel. We have now traced theſe canals from their ampullæ, back again into the veſtibule, and have to deſcribe the cavity which forms the common centre of communication between them all. In the fovea ſemielliptica, which lies nearly oppoſite the feneſtra ovalis, there is placed an oblong tranſparent membranous bag, which croſſes the veſtibulum tranſverſely: the largeſt end of this little ſac lies in the fovea we have juſt mentioned; whilſt the other extremity, contracted a little in ſize, ſtretches towards the poſterior canal. It is from this *alveus communis*, as it is termed by its firſt diſcoverer, Scarpa, that the membranous canals proceed, and it is back again into it that they open. The ampullæ of the ſuperior and external canals commence from that part of the ſac which lies in the fovea ſemielliptica; the ampulla of the poſterior canal having its origin in the ſmaller portion of the bag: from theſe points the membranous canals proceed in the manner we have deſcribed, and open again by two apertures into the middle portion of this ſac, thus completing the free communication which we obſerve between each particular tube. Theſe cavities are all filled by a limpid fluid, which encreaſes ſo much the natural tranſparency of the membranous inveſtment, that it may eſcape the eye of a perſon who was not prepared to find it.

On making an opening into the veſtibule in the recent ſubject, if the ſac is left entire and turgid, it has the appearance of a bubble of air, ſo perfectly pellucid are the membrane and its contents. Independently of this, we find in the veſtibule another membranous ſac of a rounded figure, which is placed in the fovea hemiſpherica of this cavity. It is alſo tranſparent, and forms altogether a ſphere, one half of which is buried in the correſponding fovea, the other projecting into the veſtibule. The firſt of theſe halves adheres ſo ſtrongly to its containing hollow, as not to be ſeparated from it without laceration: the projecting half is received into a correſponding depreſſion in the membranous alveus communis, without, however, in any manner, communicating with its internal cavity. This ſpherical ſac is cloſed on every ſide, and is diſtinct from all the other membranous receptacles of the labyrinth, being filled with its proper limpid fluid. In the fœtus, during the early months, the inveſtment is ſo firm as not to collapſe, when the fluid has been let out by a lancet.

We here finiſh our account of the membranous contents of the canals and the veſtibules; and to complete the deſcription muſt examine the ſoft parts which go to complete the conſtruction of the cochlea. It has already been mentioned, that the lamina ſpiralis of the cochlea was compoſed of different ſubſtances. One, a bony plate forming the part next the central modiolus, requires no further deſcription; it is the part which completes the lamina ſpiralis that we have now to examine. It is found to conſiſt of two ſubſtances, one of which approaches the nature of cartilage, the other being perfectly membranous. The firſt of theſe, which is termed the *zona coriacea,* from the firmneſs of its texture, is attached to the edge of the bony lamina ſpiralis which it accompanies in its circumvolutions, and where the oſſeous plate ceaſes, this coriaceous part is ſtill continued round the modiolus to the apex of the cochlea. The margin of this coriaceous part, which is fixed to the bony lamina, is pierced by numerous canals, proceeding in a radiated direction throughout its ſubſtance, which are continuous with thoſe canals which lie between the plates of the bony lamina, and which have been already deſcribed as adapted for the reception of the auditory nerve. The external edge of this part is ſomewhat tranſparent, and when ſubjected to the microſcope exhibits a ſeries of reticulated cells, filled with a limpid fluid, in which we can perceive numerous white filaments, which are the ultimate expanſions of the nerve. The other portion of the ſeptum is membranous, and appears to be a duplicature of the perioſteum lining the ſcalæ of the cochlea reflected from the ſides to complete the deficiency of the lamina ſpiralis, which it encloſes in its fold. In other words, the perioſteum, which covers the two plates of the bony lamina ſpiralis, is continued from its edge over the zona coriacea, and meeting at the termination of this, coheres, and proceeds to be reflected over the internal parietes of the cochlea. And as both the oſſeous and coriaceous parts decreaſe in breadth as they approach the apex of the modiolus, it will follow that this membranous portion forms a greater part of the ſeptum in proportion as the lamina ſpiralis advances to its termination.

We here conclude our deſcription of the labyrinth, but before we proceed to conſider the diſtribution of the auditory nerve, it will be proper to take notice of the fluid contained in the different diviſions we have been following, and which, from the conſtancy of its appearance, would ſeem to execute no trivial part in conveying ſounds to the nerve with which it is in immediate contact. It has been aſcertained by numerous and indiſputable examinations, that the labyrinth is filled by a fluid, as well as the membranous receptacles which it encloſes, from which it will appear, that the membranous labyrinth itſelf, with its contents, may be ſaid to float in the water of the bony labyrinth; which will be the more readily admitted, if we conſider that the ſame occurs in the ear of ſome other claſſes of animals, as fiſhes, reptiles, and birds. It is alſo very obſervable in the human ear, on account of the great difference between the diameters of the membranous ſemicircular canals and their bony caſe. In the veſtibule it has been often demonſtrated occupying the ſpace between the feneſtra ovalis and the membranous ſacs, long before theſe ſacs were known to exiſt in their preſent form. With regard to the ſcalæ of the cochlea, the fact of their being turgid with fluid was long ſince admitted, and the lamina ſpiralis has been deſcribed as lying "inter duos aquæ rivulos demerſa." The aqueducts, which communicate with the cavities containing this fluid, have been already deſcribed; we have here only to add, that they are lined by a continuation of that delicate membrane which inveſts the internal ſurface of the labyrinth, of which we deferred the mention till we had conſidered all the parts which it covered. We find it, if we begin from the veſtibule, lining the whole of that cavity, dipping into the ſemicircular canals, entering into the veſtibular ſcala of the cochlea, and paſſing through the opening of the infundibulum at its termination, deſcending through the tympanic ſcala to the foramen rotundum. It is the ſame membrane which lines the aqueducts, and terminates in an expanded ſhape under the dura mater, covering the petrous portion of the temporal bone. Of the peculiar ſtructure of this membrane, as well as of that which forms the membranous receptacles, we know ſcarcely any thing. It ſupplies the place of perioſteum, and we have throughout mentioned it under that name: it would ſeem, however, to differ from it materially in one character, namely, that we ſuppoſe it to be the ſecreting ſurface from which the fluid of the labyrinth is poured out. The membranous canals and their ſac appear to be of a ſimilar ſtructure, though perfectly diſtinct in ſituation. The only difference obſervable between the ſtructure of the membranous labyrinth in the fœtus and the adult is, that in the former caſe it is moſt evidently vaſcular, whilſt, in the latter, it is too delicately thin to allow of the exiſtence of red blood-veſſels. The early developement of the oſſeous labyrinth in the fœtus, and the perfection which it reaches long before the uſual period of birth, have been elſewhere noticed; we introduce the mention of it here, only, as it is in the fœtal ear, that we muſt ſeek with the beſt chance of ſucceſs to examine the membranous and other ſoft parts which it contains. Before we attempt this delicate inveſtigation, we muſt obtain a correct knowledge of the oſſeous labyrinth, and the relative poſitions of its different cavities, in order to remove the bony parietes, without injuring the ſubjacent parts by random, or ill-judged efforts. With ſuch knowledge but few directions are neceſſary, without it the moſt minute would be given in vain. To gain a view of the membranous ſtructure, we begin by laying open the veſtibule from the foramen ovale ſo as to bring into ſight the ſinus of the foramen rotundum and the commencement of the cochlea. This is eaſily effected in a fœtus of three or four months, where the labyrinth is already evolved, and the removal of the bony parts is neither a work of difficulty nor labour. We have this advantage, alſo, that at this early period the tunics of the membranous receptacles are much more compact and firm, than we obſerve them at after times; and in addition to this, we always find them involved in a mucous wrapping, which adds much to their firmneſs, ſo that the membranous ſemicircular canals, when expoſed to the air and cut tranſverſely, ſtill preſerve their truncated tube open. It is after cautiouſly removing the oſſeous covering, that the pipe of an Anel's ſyringe has been introduced into one of the ampullæ, and from thence the membranous canals and their common ſac have been filled by a coloured fluid, proving beyond doubt the manner of their communication. This ſac may be preſerved entire even in opening the veſtibule of the adult from the feneſtra ovalis, or we obtain another view of it by cautiouſly cutting away the cochlea, ſo as to gain an inſight into the veſtibule from the part which it occupied. All theſe inveſtigations ſhould be made in the moſt recent ſubjects, as the membranes of their fluid ſoon loſe their tranſparency, and become inextricably confuſed. It is, perhaps, from examining them in this ſtate, that anatomiſts, prior to Scarpa, have given us ſuch vague and unintelligible accounts of their ſtructure. The mode of obtaining a proof of the exiſtence of a fluid in the labyrinth, has been moſt excellently deſcribed by Meckel in his "Diſſertatio de labyrinthi auris contentis," to which we ſhall refer the reader who wiſhes for a minute and particular account of his manner of proceeding. He preferred the making a ſmall opening into the cochlea, from which a fluid immediately burſt, and then by preſſing the baſe of the ſtapes againſt the feneſtra ovalis, he was enabled at will to force out more of its fluid contents; the ſame fact occurs if we make the opening into one of the bony ſemicircular canals. By freezing alſo ſeveral recent ears, he decidedly obſerved an icy cake in the labyrinth formed by the congelation of the water it contained. To obtain a view of the zona mollis of the cochlea, we make ſections of this body in different directions, or carefully remove its ſides, beginning at the feneſtra rotunda, and following the ſcala to its termination in the infundibulum. It need only be added, that from the tenuity of the parts to be examined, the inveſtigator ſhould be provided with magnifying glaſſes of conſiderable power.

Having thus ſtudied the apparatus deſigned for the reception of the auditory nerve in man, we proceed, before we complete our deſcription of the organ, by tracing its extreme diſtributions on theſe ſoft parts, to give a ſuccinct account of them as they have been ſeen in other claſſes of animals. The *cray-fiſh* and the *ſepia* have been found to poſſeſs only a veſtibule; the animals of all the other claſſes have the additional apparatus of ſemi-circular canals. And it may be worth our noticing that in all of theſe, the membranous ſemi-circular canals regularly ſwell into an ampulla, in the part at which the auditory nerve is admitted; that all of them are filled with their peculiar fluid; communicate freely with a common ſac in the veſtibule, and are immerſed in the water of the labyrinth. *Fiſhes*, however, and *reptiles*, have this peculiarity, that their membranous receptacles are found to contain certain ſolid bodies, *lapilli*, or *oſſicula*, as they have been termed, which are ſuſpended by a great number of nervous fibrillæ. Again, the more perfect animals are provided with the elaborately conſtructed cochlea, and the feneſtra rotunda.

We ſhall take up our deſcription of the *auditory nerve* at that part of it where it enters the internal meatus; its connection with the encephalon will be found in the hiſtory of the brain; the foramina, through which it penetrates to gain admiſſion to the ear, are deſcribed under the article CRANIUM. The auditory nerve lies in the internal meatus, in a twiſted form, and rolled up, as it were, in different bundles, which, when unravelled, give the nerve the form of a flattened band of fibres. At the commencement of this twiſted appearance, we obſerve a ganglion like ſwelling, which gives origin to three branches, differing conſiderably in ſize.

The *largeſt* of theſe, as it arrives at the *maculæ cribroſæ*, divides into numerous threads, which pierce the pyramid of the veſtibule, into which they enter, appearing, to uſe the words of Scarpa, "barbulæ albidiſſimæ quam ſimiles." Theſe divide into two portions, one of which is received into the membranous ſac of the *alveus communis*, over which it firſt expands in a fan-like form, occupying about two-thirds of its length. Soon after this expanſion begins, we loſe ſight of the nervous fibres which penetrate the ſac, and ſeem to terminate in a delicate nervous pulp, ſpread over the inner ſurface of this membranous inveſtment. The other portions of this *barbula* take their courſe towards the ſuperior and exterior canals, the ampullæ of which they embrace with this expanded ſurface: after which, they penetrate the membrane, and appear as a ſoft nervous pulp on the inner ſide. The *leſſer branch* penetrates through a ſingle foramen in the bone from the meatus; which, however, is ſubdivided into numerous ſmall canals, before it opens again at the baſe of the foſſa orbicularis of the poſterior canal: in conſequence of this diſpoſition, we ſee the nerve emerging in numerous fibrillæ, remarkable for their whiteneſs, which are ſpread over the ampulla of this canal, which they ſubſequently penetrate, and terminate, as the other branch, in a nervous pulp on its inner ſide. After minute inveſtigation, Scarpa was unable to trace this pulp beyond the ampulla into the membranous canals. The *middle branch* of theſe three paſſes almoſt immediately after its ſeparation from the others, through a foramen, or *macula foraminuloſa*, correſponding to the bottom of the ſacculus ſphericus, into which it enters, and the internal ſurface of whoſe membrane it covers with a nervous pulp, which is more oſtenſible at the part by which the nerve penetrates. This diſtribution has been compared, and not unaptly, to the expanſion of the optic nerve into the retina.

The auditory nerve having given off theſe branches, goes direct towards the baſe of the *cochlea*, where its fibres become untwiſted a little, and penetrate the *tractus ſpiralis foraminuloſus* on every ſide, in the direction of the axis of the modiolus; a tolerably large cord in the middle of the nerve paſſing into the hole in the baſe, and running through its length, till it arrives at the infundibulum, and the laſt half turn of the cochlea. The nervous fibres, which paſs through the external circle of the tractus ſpiralis, penetrate the firſt turn of the ſcalæ; thoſe which paſs through the next circle of the tractus arrive at the ſecond turn of the ſcalæ. The fibres having penetrated in this way through the ſmall canals, arrive at the external ſuperficies of the modiolus contained in the ſcala tympani, and paſs on till they arrive at the lamina ſpiralis: here they change their direction, which was before parallel to the axis of the modiolus, and follow the plane of the lamina ſpiralis, which they penetrate, and between the laminæ of which they radiate in minute penicillous filaments, extending on through the zona mollis, where they are finally loſt, as before noticed. Thoſe which pervade the ſecond circle of the tractus ſpiralis have to take a longer courſe before they arrive at the ſcala tympani of the ſecond turn, where they are diſtributed in the manner above deſcribed, receding from the modiolus, and terminating in the moſt minute reticulated filaments in the outer edge of the ſubſtance of the zona mollis. This diſtribution of the nerve through the ſpiral lamina of the cochlea is very conſpicuous, when viewed through a microſcope, and ſtill more diſtinct, if the cochlea be macerated for a few hours in a mixture of ſpirit of wine, and nitrous acid, which will be found to increaſe the tranſparency of the oſſeous lamellæ. The nerve which paſſed through the centre of the modiolus, is found to ſupply the laſt half turn in the ſame manner as the other branches did the turn below.

We have omitted the mention of the arteries, and other veſſels of the ear, as they poſſeſs no peculiarity of diſpoſition, and will be better deſcribed elſewhere. It is ſufficient to remark, that the whole of the organ is well ſupplied with veſſels and nerves from the moſt contiguous trunks, the veins of the internal ear communicating with the lateral ſinuſes.

We thus complete the firſt great diviſion of the ſubject, having given a detailed hiſtory of the human ear, and a brief account of it as it exiſts in other animals. Before, however, we ſhall attempt to exhibit what is at preſent believed, with regard to the functions of this apparatus, we think it proper to give a ſhort account of the powers of the human ear in diſtinguiſhing the varieties of ſound; after which inquiry, we ſhall be better prepared to take a ſurvey of its phyſiology, as far as it is at preſent underſtood.

Deſcription of the Plates in which the Anatomy of the Ear is repreſented.

Plate I.

Fig. I.—A well-formed left ear of a male, drawn from life. It has a more rounded ſhape, is thicker, and is marked by ſtronger features than in the female.

a to *e*, the helix, forming the external circumference, or fold of the auricle.—*a*, the upper end, or beginning of this border, ſloping into the concha; *b*, part of the edge which is loſt in the ſkin of the face; *c d*, that part which is prominent from the head; *e*, the lower end of the fold, which terminates in the lobule of the ear.

f to *m*, the antihelix, forming a plait, or fold, in the external ear.—*f g*, the upper end of it dividing into crura, ſinking under the edge of the helix; *h*, the junction of the crura, or proceſſes *f* and *g*; *i k*, the lower end of the antihelix, continued at *i* into the concha, and at *k* into the antitragus.

l, the tragus covering the entrance to the external meatus.

m, the antitragus.

n, the lobe of the ear.

o o, the furrow between the helix and antihelix.

p, the oval, or boat-like depreſſion between the crura of the anthelix.

q, the concha.

r, the beginning of the meatus auditorius.

Fig. II.—A well-formed female ear, drawn from life. In its moſt perfect form it poſſeſſes a more lengthened and delicate ſhape than the male.

Fig. III.—A repreſentation of the muſcles which move the external ear, or auricle. They are exhibited as ſeen from behind, or from that ſurface which is turned towards the ſkull, in order to obtain a more complete view of the whole at one glance: there is leſs objection to this, as the muſcles are not attached immediately to the bone, but to the aponeurotic and cellular ſheath which covers it.

a d e, the cartilage of the ear, as ſeen on that ſide which looks towards the cranium.

f to *p*, the attollens aurem.—*f g h i*, the upper end of this flat and delicate muſcle, the fibres of which converge; *l m*, and terminate in a tendinous expanſion; *o p*, attached to the prominence correſponding to the hollow between the crura of the anthelix.

q to *t*, the anterior auris.—*q r*, the anterior portion attached to the aponeuroſis of the occipito frontalis: it grows narrower at *s*, and is inſerted tendinous into the prominence at the back of the beginning of the helix *t*.

u to *z*, two retrahentes aurem.—*u v w x*, the upper and larger of theſe two; it conſiſts of two or three portions of muſcular fibres, *u*, *v*, *w*, and is inſerted by an evident tendon into the bulging part of the pinna, correſponding to the hollow of the concha; *y z*, the inferior and ſmaller of theſe muſcles, directed obliquely under the other.

Fig. IV.—There was conſiderable difficulty experienced in executing this figure, both from giving the relative ſituation of the parts clearly and correctly, and from the neceſſity of chooſing ſuch a point of view as would enable one to gain a ſufficiently perſpicuous view of the moſt important points, without giving any erroneous idea of them by the ſtrong fore-ſhortening of the picture.

The external ear is ſeen fore-ſhortened ſtraight from before.

b to *d*.—*b c*, the meatus externus, as it appears detached from the bone; *b*, *c*, its two curvatures; the firſt, *b*, upwards and forwards; the ſecond, *c*, downwards, and in ſome degree backwards; *d d*, the oblique direction of its internal end, which is ſeen as cloſed by the membrana tympani.

e, the membrana tympani ſtretched on its bony ring, and bulging inwards.

f g h the malleus.—*f*, the handle or proceſs attached to the membrana tympani; *g*, the long proceſs; *h*, the head.

i k, the incus.—*i*, the ſhort leg or proceſs; *k*, the long proceſs.

m, the ſtapes.

V H A *m n p*, the labyrinth.—*n p*, the cochlea; *n*, its beginning, its termination at *p*; *m*, the veſtibulum. V, the bony caſe of the anterior, or ſmaller of the ſemicircular canals; H, the poſterior, or largeſt ſemicircular canal; A, the outer, or ſmalleſt canal.

This figure, exhibiting the moſt important parts of the ear in their ſeveral relations to each other, holds a middle place between the figures of the external ear and the more intricate ones of the internal parts, to which it naturally leads us.

The remaining figures of this plate, together with the two firſt of the following one, repreſent the parts contained in the middle diviſion of the ear, or the cavity of the tympanum: all theſe parts are ſhewn in their natural connections with each other, as well as individually. It appearing, however, ſcarcely poſſible to give the true form of theſe fine and delicate parts, with ſufficient fidelity and clearneſs, of their natural ſize, there are repreſentations of them as magnified to four times their natural diameters. The figures IV, 8, 9, 10, 11, XII, XIII, of this plate, and I, II, of the ſecond, ſhew them of their natural ſize. In figures V, VI, VII, VIII, IX, X, XI, we ſee them magnified to four times their proper dimenſions. The form of theſe parts varies from many cauſes: we have choſen that which appears the moſt general and the moſt perfect.

Fig. V.—The labyrinth and oſſicula auditus, four times their natural dimenſions. Although the labyrinth is not ſhewn ſo completely in this figure as in thoſe of the following plate, it was repreſented here in order to ſhew the connection between the different bony portions of the ear, that when we meet with the views of the labyrinth, we may be previouſly acquainted with the relations they bear to the ſurrounding parts. Independently of this object, the figure before us exhibits the mutual connections of the oſſicula, the order in which they are placed, and the general line of their directions. On theſe accounts it ſhould be ſtudied before we proceed to the following figures.

a to *e*, the malleus in full view.—*a*, the long proceſs; *b*, the ſhorter proceſs; *c*, the handle, or proceſs attached to the membrana tympani; *d*, the neck; and *e*, the head of the malleus.

f to *i*, the incus.—*f*, the body of the incus; *g*, the ſhort leg; *h*, the long leg, or proceſs; *i*, the ſmall epiphyſis of this leg articulated with the ſtapes.

k to *n*, the ſtapes.—*k*, the ſmall head of the ſtapes; *l*, the anterior crus; *m*, the poſterior crus; *n*, the baſis, connected with the membrane which cloſes the feneſtra ovalis.

o to M, the labyrinth.—*o* to *r*, the firſt turn of the cochlea; *s t u v*, the ſecond turn; *w x*, the half turn, or third; *y*, the foramen rotundum, of a ſomewhat triangular form; *z z*, the veſtibulum; A B C D, the anterior, or ſuperior of the ſemicircular canals.—A, the ampulla, or ſinus ellipticus; B C, its curvature; and D, its junction with the inferior or poſterior canal; E F G H, the inferior canal.—E, its ampulla, or fovea orbicularis; F G H, its peculiar curve, and the connection of the united canal D, with the exterior ſemicircular canal; I K L M, the exterior canal.—I, the ampulla, or ſinus infundibuliformis; K L, the direction of its curve; M, its termination in the veſtibulum.

Fig. VI.—The malleus, drawn in ſuch a ſituation as to gain a view of the long proceſs *a a*, and the ſmooth cartilaginous ſurface *, for articulation with the body of the incus.

Fig. VII.—A longitudinal ſection of the malleus, being the anterior half of the laſt figure, reverſed ſo as to ſhew the greater and ſmaller medullary cells.

Fig. VIII.—The malleus, in the ſame poſition as in *fig.* V., but ſeparated from the incus; *a*, *b*, *c*, *d*, *e*, mark out the ſame ſpots as in that figure; *, the articulating ſurface.

Fig. IX.—The incus, in the ſame poſition as in *fig.* V., its parts being noted by the ſame letters; *, the articular ſurface adapted to the head of the malleus.

Fig. X.—The ſtapes: this ſide of it is, when in its natural poſition, directed downwards; *a b*, the head of the ſtapes; *c*, the neck; *d*, the anterior crus, ſtraighter and thinner than the poſterior *e*, which is thicker and more curved; *f*, the baſis.

Fig. XI.—The ſtapes ſeen from above; *a*, its cartilaginous ſurface, articulated with the ſmall epiphyſis of the incus; *b*, its anterior; *c*, its poſterior crus; *d*, the baſis, with its ſloping ſides. The view we have here of the ſtapes is a perpendicular one, as in the line of its axis it will be found to differ in form from that in *fig.* V., in the proportion that the latter differs from a perpendicular aſpect.

Figures 8, 9, 10, 11, ſhew the bones of their natural ſize.

Fig. XII.—The temporal bone of an adult, from which ſo much of the bony meatus has been removed as to enable one to gain a view of the muſcle called externus mallei.

a to *d*, the temporal bone.—*a*, the ſquamous portion; *b*, the zygomatic proceſs; *c*, the glenoid cavity for articulation with the lower jaw; *d*, the maſtoid proceſs.

e e, the circumference of the meatus broken off, in order to obtain a plainer view of the cavity of the tympanum *t k i u*.

f, a portion of the petrous portion of the temporal bone.

g h, a portion of the ſphenoidal bone.

i, the foramen rotundum, cloſed by its proper delicate membrane, which ſeparates the cavity of the tympanum from the cochlea.

k, *l*, *m*.—*k*, the malleus; *l*, the incus; *m*, the ſtapes.

n o p, the laxator tympani.—*n*, the upper extremity attached to the rim of the meatus, lying in a fold of the internal lining of the membrana tympani; *o*, its fleſhy portion; *p*, the tendon fixed to the handle of the malleus.

q r s, the externus mallei.—*q*, its origin attached to the ſpinous proceſs of the ſphenoidal bone; *r*, its fleſhy portion; *s*, its tendon inſerted into the long proceſs of the malleus.

t, the tendon of the tenſor tympani as it is ſeen emerging from its canal.

u, the tendon of the ſtapideus as it paſſes from out of its bony cavity.

Fig. XIII.—A continuation of the former figure; but in order to ſhew the tenſor tympani and the ſtapideus, ſome more of the bony parietes have been removed.

a b c, the Euſtachian tube.

d e f, the tenſor tympani.—*d*, the tendinous origin attached to the tube; *e*, the fleſhy belly; *f*, the tendon affixed to the ſhort proceſs of the malleus.

g h i, the ſtapideus.—*g*, its tendinous origin; *h*, its thread-like belly, which lies in a bony canal; *i*, its tendinous end, attached to the poſterior part of the neck of the ſtapes.

PLATE II.

The figures in this plate, with the exception of the two firſt, are intended to repreſent the ſtructure of the internal ear, or labyrinth; and are, as well as all the foregoing ones, taken from the left ear, in order not to increaſe the intricacy of a delicate ſubject by the confuſion which muſt ariſe from the change of ſide.

Fig. I.—The outline of the temporal bone of a child, with the oſſicula in their natural ſize and ſituation.

a to *d*, the temporal bone.—*a*, the ſquamous portion; *b*, the zygomatic proceſs; *c*, the petrous portion; *d*, the maſtoid proceſs.

e e, the bony ring, in a groove of which the membrana tympani is affixed.

The malleus, incus, and ſtapes need not be marked, as they have been already ſufficiently diſtinguiſhed in the preceding figures in *Plate* I.

Fig. II.—This figure repreſents the oſſicula, from the oppoſite ſide to that in which they were ſeen in *fig.* I.

a, the ſquamous part of the temporal bone; *b*, the zygomatic proceſs; *c d*, the bony ring; *e*, the malleus; *f*, the incus; *g*, the ſtapes ſeen from its baſis.

Fig. III.—The bony caſe of the labyrinth ſeen from below, magnified four times.

1 2 3 the cochlea.—1 1 1, the firſt turn; 2 2 2, the ſecond turn; 3, the incomplete third turn; *a*, *a*, *a*, ſmall canals for the nerve of the ſacculus ſphericus; *b b b*, the tractus ſpiralis foraminuloſus for the paſſage of nerves and veſſels; *c*, the opening of a canal in the middle of the baſe of the modiolus, through which a nerve paſſes to the infundibulum; *d*, an opening in the beginning of the cochlea, for the paſſage of the membranous aqueduct.

e, maculæ cribroſæ for the paſſage of nerves to the ampullæ of the ſuperior and exterior canals, and the alveus communis.

f, an oval opening for the nerve of the ampulla of the poſterior canal.

*, opening of the aquæductus veſtibuli.

g to *q*, the bony caſe of the ſemicircular canals.—*g h i*, the poſterior canal; *k l m*, the ſuperior canal; *o p q*, the exterior canal; *g*, *k*, *o*, the parts containing the membranous ampullæ.

Fig. IV.—The bony caſe of the labyrinth, one half of which has been regularly removed throughout, in order to exhibit the internal characters of the bone.

a to *l*, the upper half of the cochlea.—*a a*, the thickneſs of its external cruſt in a fœtus of eight months; *b c d*, the lamina ſpiralis; *b c*, the ſcala veſtibuli; *e f g h i*, the ſcala tympani;

tympani. In this figure we ſee only the bony lamina ſpiralis. *b*, its commencement, or broadeſt part ; *d*, its termination in the little hook, or *hamulus ; k*, the opening of the infundibulum, where the two ſcalæ communicate ; *l*, the opening for the aquæductus cochleæ.

m to *q*, the under half of the veſtibulum.—*m*, the thickneſs of its caſe in the fœtus ; *n*, the fovea hemiſphærica ; *o*, the fovea ſemielliptica ; *p*, the projecting ridge between them, terminating in the pyramis veſtibuli ; *q*, the opening for the aquæductus veſtibuli.

r, G, K, L, the canals divided each into half.—*r*, the thickneſs of their caſe in the fœtus ; G, the poſterior ; K, the ſuperior ; L, the exterior ſemicircular canal ; 1, the opening of the large end of the poſterior canal ; 2, the opening of the large end of the ſuperior canal ; 3, the opening common to their conjoined tubes ; 4, the larger end ; 5, the more contracted opening of the external canal.

Fig. V.—The labyrinth laid open in the ſame way as the laſt figure, with the ſoft parts it contained.

a to *e*, the lamina ſpiralis viewed from above.—We can ſcarcely diſtinguiſh on this ſide the diſtribution of the nerve, which is viſible on the under ſurface ; *a a a*, the firſt turn ; *b b*, the ſecond turn ; *c d e*, the third turn of the lamina ; *d e*, its unconnected edge, through which the two ſcalæ communicate. Comparetti has deſcribed the lamina as conſiſting of four different ſubſtances, or zones, as they are termed : 1, the bony zone, or ſtrip ; 2, the flexible coriaceous, or leather-like zone ; 3, its veſicular zone ; 4, the membranous zone attached to the cupola.

f, the ſacculus ſphericus, lying in the fovea hemiſpherica of the veſtibule.

g, ſpace between this laſt and the alveus communis.

h, the alveus communis, or membranous ſac, communicating with all the canals, with the fan-like expanſion of the nerve over it.

1 *k i* 3, the membranous poſterior canal.—1 *i*, its ampulla ; *k*, the radiated expanſion of the nerve over it.

2 *l m*, the ſuperior membranous canal.—*l*, the ampulla.

4 *n* 5, the exterior canal communicating at each end with the alveus communis. Soemmerring gives each of theſe canals the name of cartilagino-membranous canal, "knorpelig haütiges bogenrohr."

Fig. VI.—The ſoft contents of the labyrinth removed from their bony caſe, of their natural ſize, and in their natural ſituation ; *a a*, the ſpiral plate of the cochlea ; *b*, the ſacculus ſphæricus ; *e*, the alveus communis ; *g*, the poſterior ; *k*, the ſuperior ; *l*, the exterior ſemicircular canal.

Fig. VII.—Another view of the labyrinth laid open.

a b c, the cochlea. In order to expoſe the zona mollis, the exterior bony caſe has been removed.

d e f, the veſtibulum.

g to *q*, the ſemicircular canals.—*g h i*, the poſterior ; *k l m*, the ſuperior, *o p q*, the exterior canal.

1 2 3, the lamina ſpiralis ſeen on its under ſurface ; *3*, the two ſacs of the veſtibule, which, viewed from this, appear as one common bag.

t u, the membranous poſterior canal.

v w x, the ſuperior membranous canal, uniting with the laſt at *x*.

y z, the exterior membranous canal.

This figure exhibits the diſtribution of the auditory nerve on the labyrinth ; the large branch going to the cochlea, the three leſſer branches to the veſtibule and canals.

Fig VIII.—The natural ſize of the parts containing what we ſee exhibited in the laſt figure.

Fig. IX.—The larger half of a recent cochlea of the left ear, divided perpendicularly through the modiolus, and magnified to four times its ſize.

a, the external ſhell.

b, the modiolus.—I I, the firſt turn ; II II, the ſecond turn ; III III, the third turn ending in the cupola.

c to *i*, the lamina ſpiralis.—*c d*, the beginning of it ; *e*, a portion, which by its direction is ſeen on its under ſurface ; *f*, the lamina at the commencement of the ſecond turn, where we ſee its upper ſurface ; *g*, the lamina coming round ; *h*, the beginning of the third turn ; *i*, its termination in the infundibulum.

1 to 7, the under and ſmaller ſcala, or the ſcala tympani. The arithmetical order of the figures denotes its progreſs upwards.

d to *h*, the larger ſcala, or that of the veſtibulum. The alphabetical order of the letters points out its gradual riſe towards the top of the cochlea.

7, the point where the ſcalæ meet.

i 6, the infundibulum cut acroſs.

n n, the longeſt diameter of the cochlea.

Fig. X.—A perpendicular ſection of the bony cochlea ; I, II, III, its turns.

a to *c*.—*a*, the cupola of the cochlea ; *b*, the modiolus.

d, the bottom of the meatus auditorius internus.

e f g h i, the bony lamina ſpiralis ; *g h*, the hamulus.

1 2 3 4 5, the ſcala tympani.

k l m n, the ſcala veſtibuli.

Fig. XI.—The ampulla of the poſterior ſemicircular canal magnified to twenty times its natural ſize, to ſhew the radiated expanſion of the nerve.

a a, the ampulla ; *b b*, the portion joined to the alveus communis ; *c c*, the canal into which it contracts ; *d*, its opening ; *e*, the point where the nerve appears as a white ſpot, from which it radiates in all directions, *f*, *f*, *f*.

Fig. XII.—The ſhape of the area of theſe tubes.

Fig. XIII.—The fan-like expanſion of the nerve of the alveus communis, magnified by a power of twenty ; *a*, *b*, two arterial twigs.

Plate III.

The relative ſize and poſition of the organ of hearing, with regard to the ſkull in the adult.

a, the right os naſi.

b to *h*, the frontal bone.

d to *i*, the cribriform plate of the ethmoidal bone.

k to *o*, the parietal bone.

p to *u*, the temporal bone.—*s t u*, the ſquamous portion ; *p q u*, the petrous portion ; *q r*, the maſtoid part.

t v w x z, the ſphenoidal bone.

1, the canal for the carotid artery.

2, the paſſage for the auditory and facial nerves.

3, a fiſſure for a communicating branch between the ſecond branch of the fifth pair of nerves and the facial nerve.

5, the opening of the aquæductus veſtibuli.

On the left ſide, by the removal of ſome of the petrous portion of the temporal bone, we are enabled to diſtinguiſh plainly the external meatus paſſing under the membrana tympani, the bony ring ſupporting this membrane, and the oblique direction of the latter. We ſee alſo the oſſicula, the cochlea, the veſtibulum, and, laſtly, the three ſemicircular canals.

The Powers of the human Ear in diſtinguiſhing Sounds.

In proſecuting the ſecond diviſion of our ſubject, we ſhall ſoon be ſtruck with the conſideration, that the ear diſcriminates all the different qualities of ſounds, not only by its ſtructure, but by a judgment corrected by experience, aſſiſting moſt materially in forming our concluſions as to ſome of its qualities. We here then make a diſtinction of powers, and ſhould firſt examine thoſe ariſing from the mechanical conſtruction of the organ; and afterwards, thoſe depending on the correction of judgment: we ſhould not, however, inveſtigate the latter, until we have examined what proportion the ſubordinate parts of the organ bear in producing theſe effects; ſupporting our theory by the few facts we can draw from the ſource of comparative anatomy. After ſuch inquiry, obſerving the difficulty of adapting phenomena to mechanical ſtructure only, we ſhould be the better able to determine what ſhare judgment bears in their production. As the line of diſtinction between theſe powers is not, perhaps, clearly aſcertained, and as the degree of them, taken conjointly, has been more frequently the ſubject of obſervation and experiment, we ſhall give the ſimple hiſtory of the powers as deduced by obſervable phenomena, reſerving all examination of cauſes till we have gone through the received opinions, as to functions of different parts of the organ.

We are not to enter here on the theory of ſound, which will be conſidered at length in another place, but briefly mention the varieties diſtinguiſhable by the organ of hearing. They may be claſſed, ſufficiently for our preſent purpoſe, into thoſe dependent on the greater or leſs frequency of the vibrations; on the quantity, force, or momentum of the vibrating parts; and on the greater or leſs ſimplicity of each ſound: obſerving that, in all theſe caſes, we are to include the variations as to the duration of the ſound, the diſtance at which it commences, and the direction in which it comes.

On the firſt of theſe cauſes depends the *tone* or *pitch* of a ſound, as to its being grave or acute; and the degree of diſcrimination which a good ear poſſeſſes in this reſpect has been the ſubject of frequent obſervation and experiment. On the ſecond cauſe depends the *loudneſs* or *ſoftneſs* of a ſound, which the ear can accurately diſtinguiſh, as far as intenſity is concerned; but the difference between a loud ſound coming from a diſtance, and a ſoft one pulſating from a nearer point, is not perhaps to be determined with an equal degree of correctneſs. As to *ſimplicity of ſound*, the ear is ſo organiſed as to ſeize readily on the differences between one ſimple ſound and another; but it can determine only vaguely the differential proportions between two noiſes. If, at the ſame inſtant, many noiſes arrive at the ear, the loudeſt will drown the weakeſt, and make of it but a ſimple noiſe; but if they ſucceed each other, the ear can diſcriminate as to their intenſity and duration, but not as to tone. Noiſe is a multitude of ſimple ſounds, which the ear cannot ſeparate from each other, and which excite in this confuſed junction the idea of one ſound only. But where ſimple ſounds ſucceed each other, the ear appears to partake of each ſeparate vibration of the ſounding body, and diſcriminates with great accuracy: nay more, if ſimultaneous ſimple ſounds, ariſing from the vibration of different ſounding bodies, ſtrike the ear, it can perceive them all diſtinctly. It has not, however, this power of diſcernment to any very nice degree, excepting in perſons exerciſed in muſic: for although the ear can make the difference, ſounds are ſo analogous, their gradations ſo imperceptible, that an ear not corrected by judgment would ſtill confound them. To purſue this at preſent would lead us beyond our intention, which is to ſtate the power, without entering into its cauſe. Extremely ſenſible alſo is the faculty of the ear in diſtinguiſhing the quality, as well as the degree of tone. We know from experiment, that a muſical ear can diſtinguiſh nearly eight octaves as to pitch; but it can alſo ſtill perceive any variety of quality in the ſame note, or the difference ariſing from the law which governs each ſeparate vibration, and which conſtitutes the difference between inſtruments of different kinds, or different inſtruments of the ſame kind, or even the ſame inſtrument differently employed. It will thus diſtinguiſh clearly the character of the ſame note, given out by various inſtruments. The flute and the oboe may be in perfect uniſon, as to the pitch of the note, and as to its ſtrength; ſtill there will be always ſomething between theſe equal ſounds, which will not allow the ear to confound them: there will be a peculiar difference as to clearneſs, ſoftneſs, and other qualities, which a diſcriminating ear will inſtantly ſeize. We can diſtinguiſh very accurately alſo the modulations of voice and articulated ſounds; and ſome nations diſtinguiſh in their pronunciation certain letters, between which an ear unuſed to the ſound can perceive no difference. Every articulate word is a different modification of ſound, by which, when we reflect for an inſtant on the varieties of language, we ſee that the mind may be furniſhed with diſtinct ideas even to an infinite variety. There is another difference in the powers of the ear, which conſiſts in its being moſt delicately ſuſceptible of ſome of the qualities of ſounds, whilſt it is dull in perceiving others. It has, for inſtance, been obſerved, that a perſon capable of perceiving ſounds ſo low as to be totally unperceived by another in his company, has yet been far from having a correct ear in diſcriminating muſical ſounds. And the converſe of this holds equally good: the muſician, who can diſtinguiſh the ſlighteſt variation of tone, has been inſenſible to ſounds clearly perceived by a bye-ſtander. As an inſtance of accuracy of judgment ariſing from ſenſibility to ſounds, we ſhall mention an anecdote, told by Dr. Darwin, in his Zoonomia. "The late blind juſtice Fielding walked for the firſt time into my room, when he once viſited me, and, after ſpeaking a few words, ſaid, this room is about 22 feet long, 18 wide, and 12 high; all which he gueſſed by the ear with great accuracy."

Having ſtated thus ſhortly the power of the human ear in diſtinguiſhing the qualities of ſounds, we ſhall make a few remarks as to its faculty of determining the *diſtance* and *direction* from which they proceed. Its power of determining the duration of a ſound is obvious; that of diſtinguiſhing diſtance and direction is not ſo clearly defined, although every one is ſenſible of the exiſtence of them. Firſt, as to *diſtance*: it will appear from experiment, that a delicate ear will diſtinguiſh, with conſiderable accuracy, the diſtance from which a particular note begins to vibrate. A ſound, juſt audible at 240 feet, was diſtinguiſhed as being nearer at 40 feet than at 42, and at 38 than at 40; ſuch a power of diſcrimination muſt be allowed to be conſiderable, and to prove ſufficiently that the human ear is a very delicate judge of diſtance, as determinable by loudneſs of ſound. It cannot, however, always be depended on; and perhaps the diſtinction which the ear makes between the roughneſs and ſmoothneſs of a ſound is the beſt criterion by which it judges of proximity or diſtance; ſounds becoming perceptibly ſmoother as they are remote, and proportionally rougher as the ſound commences at ſome nearer point. The manner in which judgment influences this power will be conſidered further on. It has been found alſo by a rough experiment, that the ear can diſtinguiſh the *direction* of two ſimilar ſounds, proceeding from points which ſubtend an angle of about five degrees. Of ſuch ſpaces there are more than a thouſand in an hemiſphere, ſo that the ear can receive an impreſſion of about a thouſand different directions. By other experiments it would appear, that an horizontal difference of direction is not perceptible within the points ſubtending an angle of eight degrees, or the perpendicular difference within thoſe ſubtending ten degrees of elevation. Even this depends in a great meaſure on the force of a ſound; for unleſs it be of ſome ſtrength, though we can diſtinguiſh the general direction, we can by no means bring it within ſuch nicety of meaſurement.

The education of the ear to the nice diſcrimination of theſe differences, as well as to thoſe of muſical ſounds, together with the effects of attention in increaſing our ſenſibility of the pulſes of ſound, come to be conſidered after we have given the theory of hearing, as it is effected in the peculiar organ allotted for its accompliſhment.

Functions of the individual Parts of the Organ of Hearing.

In order to diſcover what part of the ear is more immediately concerned in the perception of ſounds, we ſhall exhibit a very ſhort comparative review of its ſtructure in thoſe animals in whom an organ of hearing has hitherto been diſcovered.

In *cray-fiſh*, and *the ſepiæ*, the organ is moſt ſimple, conſiſting of a ſmall cavity or veſtibule and a ſingle membranous tube, and in the latter genus the ſac includes a ſmall ſolid body or lapillus: in the interior of this receptacle the auditory nerve is expanded. The *ſpinous fiſhes*, in addition to the hollow of the veſtibule and membranous bag containing the lapilli, are provided with ſemicircular canals. The *cartilaginous fiſhes* have the veſtibule, the ſacculus for the lapilli, ſemicircular canals, and a feneſtra ovalis, defended by an operculum compoſed of a membrane and the ſkin, whilſt in the oſſeous fiſhes the whole organ is encloſed by bone. To the labyrinth of the *ſerpent* tribe, which is very ſimilar to the internal ear of the cartilaginous fiſhes, there is added an oſſiculum cloſing the feneſtra ovalis. In one of this order, the genus cæcilia, and in almoſt the whole of the four-footed *reptiles*, a membrana tympani is connected with this oſſiculum. In the other claſſes of *birds* and *mammalia*, we find an external paſſage leading to the membrane, and in the laſt of theſe an external cartilaginous auricle is annexed.

The obvious inference drawn from this view will be, that the whole of the apparatus, external to the labyrinth, is not abſolutely neceſſary to the perceiving of ſounds, becauſe many creatures we know are ſuſceptible of the impreſſion, who are entirely deſtitute of theſe parts of the organ. We ſuppoſe, indeed, that the additional apparatus is intended to collect and modify the pulſes of ſound in their progreſs towards the labyrinth, to give force to the ſlighteſt tremors, and to regulate the intenſity of the ſtrongeſt. Whatever be their office, it is proved beyond a doubt, that for the ſimple perception of ſound a membranous tube, or bag connected with the pulp of a nervous trunk, is fully ſufficient; and whatever be the variation in the ſhape of theſe, we ſhall find them in all caſes fundamentally the ſame. We ſay nothing of the manner in which the ſenſation of ſound is excited in the leſſer inſects and worms, as we cannot perceive any organ ſet apart for this purpoſe, though we know that they are, for the moſt part, ſenſible to its impreſſion. Among thoſe creatures which have been ſubjects of repeated obſervations, we may remark, that from the oſſeous fiſhes up to man, we always find the membranous ſemicircular canals connected with a common ſac in the veſtibule. As to the cochlea, it is clear, that from its being found in perfection only in the claſs of mammalia, it is by no means requiſite for ſimple hearing.

We conclude then, that the *labyrinth*, whatever be its form, is the moſt important part of the ear, inaſmuch as it contains thoſe ſoft parts immediately connected with the ſenſe of hearing; and by giving an account of the manner in which ſound is ſuppoſed to be impreſſed on thoſe parts in man, any one may readily deduce the effects it would have in every other inſtance.

The pulſes of ſound, having arrived at the membranes of the feneſtræ, are communicated to the aqueous contents of the labyrinth, and from them ſpread in every direction to the membranous receptacles ſupporting the auditory nerve; and not only will the fluid external to the membranous ſacs and their canals partake of the vibration, but alſo the whole of their gelatinous fluid contents, and conſequently the nervous pulp which is immerſed in them. The nerves of the ampullæ, of the alveus communis, and the ſacculus ſphericus, will all be excited by the tremor, and convey to the brain their peculiar ſenſations. As to the cochlea, we have deſcribed it as conſiſting of two ſcalæ, or hollow ſpiral cones communicating with each other at their apices, the baſe of one opening into the veſtibule, the other being terminated by the membrane of the feneſtra rotunda: they are both filled by the aqueous contents of the labyrinth, which will communicate the vibration to the delicate filaments of that portion of the nerve diſtributed to the zona mollis. And here we cannot but curſorily notice the care which nature appears to have taken, that this nervous pulp ſhould ſuffer no injury from rude and unexpected ſhocks, by including it in an elaſtic membranous receptacle floating in an aqueous fluid, as well as containing one within itſelf. There has been many an idle diſpute concerning the immediate ſeat of hearing, before the ſtructure of the organ had been the ſubject of ſucceſsful as well as minute inveſtigation. It has been placed excluſively in the canals, in the veſtibule, and in the ſpiral lamina of the cochlea; the inferences, however, furniſhed by a comparative review of this organ, will prove that it can be attributed in preference to no one particular diviſion of the nerve, the whole of which is ſenſible of the impreſſion. If we might hazard a conjecture, drawn from the ſame ſource, it would be, that the nervous pulp of the membranous ampullæ, and the ſacs in the veſtibule, is the moſt immediately concerned in the ſimple perception of ſounds; as to this part of the ſtructure there is an analogous formation in all the claſſes of animals.

It has been aſcertained by common obſervation, that ſounds can be impreſſed on the nerve, not only when propagated through the medium of the air, but that they affect it moſt powerfully when conveyed by the medium of the ſolid parts ſurrounding it. In thoſe animals, whoſe labyrinth is completely caſed in bone, this muſt neceſſarily be the only way in which ſounds can be communicated; the reaſon why in man, as well as in other animals who have a membranous opening, acted on by external air, the labyrinth ſhould be hollowed out of moſt compact bone, is not eaſily determinable. It has been conjectured, that the ſounds rebound from the bony channels to the nerves they ſurround; alſo, that we judge of the direction of ſounds by means of tremors communicated to the ſolid parts continuous with the labyrinth. This is rendered the more probable, as we cannot but ſuppoſe, that animals who poſſeſs this organ in its moſt ſimple ſtate, judge with ſome correctneſs of the direction of the point from which the ſound proceeds. Whatever be the direction of the ſound in the open air, when it enters the winding meatus externus, it muſt neceſſarily follow the courſe of that channel, and will in every inſtance be propagated to the tympanum and labyrinth in the ſame line of direction. However acute we may ſuppoſe the ſenſibility of the ear to be, we cannot conceive that under ſuch circumſtances it could diſtinguiſh the angular difference of direction, but that every ſound would appear to come from the ſame point; which we know not to be the caſe. How far the external ear is concerned in producing this effect, we ſhall briefly notice in the ſequel; and to render ourſelves the better judges, ſhall ſtate then what ſhare the ſolid parts have been ſuppoſed to take. It appears ſufficient here to obſerve, that the nerve can be impreſſed, and can diſtinguiſh direction without the apparatus of the external ear.

Speculations as to the reaſons of the particular form of the *ſemicircular canals*, we conceive, in the preſent ſtate of our knowledge reſpecting this organ, to be but a waſte of labour: their uſe we believe to be perfectly unknown. One fact we ſhall mention, which is, that in the oſſeous fiſhes, whoſe labyrinth is enveloped wholly in bone, we obſerve them to be particularly capacious, and deſcribing portions of large circles. With reſpect to the *cochlea*, the obvious point which would firſt ſtrike us is, that by means of it the expanſion of the auditory nerve is very conſiderably increaſed in the animals who poſſeſs it: we obſerve, alſo, that it is proportionally larger in quadrupeds than it is in man. Its relative importance to the organ cannot be preciſely determined, but it would appear that its exiſtence in the perfect ſtate in which we ſee it in quadrupeds and man, is not neceſſary for any of the nicer perceptions of ſound. Birds, in whom it is found of a ſimple conſtruction, in no wiſe approaching to the elaborate one of the other claſs, have a delicate feeling of all the qualities of ſound. This is proved by their learning to ſing with great correctneſs, and when their vocal organs permit them, by their imitating very accurately the human voice in all its tones and articulations. That the cochlea is not neceſſary for that correctneſs in hearing, which conſtitutes a muſical ear, is thus fully aſcertained. Whether it increaſes the ſphere of the perception, enabling animals who poſſeſs it, to hear thoſe low and gentle tremors, which would not affect an ear without this part, has not been at preſent aſcertained, nor from the difficulty of the inveſtigation do we ſee any probability of effecting it. We omit the different opinions reſpecting the uſe of the decreaſing lamina ſpiralis of the cochlea in modulating ſounds, or its office of perceiving excluſively ſome of their particular qualities, as we can ſee no foundation whatever on which to build them: and ſhall conclude this account of its negative properties by remarking, that although it is rational to ſuppoſe that ſome important purpoſe is anſwered by the conſtruction, we have as yet no data from which to draw a concluſion as to its extent.

The *feneſtra rotunda*, and its membrane, are found only in animals who poſſeſs a cochlea, one of the ſcalæ of which the membrane occludes, forming a ſeparation between it and the cavity of the tympanum. Its uſe is neceſſarily connected with that of the cochlea, and we conclude that it is to tranſmit to the fluid in that part the tremors which have been communicated to it through the air in the tympanum; we ſuppoſe it to be perfectly paſſive, influencing in no degree the quality of the ſound. We noticed, in the deſcription of the nerve of the cochlea, that it was moſt obſervable in the tympanic ſcala, with which the feneſtra ovalis immediately communicates. It is not improbable, therefore, that the impreſſions conveyed to this portion of the nerve paſs through the medium of the membrana feneſtræ rotundæ; the ſuppoſition, though conjectural, carries with it no direct abſurdity.

The *feneſtra ovalis* is another road by which we ſuppoſe ſounds to arrive at the labyrinth, and the importance of the opening and its membrane would appear to be conſiderable, ſince we find them in almoſt all animals, though its immediate office is not ſo clear. In the cartilaginous fiſhes it has been conſidered as performing the part of a membrana tympani, there being no parts exterior to it. In other animals the veſtibular feneſtra is occupied by a bone, between which and the rim of the opening there is apparent, more or leſs of a membrane.

The *cavity of the tympanum*, we have found very generally, when comparing the varieties of ſtructure, and coexiſting with it, certain additional parts, the uſes of which we ſhall now attempt to inveſtigate. In adding this diviſion of the machine, which includes ſeveral ſubordinate parts, it is a matter of no conſequence with which individual piece we begin our examination. They are found exiſting together, and we conclude therefore that they are immediately dependent on each other with regard to their functions, which can ſcarcely be ſuppoſed to be executed unleſs in mutual combination. Again, the configuration of the different pieces is ſo exceedingly different, that we are totally at a loſs to determine the value of any particular form of parts. Conſidered in its integral form, it appears as the medium through which ſounds are communicated to the labyrinth; and our object here is to aſcertain what changes it effects on them during their tranſmiſſion.

The oſſicula and the membranes are ſo immediately connected with each other, that it imports but little with which we next proceed: as, however, an oſſiculum is found in many animals, where the membrana tympani, (if indeed it deſerve the appellation,) appears immoveable from its ſtructure, we ſhall firſt examine the probable office of theſe ſmall bones, and afterwards that of the membranes to which they are attached, and the muſcles which, by their action, have an evident effect in altering their exiſting ſtates.

There is ſo ſtriking a variety in the form of the cavity, not only in different claſſes of animals, but in the different genera of the ſame claſs, that we can draw no probable concluſion as to the utility of the particular ſhape of it in man. Its depth from without inwards is ſuited to the length of the connected chain of the oſſicula, all of which are ſituated in its upper half in the human ſubject, ſo that a plane drawn parallel to the baſe of the ſtapes is deſcribed as dividing the cavity into equal halves. The feneſtra ovalis is thus placed in the middle of the interior wall, oppoſite to the centre of the membrana tympani, and immediately in the courſe of coming ſounds. The feneſtra rotunda is directed more downwards, ſo that the plane of its membrane forms an obtuſe angle with that of the feneſtra ovalis. From this poſition it has been ſuppoſed to be more particularly deſigned to tranſmit thoſe vibrations which have been reflected from the oppoſite bony hollow: and, as it is acted on immediately by the tremors of the air, it has been conſidered by Scarpa as a ſecond membrana tympani. As the feneſtræ differ in their proportional ſize in different animals, we cannot ſuppoſe any thing very material as depending on that circumſtance.

The cavity of the tympanum has communicating with it ſeveral *cells* hollowed out in the bony parietes of the ſkull: in man we have deſcribed theſe as exiſting chiefly in the maſtoid proceſs of the temporal bone. In other mammiferous animals they are irregularly diſpoſed; in the elephant, whoſe acuteneſs of hearing is very great, they exiſt in great numbers, the cells of one ſide communicating with thoſe of the other. In birds, but more particularly in the nocturnal birds of prey, theſe cells are extenſive, and particularly large; for inſtance, in the common white owl. The inference drawn from combining theſe facts will be, that theſe cells are in ſome manner aſſiſtant in the tranſmiſſion of ſound, and probably increaſe its force, as we obſerve them more particularly enlarged in thoſe creatures who are gifted with the power of perceiving the loweſt and moſt effete pulſes of ſound.

In every inſtance where we meet with a cavity of the tympanum we find a *tube* of different diameter and length, communicating with ſome other cavity in which the external air is conſtantly paſſing, ſo that the tube being pervious, the air penetrates to the part in which it opens. The air thus admitted fills all the cavities we have juſt now mentioned, as well as that of the tympanum, where its preſence would ſeem to be neceſſary for the ready tranſmiſſion of ſound. Its importance is beſt proved by obſerving what occurs in caſes where its tube is by ſome means cloſed, and in which the air can no longer gain an acceſs to the tympanum. Deafneſs always ſucceeds to a greater or leſs degree, and the cauſe of it is aſcertained by ſome marks which we need not dwell on here: it is enough for our preſent purpoſe to obſerve, that where an opening has been again made for the admiſſion of air, the ſenſe of hearing is at firſt painfully acute. The ear, having loſt its habit of perceiving, is ſo ſenſible to the ſudden return of the ſenſation as to feel much diſtreſs. The ſenſibility diminiſhes by degrees, and the ear again accommodates itſelf to its former mode of action. The opening a new paſſage for the air, by making a perforation through the membrana tympani, is not, however, conſtantly ſucceſsful in reſtoring the functions of the organ for any continuance; the cauſe of failure is not to be examined here, our object being to prove the neceſſity for air being admitted into the cavity, and not to eſtimate the manner in which it ſhould be effected: the organ is not neceſſarily perfect, becauſe air is found in the tympanum, but it is always imperfect if the acceſs for it is barred. Another uſe of the Euſtachian tube has been ſuppoſed to be that of giving admiſſion to ſounds when the hearer is anxiouſly endeavouring to collect them. It had been obſerved, that a man, attentively liſtening to any ſound, generally keeps his mouth half open, and it was ſuppoſed that this was to afford an additional channel for the arrival of ſounds to the internal ear. In oppoſition to this theory it is ſaid, that although we generally open the mouth when in the act of liſtening with attention, it is not for the purpoſe above ſtated, but that in depreſſing the lower jaw, we neceſſarily widen the aperture of the external meatus which is cloſely connected with it, and conſequently, that by this action, we facilitate the tranſmiſſion of ſound to the tympanum. Conſidering the latter uſe of the Euſtachian tube as rather problematical, we ſhall be contented with aſſigning to it its more obvious and important office, or that of conveying air to the cavity of the tympanum.

The *oſſicula* which croſs the tympanum have been ſuppoſed to act either as ſolid bodies, tranſmitting ſonorous vibrations, or merely as ſubordinate pieces concerned in giving different degrees of tenſion to the membranes with which they are connected. That they may execute in ſome extent both theſe functions is not improbable; becauſe in ſome animals they are not furniſhed with muſcles, and conſequently can have no power over the membrane with which they are connected, in which inſtance we can only ſuppoſe them to continue vibrations they have received. In other inſtances, however, where we obſerve a delicate membrana tympani, capable, from its conſtruction, of undergoing tenſion and relaxation, we always find the bones furniſhed with muſcles, which, acting through their intervention, can produce conſiderable alterations in the ſtate of the membranes. We know nothing as to the difference of perception ariſing from this different ſtate of the oſſicula, but from obſerving them to be provided with muſcles only in caſes where they can act with effect, we believe, that, in the latter caſe, their principal uſe is not that of tranſmitting ſounds, but of altering the tenſion of the membranes with which they are connected. In caſes of diſeaſe of the ear, theſe bones have been known to fall out, without very materially injuring the delicacy of the organ, provided they did not involve in their ſeparation the deſtruction of the membrane of the feneſtra ovalis. As we ſuppoſe their principal office to be allied to that of the membrana tympani, we ſhall conſider the latter more particularly before we can draw any inference as to their combined functions.

The oſſicula are provided with *muſcles* which can move them in different directions: the moſt powerful of theſe would appear to produce the effect of rendering more tenſe the membrane of the drum, and by the tranſmitted motion of the bones increaſing the tenſion alſo of the membrane of the veſtibular, or oval feneſtra. By their action they can produce no immediate effect on the membrane of the feneſtra rotunda, which they can only influence by the preſſure given to the fluid contents of the labyrinth. The importance of their acting thus on membranes occluding the openings to the labyrinth, does not appear to be very great, as in birds, whoſe delicacy in the perception of ſound has been already noticed, the plate of bone connected with the veſtibular feneſtra, cannot produce any effect of this kind: it is fitted ſo exactly to the opening, as to be incapable of being in any degree moved in its ſituation. In theſe creatures, the muſcle acting on their oſſiculum, can only affect, by its means, the membrana tympani, to which we refer alſo the chief uſe of the muſcles of the oſſicula in man. That they will alſo produce an alteration in the membranes of the feneſtra is highly probable; but the effects will be comparatively ſlight, when ſet by the ſide of thoſe alterations they will cauſe in the membrana tympani. The importance of their action on the labyrinth is rendered ſtill further of a doubtful nature, when we conſider the perfection of the organ, in caſes where the bones on which they act have been deſtroyed. We have obſerved, that the moſt powerful of theſe little muſcles will, by their action, increaſe the conical form of the *membrana tympani,* and render it more tenſe. It would appear to return, by its elaſticity, in ſome degree, to its former ſtate, as the relaxing power can be brought to act on it but feebly. We conjecture, from this circumſtance, that the membrane is always in a ſtate to tranſmit the pulſes of ſound; and that it is only when our attention is particularly directed to a low ſound, that the membrane is rendered tenſe: this ſuppoſition is, in ſome meaſure, ſtrengthened, by obſerving, that in birds, the muſcle which acts on their oſſiculum can produce the effect of tenſion only. It is, again, ſuppoſed, that in caſes of loud and impetuous ſounds, the membrana tympani in man, at leaſt, and animals ſimilar to him in ſtructure, can be in ſome meaſure relaxed. Granting that ſuch is the caſe, we would obſerve, that the membrana tympani and its muſcles are ſomewhat analagous in function to what we know of the iris: they are to be regarded as the regulators of the intenſity of ſounds; damping the force of the powerful, and facilitating the tranſmiſſion of the ſlight. This leads us to notice ſome further properties of theſe muſcles, as well as to make ſome obſervations on the uſe of the radiated muſcle of the tympanum, as deſcribed by Mr. Home. Are the muſcles of the tympanum to be conſidered as involuntary in their actions, or are they dependent in any degree on the will? We believe them to act independently of the will, and to be ſtimulated by the impulſe of ſound, in the ſame manner as the iris acts from the ſtimulus of light. It has been objected, that in ſuch caſe, their action would be too late; that the ſound would have paſſed the membrana tympani before it could be accommodated to its proper tranſmiſſion.

miſſion. The ſame objection would hold good with regard to the iris, where it may be ſaid that the retina would be impreſſed before the iris had time to alter the diameter of its aperture. How far the membrane is affected, in the inſtance of voluntary increaſed attention, cannot be aſcertained: that the external ear is directed more immediately towards the point from which the ſound proceeds, is, in all caſes, evident. With reſpect to the action of the radiated muſcle of the tympanum we can ſay but little: it can be but trifling, if we conſider the nature of the membrane, and the acknowledged delicacy of the muſcle, which, in man, has hitherto eſcaped our eye. Mr. Home remarks, "that the membrana tympani is ſtretched, in order to bring the radiated muſcle of the membrane itſelf into a ſtate capable of acting, and of giving thoſe different degrees of tenſion to the membrane which empower it to correſpond with the varieties of external tremors: when the membrane is relaxed, the radiated muſcle cannot act with any effect, and external tremors make leſs accurate impreſſions. If the tenſion given by the muſcle of the malleus be perfect, all the variation produced by the action of the radiated muſcle will be equally correct, and the ear truly muſical: if the firſt adjuſtment be imperfect, none of the effects of the action of the radiated muſcle will be correct." Such is the theory as to the uſe of the membrana tympani and its various muſcles, the oſſicula being conſidered as ſecondary agents only, and their articulations not deſigned to regulate the intenſity of violent impulſes, as communicated through themſelves to the feneſtra ovalis, but only to act with more correctneſs and accuracy on the membranes to which they are connected. We believe the tranſmiſſion of ſounds to be performed through the medium of the air in the tympanum, not wholly certainly, but in a conſiderable degree.

In ſuch a complicated machine as the organ of hearing in man, it is difficult and hazardous to affix the preciſe power of every individual piece, when we conſider, that in no caſe does it act ſingly, or uncombined with ſeveral others. The relative importance of each is more eaſily eſtimated; and we ſhall conclude the examination of this part of the apparatus, by obſerving the effects which enſue on their loſs. It is, we conceive, proved, by numerous obſervations, that the integrity of the membrana tympani is not neceſſary for the perfection of the mechaniſm of this organ. Many perſons, who have been able to drive ſmoke from the mouth in large volumes through the external meatus, have, nevertheleſs, retained great accuracy of ear: and it would appear, from ſome later obſervations, that the total deſtruction of the membrane does not neceſſarily produce deafneſs, or even any very perceivable defect in the organ. In an inſtance recorded by Mr. Aſtley Cooper, in which the membrana tympani of one ear was totally deſtroyed, and that of the other nearly ſo, by diſeaſe, it appeared that the deafneſs was inconſiderable, and that ſound was moſt readily perceived by the ear in which no trace of the membrane could be diſcovered. This proves that the membrana tympani may be deſtroyed without any great prejudice as to the power of catching low ſounds. Another circumſtance is, that, in the ſame caſe, the ear was nicely ſuſceptible of muſical tones, the individual playing well on the flute, and ſinging perfectly in tune. The power of accommodating the ear to differing intenſity of ſound was loſt for ſome time after the deſtruction of the membrane: it, however, gradually returned; and at the period of examination there was no diſtreſs ariſing from that deficiency. The inference drawn from theſe obſervations would be, that the membrana tympani is not materially concerned in giving either delicacy, or correctneſs of ear, that it may be deſtroyed without injuring eſſentially its functions, its principal uſe being to regulate "the impreſſions of ſound, and to proportion them to the expectation and power of the organ." In caſes where deafneſs follows the deſtruction of this membrane, it depends, moſt probably, from the diſeaſe having injured, at the ſame time, the membranes of the feneſtra, in which caſe, the fluid of the labyrinth would eſcape, and the auditory nerve inevitably loſe its power of perception.

The obvious uſe of the *external meatus* is to convey the vibrations of ſound, propagated through air, to the membrana tympani; and we find it, accordingly, only in thoſe animals who have a proper elaſtic moveable membrane, as in birds and mammalia. From the inflections and variations in dimenſion, in different parts of its courſe, it is evident that, from whatever point the ſound proceeds, it muſt ultimately ſtrike on the membrane in the direction of this paſſage, and be continued in the ſame line to the auditory nerve. The conſequence of ſuch formation would be, that the ear would in no caſe be enabled to determine the direction from which the ſound proceeded. The ſenſibility of its ſurface, as it approaches the tympanum, is very conſiderably augmented; and it has been conjectured that, by the wave of ſound acting on this part during its paſſage, notice is communicated to the muſcles of the membrana tympani, which are immediately ſtimulated to action. The different directions of the meatus in animals, as well as the differences in the form and obliquity of the membrana tympani at the bottom of it, are ſo numerous, and, apparently, irregular, as not to allow us to form any reaſonable conjecture as to the utility of their particular figure in the human ſubject.

The *pinna*, or that part of the external ear which lies without the head, would appear to be in no wiſe neceſſary for the perfection of the organ, as far as the perception of ſound is concerned, and it can be regarded as an acceſſary part only, ſuperadded to the meatus in quadrupeds and man. In the generality of quadrupeds the auricle is of a conical form, the apex of the cone terminating in the meatus, appearing thus calculated to collect ſonorous vibrations, and tranſmit them with increaſed energy to the internal parts. In man we cannot obſerve ſo much of this conical form in the concha, nor do we exactly perceive the utility of the different eminences and the intervening hollows. The probable ſuppoſition is, that they are concerned in directing towards the meatus, as towards a focus, all the waves of ſound impinging on their different ſurfaces. In order to favour the collecting of ſounds, we have found the auricle to be furniſhed with *muſcles* capable of moving it in different directions. In animals, who have it of a larger form, theſe muſcles are conſiderable both in number and ſtrength, and empower them to direct it with ready execution towards the point from which the pulſes proceed. Man, at leaſt in his civilized ſtate, would appear to have much leſs power in this reſpect. In the inſtance mentioned above, where the membranes of the drum were ſo materially injured, the muſcles of the external ear had acquired a diſtinct power of moving it upwards and backwards, which power was more particularly exerted when the attention was directed to catch an indiſtinct ſound. When the external ear moves, it is moſt commonly to accommodate its poſition to the direction of the ſonorous rays, to fix itſelf ſteadily in order to reflect them, and to ſtraighten the curved direction of the cartilaginous meatus. It is for the latter reaſon, perhaps, that in man we find no muſcle capable of depreſſing the pinna, as ſuch a movement would neceſſarily increaſe its curve, whilſt the motion, either upwards or backwards, would tend to make the paſſage more direct. The pinna has been removed in many inſtances where no material injury to the power of the organ has been afterwards obſervable: for a few days after there has been a ſlight deafneſs. but the ear has, in every caſe, ſoon recovered all its fineneſs of perception. Where the canal of the meatus has been covered by a continuation of the ſkin over it, there being no auricle connected with it, obſervation has proved alſo that the functions of the organ were perfect.

Such is the apparatus deſtined to convey to the ſenſorium the impreſſions of ſound. We have endeavoured to aſcertain the relative importance and functions of the individual parts, and ſhall now give the ſum of their united powers in man, tracing the progreſs of ſound from without. The pulſes of ſound, which come in contact with the external ſurface of the pinna, are reflected by its eminences and depreſſions, but more poſitively by the ſides of the hollow of the concha, and directed into the external meatus, where their energy is probably augmented. Arrived at the bottom of this tube, they ſtrike againſt the membrana tympani, which we ſuppoſe to alter its degree of tenſion in conformity to their force. The vibration excited by the ſonorous waves is continued with them acroſs the tympanum, by means of the air and the chain of oſſicula to the feneſtræ of the labyrinth, and the fluid it contains. The agitations of this fluid are communicated to the nervous ramifications immerſed in it, and the nerve conveys to the ſenſorium the peculiar impreſſion of the ſound. Further, that there are paſſages communicating with the labyrinth, and ending in widened ſacs on the interior of the ſkull, by means of which the motion of the fluid is regulated, and its accumulation to too great a degree prevented. We have obſerved alſo, that there remains ſtill another medium by which ſounds could be conveyed with ſome accuracy and force to the nerve, provided the communication was kept up by the vibrations of ſolid bodies: this we ſtated to reſide in the ſolid parts of the head. The concluſion, drawn from this review, will be, that the internal ear is alone ſufficient to perceive the qualities of ſounds, and that the parts exterior to it can only collect, tranſmit, and regulate the intenſity of them.

Having examined the powers of the ear as reſulting from ſtructure, we muſt ſtill look further for the explanation of ſome other faculties which the perfect organ poſſeſſes. We are not to enter here on the advantages which one ſenſe derives from the aſſiſtance of others, in correcting its imperfections, or enlarging its powers: we ſhall ſuppoſe ſuch to be proved with reſpect to the ear, and ſhall therefore only ſtate the inſtances in which they may be obſerved. One of theſe is ſeen in the faculty we poſſeſs of determining the diſtance of the ſounding body. We mentioned before, that when ſounds proceeded with equal forces from the ſame body, the ear was capable of diſtinguiſhing the alteration of diſtance by the difference of the ſtrength or weakneſs of the wave. This power we conceive to be acquired by experience, and that it is ſo, may be rendered further probable by obſerving that loud ſounds coming from a diſtance, and fainter ones pulſating from a nearer point, provided the tone is the ſame, cannot be diſtinguiſhed unleſs by a judgment derived from other ſources. The ſame may be ſaid of the power of aſcertaining direction, which is a ſecondary faculty depending for its perfection on the aſſiſtance of the other ſenſes. It has been ſuppoſed by Mr. Gough, and the theory has been ſupported by ſome ingenious and concluſive experiments, that the ſolid parts of the head are the means by which we judge of the point from which the ſound proceeds. Having proved, by experiment, that the head is a ſenſitive ſolid, and capable of perceiving impulſes made on it by ſounds much more exquiſitely than men generally imagine, he makes ſome obſervations on the relative degree of its ſenſibility in different parts, and adds, "the ſenſation in queſtion being but of little uſe, independently of its connection with hearing, we, for the moſt part, miſtake its true ſituation, and refer it to the organs of this ſenſe. Seeing, however, that we are convinced, by a delicate ſort of touch, what part of the head is affected by the ſtrokes of the ſonorous object, and at the ſame time well acquainted with the form of this member of the human body, we judge accurately what is the ſituation of the excited portion of it, relative to the centre of the axis of hearing:" which he has ſuppoſed to be in an imaginary ſtraight line joining the two ears. We are taught alſo, by experience, to judge of the lateral direction of ſounding bodies according as they ſtrike both the ears with equal or different degrees of force: the perception which determines the poſition to be before or behind the hearer, is determined in the manner above explained. The diſcernment of the ear, then, has its bounds, becauſe the ſounding bodies are not ſubject to the touch, and we can determine diſtance, as well as direction, by judgment only. In the ſame way we know alſo the poſition of a body; and this can only be acquired by exerciſe. If a deaf man was ſuddenly to hear, he would be able to judge with correctneſs of neither: he would be miſtaken, if he has not beforehand ſtudied the nature of the ſounding object, and the varieties of impreſſion reſulting from its different ſituations.

Although the organ of hearing is double, it does not follow that we muſt hear a ſimple ſound twice; the two impreſſions which the ſame tone makes on them both are received by correſponding parts, and tranſmitted at the ſame inſtant to the ſenſorium: the two impreſſions are thus regarded as one, and excite, conſequently, but a ſimple ſenſation: it is exactly the ſame as in the caſe where the object is painted at the ſame inſtant on both the organs of viſion. The differences of power in the ears of different individuals, would appear to depend on ſtructure as well as exerciſe. The correct muſical ear ariſes, in a great degree, from original formation, but its exquiſite accuracy, as we obſerve it in perſons exerciſed continually in the ſcience of muſic, is derived, beyond doubt, from education. The high finiſh which the organ attains by this conſtant attention to muſical ſounds, appears in a moſt ſtriking light, when compared with the undiſtinguiſhing perceptions of the untutored ear. An equality of power in the two ears does not appear to be neceſſary in order to complete the organ as affected by muſical ſounds. Inſtances are every day met with of perſons with ſlight deafneſs of one ear, who are nicely correct in perceiving every variation of tone. To complete the perfection of the ſenſe in every inſtance, it ſeems neceſſary that the organ ſhould diſpoſe and accommodate its action to the impulſe, that it ſhould be on the alert to catch the low tremor of a faint and indiſtinct ſound. It is in ſuch caſes that we obſerve the increaſed energy of the ear when the attention is particularly called forth. Such are the circumſtances and conditions which influence, in a manner, more or leſs direct, the perfection of the organ of hearing; and we ſhall conclude by ſaying a few words on its peculiar pleaſures.

The pleaſures of the ear conſiſt, independently of thoſe of articulated language, in the ſucceſſion of ſounds according to the laws of harmony. We are not ſo well pleaſed with one ſound, as with an entire air, which cauſes joy or ſorrow, pleaſure or pain, by ſome unknown change which it is ſuppoſed to produce on the organ. Muſic pleaſes more as the ear is leſs exerciſed to it: tunes ſimple and unpoliſhed pleaſe at firſt: if we accuſtom the ear to their effects, we ſoon ſeek for more finiſhed and compounded airs, which, at firſt, were far from pleaſing. Muſic thus becomes a ſource of new pleaſures, ever varying her combinations to ſuit the educated organ. This can only occur to any high degree in well organized ears; there are ſome to whom muſic is ever but a noiſe. The cauſes of the pleaſure reſulting from harmony and melody are very far from being ſatisfactorily explained, notwithſtanding the ſagacious conjectures and repeated attempts of the moſt able metaphyſicians, as well as phyſiologiſts: we know no more of them than we do of the cauſes of the pleaſures and pains of all the other ſenſes.

The ear, then, is an organ of ſenſe, ſubjected but incompletely to the will, and unable to withdraw itſelf from the impreſſion of every impulſe of ſound: it is on this account, provided with a certain regulating apparatus, which modifies the action of the external agent, and is further aſſiſted by judgment, as acquired from the other ſenſes. Gifted with theſe powers, and alive to all theſe pleaſures, we once more ſee this beautiful organ perfect in all its parts, capable of exciting in us, with immeaſurable rapidity, that infinite number of ideas which reſults from the ſenſe of hearing.

In the deſcription of the ear, as far as it is contained under the article Cranium, we mentioned the comparative merits of the different authors who had written on that ſubject. The reader will find ſome further information as to its functions, in ſome papers by Mr. Home and Mr. A. Cooper, in the Philoſophical Tranſactions for 1800, 1801, and 1805; in an eſſay by Mr. Gough, in Mancheſt. Mem. vol. v.; and in Haller Element. Phyſiol. vol. v. He will find alſo a complete catalogue of authors on this ſubject in the ſecond vol. of Dr. Young's Natural Philoſophy. See alſo the article Acoustics for further references to ſubjects connected with this organ.

Several naturaliſts and phyſicians have held, that cutting off the ear rendered perſons barren and unprolific; and this idle notion was what firſt occaſioned the legiſlators to order the ears of thieves, &c. to be cut off, leſt they ſhould produce their like.

The ear has its beauties, which a good painter ought by no means to diſregard; where it is well formed, it would be an injury to the head to be hidden. Suetonius inſiſts, particularly on the beauties of Auguſtus's ears; and Ælian, deſcribing the beauties of Aſpaſia, obſerves ſhe had ſhort ears.

Martial alſo ranks large ears among the number of deformities. Felibien.

Among the Athenians, it was a mark of nobility to have the ears bored, or perforated. And among the Hebrews and Romans, this was a mark of ſervitude.

Loſs of one ear is a puniſhment enacted by 5 and 6 Ed. VI. cap. 4. for fighting in a church-yard; and by 2 and 3 Ed. VI. cap. 15. for combinations to raiſe the price of proviſions, labour, &c. if it be the third offence, beſide pillory, and perpetual infamy, or a fine of 40*l.*

By a ſtatute of Henry VIII. maliciouſly cutting off the ear of a perſon is made a treſpaſs, for which treble damages ſhall be recovered; and the offender is to pay a fine of ten pounds to the king. 37 Hen. VIII. cap. 6. § 4. In the index to the Statutes at large, it is ſaid, that this offence may be puniſhed as felony, by 22 and 23 Car. II. cap. 1. § 7. commonly called Coventry's act; but ear is not mentioned in that ſtatute.

Ear, in *Botany*, is alſo applied to a long cluſter of flowers, or ſeeds, produced by certain plants: and uſually called, by botaniſts, *ſpica*. The flowers and ſeeds of wheat, rye, barley, &c. grow in ears. The ſame holds of the flowers of lavender, &c.

We ſay, the ſtem of the ear, *i. e.* its tube, or ſtraw; the knot of the ear; the lobes, or cells, wherein the grains are encloſed; the beard of the ear, &c. great numbers of ears of wheat have been known to ariſe from the ſame root.

Ear, in *Conchology*. See Auris Dianæ, &c.

Ear, in *Gardening*, a name given to the ſeminal leaves of plants, or thoſe two green and ſucculent leaves which firſt appear from the ſeed, and are very different, in all reſpects, from thoſe which follow. Thus in the melon plants, the two firſt leaves are called ears; and the leaves, with their ſtalks, which ſhoot out afterwards, are called knots, and denominated the firſt, ſecond, and third knot, according to their place, and time of growing. The cutting off every third knot in this plant, is the great means of procuring the fineſt and largeſt fruit. Phil. Tranſ. N° 45.

Ear, in *Muſic*, denotes a kind of internal ſenſe, whereby we judge of muſical ſounds and harmony; they who poſſeſs this ſenſe are ſaid to have a good ear. And the like diſtinction we ſhould, probably, acknowledge in other affairs, had we got diſtinct names to denote thoſe powers of perception by.

Thus, a greater capacity of perceiving the beauties of painting, architecture, &c. is called a *fine taſte*. See Taste.

Ear *of Birds*. See *Anatomy of* Birds.

Ear *of Fiſhes*. See Fish.

Ear-*ach*, in *Surgery*. See Otalgia.

Ear, *running of the*, in infants. See Infant.

Ear, *tingling of the*. See Tinnitus.

Ear, *Jews*, in *Natural Hiſtory*. See Auricula *Judæ*.

Ear *of Corn*, and *Ermine, order of*, in *Heraldry*, ſo called from the collar, an order of knighthood, inſtituted by Francis I. duke of Britany, for 25 knights of noble deſcent. The badge of the order was an ermine on a mount enamelled proper; round the mount the following motto, Amavie. The collar was compoſed of ears of corn interlaced.

Ear-*picks*, are inſtruments of ivory, ſilver, and other metal, ſomewhat in form of a probe, for cleaning the ear. The Chineſe are particularly fond of entertaining themſelves with picking and tickling their ears; this they do either for themſelves, or interchangeably for one another, and have a great number of inſtruments of peculiar ſhapes and ſtructure, invented for this purpoſe. But ſir Hans Sloane very judiciouſly obſerves, that the uſe of them ſeems very prejudicial; for that, among many people in England who had applied to him on account of deafneſs, the far greater part were thrown into their complaints by too often picking their ears, and thereby bringing humours, or ulcerous diſpoſitions, on them. Phil. Tranſ. N° 246. p. 406.

Ear *ring*. See Pendant.

Ear-*ſhell*. See Auris *Marina*.

Ear-*wax*. See Wax.

Ear *wig*. See Forficula.

EARCH, in *Geography*, a river of North Wales, which runs into the ſea near Pwllhely, in Caernarvonſhire.

EARED Owl, in *Ornithology*. See Strix.

EARINÆ Vestes, from εαρ, *ſpring*, among the ancient Greeks, a habit worn in the ſpring, which was made of wool, and dyed green. The cuſtom of wearing green veſtments in this ſeaſon has not been unknown in modern times.

Dempſter ſays, it was cuſtomary, in his time, for the king, and nobility of England, to go a hunting in the ſpring, dreſſed in green, that they might be of a ſimilar colour with the ſeaſon.

EARING, in a ſhip, that part of the bolt-rope, which, at the four corners of the ſail, is left open, in the ſhape of a ring. The two uppermoſt parts are put over the ends of the yard-arms, and ſo the ſail is made faſt to the yard; and into the lowermoſt earings the ſheet and tackles are ſeized, or bent at the clew.

Earing, *Third*, in *Huſbandry*. See Third.

EARL, an Engliſh title of honour, or degree of nobility, next below a marquis, and above a viſcount.

Earls were anciently attendants, or aſſociates of the king in his councils, and martial expeditions; much as comites, counts, were of the magiſtrates of Rome, in quality of deputies, to execute their offices for them.

Hence, alſo, earls are called, in Latin, *comites;* in French, *comtes*, counts, &c. The Germans call them *graves*, as landgrave, marcgrave, palſgrave, &c. The Saxons, *ealdormen;* the Danes, *eorlas;* and the Engliſh *earls*.

Earl was a conſiderable title among the Saxons: it is obſerved to be the moſt ancient of any of the peerage; and that there is no other title of honour in uſe among the preſent nobility, which was likewiſe uſed among the Saxons, beſide it. The original titles of honour among the Saxons were, *edeling*, *calderman*, and *degen*, or *degn*. The firſt appropriated to thoſe of the royal family; the other two to the reſt of the nobility; only the thani were afterwards diſtinguiſhed into majores and minores. *Comes* in Latin, *alderman* in Saxon, and *earl* in Dane-Saxon, were ſynonymous. See Alderman.

Originally the title earl always died with the man. William the Conqueror firſt made it hereditary; giving it in fee to his nobles, and annexing it to ſhires and counties; for the ſupport of the ſtate thereof, he allotted the third penny out of the ſheriff's court, iſſuing out of all pleas of the ſhire from which the earl took his title. Accordingly, it became uſual in creating an earl, to erect a certain territory into a county or earldom, and to beſtow it upon the perſon and his family; and alſo to give him a fixed ſalary, commonly about 20*l*. a year, in lieu of his third of the fines. The diminution of his power kept pace with the retrenchment of his profit; and the dignity of earl, inſtead of being territorial and official, dwindled into perſonal and titular. But earls are now created by patent, without any authority over, or particular relation to, their counties; and without any profit ariſing thence, except ſome annual ſtipend out of the exchequer, for honour ſake. The number of earls being of late much encreaſed, and no more counties being left for them, ſeveral of them have made choice of ſome eminent part of a county, as Lindſey, Holland, Craven, &c. Others of ſome town, as Marlborough, Exeter, Briſtol, &c. And others, of ſome village, or their own ſeat, park, &c. as Godolphin, Bolton, Danby, &c.

Some earls we have, who are not local, *i. e.* not dignified from any places, but from noble families, *viz.* earl Rivers, and earl Paulet. A third is denominated from his office, *viz.* earl Marſhal.

Earls are created by cincture of ſword, mantle, a cap, and a coronet put on his head, and a charter in his hand. Their title is, *moſt potent and noble lord*. Their coronet has the pearls raiſed on points, with leaves between.

Their place is next to a marquis, and before a viſcount; and as in very ancient times, thoſe who were created counts, or earls, were of the blood royal; our Britiſh monarchs to this day call them in all public writings "truſty and well beloved couſin;" an appellation as ancient as the reign of Henry IV., who, being either by his wife, his mother, or his ſiſters, actually related or allied to every earl then in the kingdom, artfully and conſtantly acknowledged that connexion in all his letters and other public acts; from whence the uſage has deſcended to his ſucceſſors, though the reaſon has long ago failed. They alſo originally did, and ſtill may, uſe the ſtyle of *nos*.

Earl-*marſhal* is one of the great officers of the crown; who takes cognizance of all matters relating to honour and arms, determines contracts that reſpects deeds of arms out of the realm upon land, and matters concerning war within the realm, which cannot be determined by common law, in which he uſually proceeds according to the civil law. He had, anciently, ſeveral courts under his juriſdiction, as the court of chivalry, now almoſt forgotten; and the court of honour. See Court *of Chivalry*.

He has alſo ſome pre-eminence in the court of marſhalſea, where he may ſit in judgment againſt criminals offending within the verge of the court; whence the chief officer under him is called *knight marſhal*. Under him is alſo the herald's office, or college of arms. See College and Court.

Mr. Camden, in his diſcourſe concerning the etymology, antiquity, and office of earl-marſhal of England, attributes the firſt uſe of the word "mareſcallus" in England to Petrus Bleſenſis, ſecretary to king Henry II.; and he ſays, that the firſt mention he could find of a marſhal on record is in the red book of the exchequer, written, as he erroneouſly ſuppoſes, in the time of that king, not having reference to the reign of Henry I., and that the ſecond mention of marſhal is in the firſt year of king John, and adds, that the marſhal had not any precedency in reſpect of his place, until king Henry VIII. in the 31ſt year of his reign, by act of parliament, aſſigned him place next to the lord conſtable and before the lord admiral; and that king Richard II. created the earl of Nottingham (Thomas Mowbray) "earl marſhal of England," whereas in former times they were ſtyled only "marſhals of England." Camden, however, in a ſubſequent diſcourſe, concerning the original and ſucceſſion of the earl marſhal of England, and alſo in his Britannia, receded in part from his former opinion, and allowed the inſtitution of a marſhal in England to have been coeval with the reign of William the Conqueror; and this is the generally received opinion. That the term marſhal was uſed as a ſurname in the time of the conqueror is evident from "domeſday," where divers perſons under the denomination of marſhal are found to hold lands: and, upon the whole, there are ſo many concurring teſtimonies of the office of marſhal being known in this kingdom almoſt immediately after the Norman invaſion, that there cannot remain the leaſt doubt of its having been brought hither by William I. The earl marſhal appears to have been from the firſt eſtabliſhment of his office in this kingdom, an officer of great authority and dignity both in war and peace. The office of grand ſerjeanty, and the inſtitution of the high officer who enjoys it, muſt be alone the king's, who creates him by letters patent under his great ſeal, and at the ſame time, for his better diſtinction and greater ſtate, delivers to him a rod, which he is thenceforth conſtantly to bear in his hand. This rod was originally made of wood, and like the tipſtaff which is carried by the modern marſhalmen: but when king Richard II., in the 20th year of his reign, regranted the office to Thomas, earl of Nottingham, and the heirs of his body, that monarch, in order to enhance the grandeur and honour of this new marſhal, by the patent of his creation, directed that he and the heirs of his body "earl marſhals," ſhould, in the royal preſence, and at all other times, bear and carry a rod of gold, tipped at each end with black enamel, and having the royal arms at the upper end, and the arms of the ſaid earl on the lower; ever ſince which time the earls marſhal have borne the like official badge. It is difficult to aſcertain the reſpective periods in which this officer acquired the ſeveral ſtyles of "marſhal of England" and "earl marſhal of England." The earlieſt patent by which the appellation of "earl" was added to marſhal of England, is that of the 12th of January, in the 9th year of king Richard II., granted to Thomas Mowbray, earl of Nottingham, and conſtituting him earl marſhal of England, to hold to him and his heirs male of his body; and yet the ſtyle of "comes mareſcallus" was far more ancient, and probably aroſe from the perſons on whom the office of marſhal was uſually conferred, being *earls* or *comites*, at or before the time of their inveſtiture; the word "comes" being uſed in theſe early ages as a ſtyle of office and judicature, and not as a title of dignity. This office, though frequently hereditary, hath not been always ſo; on the contrary, the limitations in the grants that have been made of it vary from time to time. However the limitations in king Edward Iſt's re-grant of the office to Roger Bigod, earl of Norfolk, were more general, *viz.* "to him and the heirs of his body."

Henry Howard, baron Howard of Caſtle-Riſing, and earl of Norwich, was, by letters patent, dated 19th October 1672, conſtituted "hereditary earl marſhal of England," with limitation, in default of iſſue male, to the heirs male of his grandfather, Thomas earl of Arundel, &c. with remainder to the late earl of Suffolk and his heirs male, remainder to Charles Howard, earl of Nottingham, and his heirs male. On the death of his elder brother, Thomas, duke of Norfolk, earl of Arundel, Surry, &c. which happened in 1677, he ſucceeded to the dukedom, and all other his honours and eſtates.

The office of earl-marſhal is hereditary in the family of Howard, and enjoyed by the duke of Norfolk, the principal branch thereof; though, till of late, on account of the religion of the duke of Norfolk, which rendered him incapable of adminiſtering it in perſon, it was diſcharged by deputation; but yet it is to be obſerved, that it was not given out of the name and family of Howard.

EARN, in *Geography*, a river of Scotland, which riſes in Loch Earn, and joins the Tay a little below Perth.

EARNEST, called by the civil law *Arrhæ*, and interpreted to be *emptionis venditionis contractæ argumentum*, money advanced, or any portion of goods delivered, to complete or aſſure a verbal bargain, and bind the parties to the performance thereof.

By the civil law, he who recedes from his bargain, loſes his earneſt; or, if the perſon who received the earneſt give back, he is to return the earneſt double. But, with us, the effect of earneſt is more: the perſon who gave it is, in ſtrictneſs, obliged thereby to abide by his bargain; and, in caſe he decline it, is not diſcharged upon forfeiting his earneſt; but may be ſued for the whole money ſtipulated. The property of the goods is abſolutely bound by it; and the vendee may recover the goods by action, as well as the vendor may the price of them. And by 29 Car. II. cap. 3. no contract for the ſale of goods, to the value of 10*l.* or more, ſhall be valid, unleſs the buyer receives part of the goods ſold by way of earneſt on his part, or unleſs he gives part of the price to the vendor by way of earneſt, to bind the bargain, or in part of payment; or unleſs ſome note in writing be made and ſigned by the party, or his agent, who is to be charged with the contract. With regard to goods under the value of 10*l.* no contract or agreement for the ſale of them ſhall be valid, unleſs the goods are to be delivered within one year, or unleſs the contract be made in writing, and ſigned by the party, or his agent, who is to be charged therewith. Anciently, among all the northern nations, ſhaking of hands was held neceſſary to bind the bargain; a cuſtom which we ſtill retain in many verbal contracts. A ſale thus made was called "*handſale*," "venditio per mutnam manuum complexionem." Hence in proceſs of time the ſame word was uſed to ſignify the price or earneſt, which was given immediately after the ſhaking of hands, or inſtead of it. See CONTRACT and SALE.

EARNING, or YEARNING, a name uſed in ſeveral parts of the kingdom for rennet. See RUNNET.

EARSH. See EDDISH.

EARTH, in *Aſtronomy*, is a primary planet, belonging to the ſolar ſyſtem. We ſhall firſt treat of its various motions, and afterwards of its figure and magnitude.

There are three principal motions of the earth: a motion of rotation on its own axis; a motion in an orbit round the ſun; and a motion of its axis round the poles of the ecliptic. Theſe three motions are all mathematically derived from one ſingle impulſion, ſuppoſed to be given to the earth at its origin, and combined with the continued action of the ſun.

The rotation of the earth on its axis, called its diurnal motion, is the moſt uniform we are acquainted with. It is performed in $23^h\ 56'\ 4''.1$ of mean ſolar time, or one ſidereal day.

The earth, or, more ſtrictly ſpeaking, the common centre of gravity of the earth and moon, deſcribe an orbit round the ſun, which orbit is of an elliptic form of ſmall eccentricity; the ſun being placed in one of its foci. If we ſuppoſe the plane of this orbit extended to the fixed ſtars, it will trace in the heavens a circle called the ecliptic. The plane of the earth's equator, which remains very nearly parallel to itſelf during the whole of this revolution, is inclined to the ecliptic in an angle of 23° 28′. The points in the earth's orbit, which are interſected by this plane, are called the equinoctial points. See ECLIPTIC.

The motion of the earth in its orbit is very far from uniform; but it is ſo far regular, that, with the exception of ſome ſmall inequalities cauſed by the action of the moon and planets, the radius vector, or line joining the centres of the earth and ſun, deſcribes equal areas or ſectors of the ellipſe in equal times. See ELLIPTIC *Motion.*

The third motion of the earth, we have to notice, is that which produces the preceſſion of the equinoxes. The motion of rotation having produced a protuberant form in the equatorial regions of the earth, the continued action of the ſun and moon on this ſurrounding maſs or annulus produces a rotatory motion in the axis of the earth round the axis of the ecliptic; the inclination of theſe axes remaining the ſame. This revolution is accompliſhed in 27,000 years. The reader will find a farther inveſtigation of this motion under *Preceſſion of the* EQUINOXES.

Of the Phenomena cauſed by the diurnal Motion of the Earth.

The diurnal motion of the earth from weſt to eaſt cauſes an apparent motion of the heavens from eaſt to weſt. A very correct idea of this general motion of the ſphere may be formed by inſpecting a celeſtial globe, previouſly rectified for the latitude of the place; recollecting, however, that the convexity of the one repreſenting the concavity of the other, the conſtellations are neceſſarily reverſed, thoſe appearing to the right on the globe which are to the left in the heavens.

If the axis of the earth be prolonged each way till it intercepts the heavens, it will there form the two points called the poles, round which ſtationary points the heavens will appear to revolve. With us the north pole is the elevated pole; and the ſtars near it will deſcribe ſmall cirles, increaſing with their diſtance from the pole, till they arrive at a certain diſtance, when a portion of the circle will be intercepted by the horizon. As the polar diſtance of the ſtars ſtill increaſes, they will continue for a longer time above the horizon; ſtill, however, riſing and ſetting north of the eaſt and weſt points of the horizon, till they reach the equator. At this diſtance from the pole, they riſe exactly in the eaſt, and ſet exactly in the weſt; and at their greateſt altitude, their diſtance from the zenith is obſerved to equal the elevation of the pole above the horizon. As the ſtars recede from the equator towards the ſouth, they deſcribe ſtill ſmaller arcs, continue for a leſs time above the horizon, and riſe and ſet nearer the ſouth point. When they approach this limit, they continue viſible only for a few minutes, and no ſooner appear on the meridian than they are again carried down by the general motion of the heavens below the boundary of our view. The ſun, moon, and planets, appear to partake in great meaſure of the diurnal motion of the heavens; they deſcribe nearly the ſame courſe as a fixed ſtar would do in the ſame ſituation. The diurnal motion of the moon, from its vicinity to the earth, differs a little from that of a ſtar, independently of its own proper motion in its monthly orbit. This ſmall difference is called its parallax. See PARALLAX.

The change from day to night is cauſed by the diurnal motion of the earth on its axis; and the viciſſitudes of the ſeaſons, by the combination of this motion with its annual revolution round the ſun.

Of the Phenomena which ariſe from the annual Motion of the Earth in its Orbit.

The annual motion of the earth round the ſun is performed in an orbit, the plane of which is inclined to the equator at an angle of about 23° 28′. This orbit, being extended to the heavens, traces there the great circle of the ſphere, called the *ecliptic* (which ſee). The effect of the earth's motion in its orbit is to cauſe the apparent annual motion of the ſun. When the earth is in any one point of its orbit, the apparent place of the ſun will be in the direction of the oppoſite point; and the apparent path of the ſun will be ſimilar to that actually traced by the earth; and theſe two bodies will always be in oppoſite poſitions to each other. It was not till aſtronomy had arrived at a ſtate of great perfection, that ſufficient proofs could be collected to aſcertain with certainty which of theſe bodies was really in motion. It appears by arguments which are incontrovertible, and which we ſhall hereafter enumerate, that there no longer remains any reaſonable doubt upon this ſubject.

The earth's motion in its orbit is not uniform. This is inferred from the correſponding irregularity that takes place in the apparent motion of the ſun. This irregularity, which was firſt diſcovered by Hipparchus about 140 years before the Chriſtian era, perplexed aſtronomers for many ſucceeding ages. The immediate effect of this inequality in the ſun's apparent motion is to cauſe an unequal diviſion of the ſeaſons. Various cycles and epicycles were invented to explain theſe inequalities; but their true cauſe was not underſtood, till the great diſcovery of Kepler explained it, by aſſigning to the apparent ſolar orbit its true elliptic figure; and, moreover, eſtabliſhing the curious law, obſerved to prevail likewiſe in the other planetary orbits, namely, that the revolving body always deſcribes equal areas in equal times. See ELLIPTIC *Motion.*

The difference of ſeaſons, of climates, and the inequality in the length of the days and nights, all ariſe from this circumſtance, that the plane of the earth's orbit is inclined to that of the equator, which is the plane of its diurnal motion.

If a ſtraight line be ſuppoſed always to connect the centres of the earth and ſun, this ſtraight line or radius vector will always trace the ecliptic in the heavens; and the point where it intercepts the ſurface of the earth, (ſuppoſing it a perfect ſphere,) will be that over which the ſun is vertical. Now it is evident, that, in the upper or north part of the earth's orbit, this line will intercept ſome point to the ſouth of the equator; and, on the contrary, when the earth is in the lower or ſouthern part of its orbit, this line will intercept ſome point to the north of the equator: the circle bounding light and darkneſs being always perpendicular to this line, the circles parallel to the equator will be unequally divided at different parts of the orbit, in the ſame manner as we obſerved them to be by the horizon, when we conſidered the phenomena of the diurnal revolution of the earth.

Fig. 68, *Plate* IX. *Aſtronomy*, is intended to illuſtrate this. C S C is the earth's orbit projected into a ſtraight line, the eye being ſuppoſed in the ſame plane; the earth being in the upper or moſt northern part of its orbit, the line S C, joining the centres of the ſun and earth, evidently paſſes through a point, p, whoſe angular diſtance from E, the equator, is equal to the inclination of the equator to the ecliptic, or angle E C S. On the contrary, when the earth is at its loweſt part of the orbit, the point, p, falls to the north of Q, by the ſame quantity.

The inequality in the diſtribution of the ſeaſons, (by which at preſent the inhabitants of the northern hemiſphere of the globe enjoy a greater portion of the ſun, by about eight days in the year, than thoſe of the ſouthern hemiſphere,) ariſes from a very different cauſe, which we ſhall endeavour to explain.

The great circle in the heavens, called the ecliptic, is in fact the perſpective repreſentation of the ellipſe in which the earth performs its orbit: all the irregularities, therefore, of the original will be transferred to the circle which repreſents it; and the four portions intercepted by the equinoctial and ſolſticial points, though repreſented each by an arc of 90°, will not be deſcribed in equal times, becauſe they do not repreſent ſuch portions of the ellipſe as are originally ſo deſcribed. The point of the ecliptic, repreſenting that point of the ellipſe in which the ſun and earth are neareſt to each other, is called the perigee; and the ſummer and winter months never can be equal, but in the ſingular inſtance of the coincidence of the perigee with one or other of the equinoctial points. The ſolar perigee does not remain fixed, but has a progreſſive motion in the ecliptic, which it paſſes over in about 20,000 years. It is a remarkable circumſtance, that this curious coincidence of the perigee with the autumnal equinox took place about the time when chronologiſts ſuppoſe the world to have been created, or about the year 4000 A.C. At that time each hemiſphere enjoyed an equal portion of the ſun's light and heat; ſince that time, the northern hemiſphere has had gradually the advantage, and the maximum of inequality took place in the year 1250: ſince that time the advantage has gradually diminiſhed, though it is ſtill very conſiderable. It will diminiſh till the year 6472, when the perigee, coinciding with the vernal equinox, will again equally divide the ſummer and winter periods between the two hemiſpheres: after which, the ſouthern inhabitants of the globe will enjoy the advantage of having the greateſt ſhare of the ſun for above 10,000 years.

The Egyptian aſtronomers are ſaid by ſome writers to have been the firſt that maintained the motion of the earth: it was from them, at leaſt, that the Greeks received the idea. Among theſe latter people, Philolaus of Crotona, a diſciple of Pythagoras, was celebrated as being the firſt philoſopher who eſtabliſhed the theory of the motion of the earth in a manner more diſtinct than had been done by any other Pythagorean. He lived 450 years before Chriſt. (Plutarch, de Placit. Philoſ.) Ariſtarchus the Samian, about 100 years after Philolaus, propoſed the motion of the earth in clearer and ſtronger terms, as we are aſſured by Archimedes, in his Arenarium.

Philolaus was alſo followed by Nicetas of Syracuſe, who maintained likewiſe the diurnal motion of the earth, and has been by ſome regarded as the firſt author of this part of the Copernican ſyſtem. Cicero, in his Tuſcul. Quæſt., thus ſpeaks of him: "Nicetas, according to Theophraſtus, believed that neither the ſun, the moon, nor the ſtars revolved about the earth; but that the earth, by a rapid motion round its axis, produced the ſame apparent effect as if it was immoveable, and the motion exiſting in the heavens."

Thus the diurnal motion of the earth ſeems to have been admitted into the philoſophy of the Greeks about 500 years before the Chriſtian era, which was probably ſome centuries after the ſame hypotheſis had been adopted by the eaſtern nations.

The annual motion of the earth is ſaid to have been underſtood and taught by Pythagoras, who obtained his knowledge from the aſtronomers of India and Egypt. This ſuppoſition, which places the ſun in the centre of the ſolar ſyſtem, has been occaſionally ſuggeſted by ancient philoſophers, but never univerſally received till after the revival of ſcience in modern times.

Notwithſtanding Apollonius, a celebrated geometrician of Alexandria in Egypt, mantained this hypotheſis, yet we find it afterwards abandoned even by the moſt eminent aſtronomers; a circumſtance that ſhould the leſs ſurpriſe us, when we reflect how incapable they were of acquiring any juſt knowledge of the diſtances and magnitudes of the heavenly bodies. Beſides, the religious opinions of the heathens prevented the general reception of this doctrine of the earth's motion. For Ariſtarchus, being accuſed by Cleanthes of ſacrilege, for moving Veſta and the tutelary deities of the univerſe out of their places, the philoſophers began to lay aſide ſo perilous a poſition. Many ages afterward Vic. Caſanus revived the ancient ſyſtem in his Doctr. de Pignorant.; but the doctrine gained little ground till the time of Copernicus.

It was in the beginning of the ſixteenth century that this eminent aſtronomer revived this doctrine, and gave permanence to a ſyſtem, which before his time had only been tranſitory and fluctuating. The opinions of Copernicus, however, (ſee COPERNICUS and COPERNICAN *Syſtem*,) were not received without great oppoſition; but the arguments by which they were oppoſed have gradually yielded to the force of reaſon and experience; and, at preſent, we hardly conſider the plaineſt propoſition of Euclid more ſatisfactorily demonſtrated than the diurnal and annual motion of the earth. Yet it is not unintereſting to retrace theſe erroneous opinions. There is reaſon to think, that many of the opponents of the motions of the earth would have changed their ſentiments, had they been acquainted with the diſcoveries that have been made in the laſt century. Tycho, who was the great oppoſer of this doctrine, ſeems to have been influenced by religious motives alone, which at that time deterred many devout individuals from embracing a ſyſtem, which they thought ſo diametrically oppoſed to the very words of ſcripture. Lactantius, the preceptor to the ſon of Conſtantine, diſcuſſes the queſtion at great length, in order to prove that there are no antipodes; and laments the folly and impiety of thoſe who aſſert the ſphericity of the earth, and maintains that the contrary opinion is eſtabliſhed both by philoſophers and the ſacred writers.

Kepler, the contemporary of Copernicus, obſerves at an early period after the revival of this ſyſtem, "Hodierno tempore præſtantiſſimi quique philoſophorum et aſtronomorum Copernico adſtipulantur: ſecta eſt hæc glacies: vincimus ſuffragiis melioribus: cœteris pene ſola obſtat ſuperſtitio, aut metus a Cleanthibus."

Tycho and alſo Riccioli bring forward a great many texts of ſcripture, to prove the ſtability of the earth; and the miracle of Joſhua, which cauſed the ſun to ſtand ſtill, has been thought by many to be deciſive. But the moſt approved divines of the preſent day admit a figurative conſtruction, or popular and accommodating uſe, of theſe paſſages of ſcripture, which, otherwiſe, it would be extremely difficult to reconcile to the diſcoveries of the preſent day. Aſtronomers themſelves always ſpeak the language of ſociety, ſo far as to ſay, the ſun riſes, the ſun ſets, the ſun moves in the ecliptic, &c.; nor ſhould we expect that prophets and inſpired writers, if they were again to come among us, would uſe any other language.

Accordingly we may obſerve in this place, that the Jeſuit Riccioli, though he, at the pope's command, oppoſed the motion of the earth with all his might, as ſomething contrary to holy ſcripture; yet, to frame aſtronomical tables, which ſhould tolerably agree with obſervation, he was forced to have recourſe to the motion of the earth as his only refuge.

This, De Chales, another of the ſame fraternity, frankly confeſſes: "P. Ricciolus—'nullas tabulas aptare potuit, quæ vel mediocriter obſervationibus reſponderent; niſi ſecundum ſyſtema terræ motæ;' notwithſtanding that he called in all the foreign and forced aſſiſtances of moveable epicycles, ſo that in his Aſtronomia Reformata, where he undertakes to give accurate tables of the celeſtial motions, he gives into the hypotheſis of the motion of the earth." De Chales Aſtron. Reformat. lib. x. cap. i. See COPERNICAN.

As for thoſe who oppoſe the motion of the earth, as being contrary to ſcripture, and who allege thoſe paſſages which mention the ſun's riſing and ſetting, his ſtanding ſtill in the time of Joſhua, and his going back in that of Hezekiah, we need only refer them to allowed laws of interpretation, applicable to the ſacred writings as well as to others, and to the cuſtomary uſe of vulgar language in the deſcription of ſenſible phenomena. By the ſun's riſing, therefore, is meant no more than his re-appearance in the horizon, after he had been hid below it; and, by his ſetting, an occultation of the ſun, which was before viſible in the horizon. When the preacher therefore ſays, Eccleſ. i. 5. "The ſun alſo riſeth, and the ſun goeth down, and haſteth to his place where he aroſe," he means, doubtleſs, no more than that the ſun, which before was hid, is now ſeen in the horizon; and after being there conſpicuous, is hid again, and at length re-appears in the eaſt. For thus much only appears to a perſon who views the ſun; and therefore thus much, and no more, is expreſſed by the ſacred writers.

In like manner, when in Joſh. x. 12, 13. the ſun and moon are ſaid to have ſtood ſtill; all meant by ſtation is, that they did not change their place with reſpect to the earth. For that general, by "Sun, ſtand thou ſtill upon Gibeon, and thou moon in the valley of Ajalon," required no more, than that the ſun which then appeared over that city, ſhould not change its ſituation. And from his bidding the ſun to keep its ſituation, it would be unjuſt to infer, that it moves round the earth at reſt. Of the meaning of this paſſage the interpreters of ſcripture have given different accounts. Some, without ſufficient authority, have thought it to be an interpolation from the book of Jaſher, long ſince loſt. Others have conſidered it as a real miraculous event, without preſuming to account for the manner in which it was performed; and Dr. Watſon, biſhop of Llandaff, in his "Apology for the Bible," thinks the relation in ſome meaſure confirmed by a paſſage, which he cites from Herodotus. Others again, both in ancient and modern times, have ſuppoſed that the paſſage is capable of a rational explication, without recurring to a miracle. The book of Jaſher, here referred to, they have conſidered as a collection of poetic ſongs, in celebration of the extraordinary atchievements of the armies of Iſrael: and that the paſſage is a ſublime exaggeration of an enthuſiaſtic poet, indulging thoſe fervours of rapturous invention conceded to his art. (See Wakefield's Reply to the Age of Reaſon.) Similar expreſſions of a bold figurative kind occur in Homer. The learned Bryant, in his "Obſervations on ſome Paſſages of Scripture, &c." ſuggeſts that the invocation of the Iſraelitiſh chief did not relate to the luminaries in the heavens, but to two idolatrous and probably oracular temples of the ſun and moon, for which the two places mentioned were celebrated. Accordingly he renders the paſſage in the following manner: "May the ſun, whoſe oracular temple is on mount Gibeon, be dumb; and the moon, whoſe ſhrine is in the valley of Ajalon, be equally ſilent." May their oracles ceaſe for ever: their worſhippers have been miraculouſly defeated; and thoſe who joined the ſtandard of Iſrael have been as wonderfully preſerved. This interpretation of the two Hebrew terms, he ſays, is countenanced by the verſion of Aquila and Symmachus, and by Arias Montanus, who exhibits the whole paſſage in the following manner: "Et dixit in oculis Iſrael, ſol in Gibeon ſile, et luna in valle Ajalon."

After all, theſe and ſimilar expreſſions, are true and proper deſcriptions of the phenomena, as they appear to us; but as the ſcriptures were never intended to inſtruct us in philoſophy and aſtronomy, they do not at all determine by what motions theſe phenomena are occaſioned. And it has been juſtly obſerved, that part of the account recorded in the book of Joſhua is merely a deſcription of the appearance; Gibeon and Ajalon, and the whole land of Canaan lying in too northern a latitude for the ſun or moon ever to be vertical to any part of it; and yet this was a juſt deſcription of the phenomena as it appeared to Joſhua in the place where he then was; and if one part of the account merely deſcribe the phenomena, the other muſt likewiſe be underſtood in the ſame manner.

Gaſſendus, very pertinently to the ſame purpoſe, diſtinguiſhes. "two ſacred volumes, the one written, called the *Bible;* the other, *Nature,* or the *World;* God having manifeſted himſelf by two lights, the one of revelation, and the other of demonſtration; accordingly the interpreters of the former are divines; of the latter mathematicians. As to matters of natural knowledge, the mathematicians are to be conſulted; and as to the objects of faith, the prophets; the former being no leſs interpreters, or apoſtles, from God to men, than the latter. And as the mathematician would be judged to wander out of his province, if he ſhould pretend to controvert, or ſet aſide any article of faith from principles of geometry; ſo it muſt be granted, the divines are no leſs out of their limits, when they venture to pronounce on a point of natural knowledge, beyond the reach of any not verſed in geometry and optics, merely from holy ſcripture, which does not pretend to teach any thing of the matter.

"For inſtances, we may quote Lactantius and Auguſtine; the firſt of whom rendered himſelf ridiculous by diſputing from ſcripture againſt the roundneſs of the earth; and the latter, againſt the antipodes." See ANTIPODES.

But to return from this digreſſion; it is now ſo long ſince the motion of the earth has ceaſed to be a diſputed queſtion, that the arguments on each ſide are nearly forgotten, and thoſe who do not ſcruple to adopt the hypotheſis of the earth's motion, are often leſs acquainted with the arguments on which it is ſupported, than they would have been in former times, when their opinions would have often been diſputed. Of all authors who have written on this ſubject, La Place ſeems to have collected theſe arguments together in the moſt popular and perſpicuous form. We ſhall preſent the ſubſtance of them to the reader in as conciſe a manner as poſſible, introducing at the ſame time ſome additional obſervations, for the further elucidation of this intereſting ſubject.

When we reflect on the diurnal motion to which all the heavenly bodies are ſubject, we cannot but recognize the exiſtence of one general cauſe which moves them, or which ſeems to move them, round the axis of the earth. If we conſider that theſe bodies are inſulated, with reſpect to each other, and placed at very different diſtances from the earth; that the ſun and the ſtars are at a much greater diſtance from it than the moon; and that the variations in the apparent diameters of the planets indicate great alterations in their diſtances; and, moreover, that the comets traverſe the heavens freely, in all directions, it will be difficult to conceive that it is the ſame cauſe which impreſſes on all theſe bodies a common motion of rotation. But ſince the heavenly bodies preſent the ſame appearances to us, whether the firmament carries them round the earth, conſidered as immoveable, or whether the earth itſelf revolves in a contrary direction, it ſeems much more natural to admit this latter motion, and to regard that of the heavens as only apparent.

The earth is a globe, whoſe radius is only about four thouſand Engliſh miles; the ſun, as we have ſeen, is incomparably larger; if its centre coincided with that of the earth, its volume would embrace the orbit of the moon, and extend as far again, from which we may judge of its immenſe magnitude; beſides, its diſtance from us is 23,000 times the ſemidiameter of the earth. Is it not infinitely more ſimple to attribute to the globe we inhabit a motion of rotation on its own axis, than to ſuppoſe in a maſs ſo conſiderable, and ſo remote as the ſun, ſuch an extreme rapid motion as would be requiſite to revolve in one day round the earth? What immenſe power would it not require to contain it, and counter-balance its centrifugal force? Every one of the ſtars preſents ſimilar difficulties, which are all removed by the rotation of the earth.

We have ſeen, that the pole of the equator ſeems to move ſlowly round that of the ecliptic, from whence reſults the preceſſion of the equinoxes. If the earth is immoveable, the pole of the equator is equally ſo, ſince it always correſponds to the ſame point of the terreſtrial ſurface; the ecliptic, therefore, moves round theſe poles; and in this motion carries all the heavenly bodies with it. Thus, the whole ſyſtem, compoſed of ſo many bodies, differing from each other ſo much in their magnitudes, motions, and diſtances, would be again ſubject to a general motion, which diſappears, and is reduced to a ſimple appearance, if we ſuppoſe the terreſtrial axis to move round the poles of the ecliptic.

Carried on with a velocity which is common to every thing that ſurrounds us, we are in the caſe of a ſpectator placed in a ſhip that is in motion. He fancies himſelf at reſt, and the ſhore, the hills, and all the objects placed out of the veſſel appear to him to move. But on comparing the extent of the ſhore, the plains, and the height of the mountains, with the ſmallneſs of his veſſel, he recognizes, that the apparent motion of theſe objects ariſes from the real motion of himſelf. The numberleſs ſtars which fill the celeſtial regions are, relatively to the earth, what the ſhores and the hills are to the veſſel; and the ſame reaſons which convince the navigator of the reality of his own motion, prove to us the motion of the earth.

We may here obſerve, that in all the works of nature with which we are acquainted, the Creator appears to act by the ſhorteſt, eaſieſt, and ſimpleſt means. Now, if the earth be at reſt, and the ſtars move, the velocity of theſe latter muſt be immenſe; and yet all the purpoſes thereof might have been anſwered by a moderate motion of the earth alone..

For the moon's diſtance from the earth amounts to 240000 miles. Hence, the circumference of the moon's diurnal circle being 1507968 ſuch miles, the moon's horary motion muſt be 62832 miles, inſtead of 2290 miles, which is really the caſe; conſequently, in each ſecond, a ſpace leſs than that of the pulſe of an artery, the moon, though the ſloweſt of all the heavenly bodies, muſt move more than 17 miles. Again, the ſun's mean diſtance from the earth is 23750 ſemidiameters of the earth, or 95000000 miles; conſequently, the ſun's diurnal path, when in the equator, muſt be 596904000 miles; and, therefore, in the ſpace of one ſecond, *i. e.* in the twinkling of an eye, he muſt move more than 6908 miles.

Again, the diſtance of the ſun from the earth, is to that of Mars, ſuppoſing the earth, and not the ſun, to be the centre of the ſyſtem, nearly as one to one and a half; to that of Jupiter, as one to five and a quarter; and to that of Saturn, as one to nine: wherefore, as the diurnal ſpace, and all other things deſcribed in the ſame time, are in the ſame ratio, Mars, in one twinkling of an eye, muſt fly 10362, Jupiter 36266, and Saturn 62172 miles. Laſtly, the fixed ſtars being yet vaſtly more remote from the earth than Saturn, their motion in or near the equator muſt be vaſtly ſwifter than that of Saturn.

Beſides, if the earth be at reſt, and the ſtars move by any common motion, the ſeveral planets muſt each day deſcribe ſeveral ſpirals running forth to a certain term towards the north, and thence returning to the oppoſite term towards the ſouth, ſometimes narrower, and ſometimes broader.

For the diſtances of the ſeveral planets from the zenith alter every day, increaſing to a certain point towards the north, and thence decreaſing again towards the ſouth; conſequently, the altitude of the pole being always found the ſame, and the planets not returning to the ſame point of the meridian, they do not deſcribe circles, but ſpirals. Add, that as the ſeveral planets do not retain the ſame diſtance from the earth, but are ſometimes nearer, and ſometimes recede farther from it, at a greater diſtance, a greater ſpiral, and at a leſs, a leſs is deſcribed.

Farther, as their motion is ſlower when the planet is farther from the earth, the greater ſpirals are deſcribed in leſſer times than the leſſer; and, as the greateſt and leaſt diſtance of the planets from the earth is not affixed to the ſame point of the heavens, the planets have moved in different tracts every day from the beginning.

Beſides, the force by which the ſtars and planets revolve in their orbits are not directed to the centre of the earth, but to the centres of the ſeveral orbits which they deſcribe, or to innumerable imaginary points in the axis of the earth; and theſe forces, tending to different and continually varying centres, muſt likewiſe increaſe exactly in proportion to the diſtances from the axis; whereas the force of attraction is found to decreaſe.

Theſe arguments are, likewiſe, ſtrengthened by analogy. A rotatory motion has been obſerved in ſeveral planets, and always from weſt to eaſt, ſimilar to that which the diurnal motion of the heavens ſeems to indicate in the earth. Jupiter, greatly exceeding the earth in magnitude, moves round its axis in leſs than twelve hours. An obſerver on its ſurface would ſee the heavens revolve round him in that time; yet, that motion would only be apparent. Is it not, therefore, reaſonable to think, that it is the ſame with that which we obſerve on the earth? What confirms, in a very ſtriking manner, this analogy, is, that both the earth and Jupiter are flattened at the poles. We comprehend, in fact, that the centrifugal force which tends to remove every particle of a body from its axis of rotation, ſhould flatten the earth at its poles, and elevate it at the equator. This force ſhould likewiſe diminiſh that of gravity at the equator; and that this diminution does take place, is proved by experiments which have been made on the lengths of pendulums. Every thing, then, leads us to conclude, that the earth has really a motion of rotation, and the diurnal motion of the heavens is merely an illuſion which is produced by it, an illuſion ſimilar to that which repreſents the heavens as a blue vault, to which all the ſtars are fixed, and the earth as a plane on which it reſts.

Thus, aſtronomy has ſurmounted the illuſions of the ſenſes; and it is not till they have been diſſipated by a great number of obſervations and calculations, that man has at laſt recognized the motion of the globe which he inhabits, and its true poſition in the univerſe.

Moreover, bodies let fall from any conſiderable height, are found, by experiment, not to fall upon the ſpot perpendicularly under them, but to the ſouth-eaſt thereof.

The experiment was propoſed to Dr. Hook in the year 1679, by a perſon who ſuggeſted, that, if the earth had any diurnal motion, the body would fall to the eaſt of the perpendicular. Dr. Hook, on that occaſion, read a diſcourſe before the Royal Society, wherein he endeavoured, *à priori*, to aſſign what curve a falling body would deſcribe; aſſerting, particularly, that the fall of the body would not be directly eaſt, but ſouth-eaſt; which was confirmed by divers actual trials. The objection, which ſuppoſes, that *e. g.* a ball fired perpendicularly upward in the air ſhould fall weſtward of the place from which it was projected, on the ſuppoſition of the earth's revolution eaſtward, can have no weight, when it is conſidered that the gun and ball partake of the earth's motion; and, therefore, being carried forward with the air as quick as the earth and air turn, it muſt fall down on the ſame place, deſcribing, in its deſcent, the diagonal of a parallelogram, whoſe two ſides are proportional to the forces acquired from the earth's motion and the gravity of the ball. Thus, a ſtone let fall from the top of a main-maſt, if it meets with no obſtacle, falls on the deck as near the foot of the maſt when the ſhip ſails, as when it does not.

Shall we now ſuppoſe the ſun, accompanied by the planets and ſatellites in motion round the earth, or ſhall we imagine the earth and other planets to revolve round the ſun? The appearances of the heavenly motions are the ſame in the two hypotheſes; but the ſecond ſhould be preferred, for the following conſiderations:

The ſun will equally appear in motion, and the earth as ſtanding ſtill, to a ſpectator on the earth, whether the ſun really move round the earth at reſt, or the earth move round the ſun at reſt.

For, ſuppoſe the earth in T (*Plate* IX. *Aſtronomy, fig.* 69.), and the ſun in 1; the ſun will then appear in ♈. And, ſuppoſe the ſun to proceed in an orbit ſurrounding the earth from 1 to 2, he will then appear in ♉; and, if he proceed farther to 3, he will ſeem to be in ♊: and thus will he appear to go on, according to the order of the ſigns in the ecliptic. Suppoſe, again, the earth in 1, and the ſun in T, the ſun will now be ſeen in ♎; let the earth go on from 1 to 2, the ſun will appear to the inhabitants of the earth to have proceeded from ♎ to ♏; and if the earth proceed to 3, the ſun will appear to have advanced farther from ♏ to ♐; and ſo on, according to the ſucceſſion of the ſigns of the ecliptic.

Thus, does the ſun appear alike to move, whether he really move or ſtand ſtill; ſo that the objection from ſenſe is of no force. But again,

If one of the planets be ſuppoſed to have moved a certain ſpace from weſt to eaſt, the ſun, earth, and other planets, together with the fixed ſtars, will all ſeem to an inhabitant of that planet to have moved juſt ſo far round in the contrary way.

For, ſuppoſe a ſtar M (*fig.* 70.) in the zenith of an inhabitant of a planet placed in T; and ſuppoſe the planet to have revolved on its axis from weſt to eaſt; in a certain ſpace of time, the ſun S will have arrived at the zenith of T, then the ſtar I, then N, then the earth L, and, at length, the ſtar M again. To the inhabitants of the planet, therefore, the ſun S, with the earth L, and the ſtars I, N, M, &c. will appear to have moved round the planet a contrary way.

Thus, to the inhabitants of the planets (if any ſuch there be) the mundane ſphere, with the ſun, ſtars, and all the other planets, will, as to us, appear to move round them from eaſt to weſt; and accordingly, the inhabitants of our planet, the earth, are only liable to the ſame deluſive appearance with thoſe of the reſt. Moreover, the orbits of the planets include the ſun as the common centre of them all; but it is only the orbits of the ſuperior planets that include the earth; which, however, is not in the centre of any of them, as will be ſhewn under SUN and PLANET. Again, the earth's orbit being proved to be between thoſe of Venus and Mars, it follows, that the earth muſt turn round the ſun; for, as it lies within the orbits of the ſuperior planets, their motion would appear unequal and irregular; but they would never either be ſtationary, or retrograde, without this ſuppoſition. Beſides, from the orbits and periods of the ſeveral planets about the ſun, and of the moon and ſatellites round the earth, Jupiter and Saturn, it is evident, that the law of gravitation is the ſame towards the earth, Jupiter, and Saturn, as towards the ſun; and the periodical times of the ſeveral bodies moving round each, are in the ſame ratio to their ſeveral diſtances from them.

Now, it is certain, that, on the hypotheſis of the earth's annual motion, her periodical time exactly ſuits this law, bearing ſuch a proportion between thoſe of Mars and Venus as the ſeveral other bodies directed by the ſame law do bear; *i. e.* the ſquares of the periods are, in all, as the cubes of the diſtances from the centre of their orbits. But, ſuppoſing the earth too at reſt, this law is broken moſt exorbitantly.

For, if the earth does not move round the ſun, the ſun muſt move with the moon round the earth: now, the diſtance of the ſun to that of the moon being as 23750 ſemidiameters of the earth to 60, or nearly as 396 to 1; and the moon's period being leſs than 28 days, the ſun's period ſhould be found no leſs than 212775 days, or 583 years; whereas, in fact, it is but one year. Which ſingle conſideration Mr. Whiſton thinks of weight enough to determine the controverſy between the two ſyſtems, and to eſtabliſh the motion of the earth for ever.

Whereas, ſuppoſing our earth to have once revolved about the ſun in a circular orbit, whoſe ſemidiameter were equal to the earth's original diſtance from the ſun ſix degrees paſt its perihelion, the annual period would be found exactly and ſurpriſingly equal to the lunar, or the ancient ſolar year, which were exactly commenſurate, containing 12 ſynodical, or 13 periodical months, *i. e.* 365 days, 4 hours, 19 minutes.

The maſſes of the ſun, and of ſeveral of the planets, are conſiderably greater than that of the earth; it is much more ſimple to make the latter revolve round the ſun, than to put the whole ſolar ſyſtem in motion round the earth. What a complication in the heavenly motions would the immobility of the earth ſuppoſe? What a rapidity of motion muſt be given to Jupiter; to Saturn, which is ten times farther from the ſun than we are, and to Uranus, which is ſtill more remote, to make them every year revolve round us, at the ſame time they are revolving round the ſun.

This complication and this rapidity of motion diſappear, by transferring the motion to the earth; a motion conformable to the general law, by which the ſmall celeſtial bodies revolve round the large ones which are placed in their vicinity.

The following is an actual demonſtration of the earth's motion, drawn from phyſical cauſes, for which we are indebted to the diſcoveries of ſir Iſaac Newton, and which Dr. Keil takes for concluſive and unanſwerable.

All planets, it is demonſtrated, gravitate towards the ſun; and obſervations teſtify to us, either that the earth turns round the ſun, or the ſun round the earth, in ſuch a manner as to deſcribe equal areas in equal times. But it is demonſtrated farther, that whenever bodies turn round each other, and regulate their motions by ſuch a law, the one muſt of neceſſity gravitate to the other: conſequently, if the ſun in its motion doth gravitate to the earth, action and re-action being equal and contrary, the earth muſt likewiſe gravitate towards the ſun.

Again, the ſame author has demonſtrated, that when two bodies gravitate to one another, without directly approaching one another in right lines, they muſt both of them turn round their common centre of gravity; the ſun and earth, therefore, do both turn round their common centre of gravity; but the ſun is ſo great a body in reſpect of our earth, which is as it were but a point; that the common centre of gravity of the two bodies will lie within the body of the ſun itſelf, and not far from the centre of the ſun. The earth, therefore, turns round a point, which is in the body of the ſun, and therefore it turns round the ſun.

Beſides, if the ſun moves about the earth, the earth's attractive power muſt draw the ſun towards it from the line of projection, ſo as to bend its motion into a curve; but the ſun being at leaſt 227000 times as heavy as the earth, it muſt move 227000 times as ſlowly towards the earth as the earth does toward the ſun; and conſequently the earth would fall to the ſun in a ſhort time, if it had not a very ſtrong projectile motion to carry it off. There is, indeed, no ſuch thing in nature as a heavy body moving round a light one as its centre of motion. A pebble, as Mr. Ferguſon familiarly illuſtrates this matter, faſtened to a mill-ſtone by a ſtring, may, by an eaſy impulſe, be made to circulate round the mill-ſtone; but no impulſe can make a mill-ſtone circulate round a looſe pebble, for the mill-ſtone would go off and carry the pebble along with it.

The analogy of the earth, with the planets, confirms this hypotheſis: like Jupiter, it revolves on its axis, and is accompanied by a ſatellite. An obſerver, on the ſurface of Jupiter,

Jupiter, would conclude, that the ſolar ſyſtem was in motion round him, and the magnitude of that planet would render this illuſion leſs improbable than for the earth. Is it not, therefore, reaſonable to imagine, that the motion of the ſolar ſyſtem round us is likewiſe only an illuſion?

Let us tranſport ourſelves in imagination to the ſurface of the ſun, and from thence let us conſider the earth and the planets. All theſe bodies will appear to move from weſt to eaſt, already this identity in the direction indicates a motion of the earth, but that which demonſtrates it evidently is the law which exiſts between the times of the revolutions of the planets, and their diſtances from the ſun. They revolve round it ſlower, as their diſtances are greater, and in ſuch a manner, that the ſquares of the periodic times are in proportion to the cubes of their mean diſtances. According to this remarkable law, the length of a revolution of the earth, ſuppoſing it in motion round the ſun, ſhould be exactly a ſidereal year. Is not this an inconteſtible proof, that the earth moves like the other planets, and is ſubject to the ſame laws? For would it not be very ſtrange to ſuppoſe the terreſtrial globe, which hardly ſubtends a viſible angle at the ſun, immoveable amidſt the other planets which are revolving round it, and that the ſun ſhould be carried with them about the earth?

The force, which ſerves to retain the planets in their reſpective orbits round the ſun, balances the centrifugal force. Ought it not likewiſe to act upon the earth? And muſt not the earth oppoſe to this action the ſame centrifugal force? Thus the conſideration of the celeſtial motions, as obſerved from the ſun, leave no doubt of the real motion of the earth.

The principal argument againſt the annual motion of the earth, has been the want of an annual parallax in the fixed ſtars. For let T A *t* (*Plate* X. *Aſtronomy*, *fig.* 71.) repreſent the earth's orbit about the ſun S, T X the axis of the earth, and *t x* parallel to T X, will repreſent the poſition of the ſame axis at the oppoſite point *t*. Suppoſe T X to be directed towards the ſtar P; and it is manifeſt, that the axis of the earth will not be directed to the ſame ſtar, when it comes to the ſituation *t x*, but will contain an angle *x t* P with the line *t* P, joining the earth and ſtar, equal to the angle *t* P T, under which the diameter, T *t*, of the earth's orbit, appears to a ſpectator, viewed from the ſtar P. It might be expected, therefore, that by obſerving the fixed ſtar P, from the different parts of the earth's orbit, we might judge of the angle T P *t*, and conſequently of the proportion of T P, the diſtance of the ſtar, to T *t*, the diameter of the earth's orbit, or double diſtance of the ſun. Yet it is certain that aſtronomers have not hitherto been able to diſcover any difference in the apparent ſituation of the fixed ſtars with reſpect to the axis of the earth, or to one another, that can ariſe from the motion of the earth: though, ſince the reſtoration of the Pythagorean doctrine of the earth's motion, they have taken great pains to examine the matter.

The ſeeming motion of the pole-ſtar, obſerved by Mr. Flamſteed, was by ſome miſtaken for a proof of its annual parallax; but this phenomenon has ſince been accounted for in the moſt ingenious manner by Mr. Bradley, from the motion of light combined with that of the earth in its orbit. See Parallax, and the ſequel of this article.

The objection to the earth's motion, from there being no diſcernible parallax of the fixed ſtars, is anſwered by obſerving, that the diſtance of the fixed ſtars is ſo great, that the diameter of the earth's orbit bears no ſenſible proportion to it; ſo that the parallax is not to be diſcovered by our exacteſt inſtruments. Nor is this immenſe diſtance of the fixed ſtars advanced by the Copernicans merely as an hypotheſis for the ſake of ſolving the objection. For there ſeems great reaſon to ſuppoſe the fixed ſtars like to our ſun, and hence to conclude their diſtance to be vaſtly great, ſince they appear to us of ſo faint a light, and of no ſenſible diameter, even in the largeſt teleſcopes.

But from the diligence and accuracy of late aſtronomers, we learn ſeveral curious things in confirmation of the motion of the earth about the ſun, and ſerving to ſolve this only material objection againſt it. Accordingly, an obſerver on the ſurface of the earth has another evident proof of its motion in the phenomenon of the *Aberration*, (ſee Aberration) which is a neceſſary conſequence of it, as we ſhall now explain. About the end of the 17th century, Roemer obſerved, that the eclipſes of the ſatellites of Jupiter happened ſooner about the oppoſitions of this planet, and later towards the conjunctions. This led him to ſuſpect that light was not tranſmitted inſtantaneouſly from thoſe bodies to the earth, but that it employed a ſenſible interval of time to traverſe the diameter of the orbit of the ſun. In fact, Jupiter being in his oppoſitions nearer to us than in the conjunctions by a quantity equal to this diameter, the eclipſes ought to happen ſooner to us in the firſt caſe, than in the latter, by the time which the light takes to traverſe this orbit. The law of retardation, obſerved in theſe eclipſes, anſwers ſo exactly to this hypotheſis, that it is impoſſible to refuſe aſſent to it. It appears that light employs 8′ 5″ in coming from the ſun to the earth.

Now, an obſerver at reſt would ſee the ſtars according to the directions of their rays, but this will not be the caſe, on the ſuppoſition that he partakes of the motion of the earth. To reduce this caſe to that of the obſerver at reſt, it is ſufficient to aſſign, in a contrary direction, both to the ſtars, to the light, and to the obſerver himſelf, a motion equal to that by which he is impelled, which would not change the apparent poſition of the ſtars: for it is a general law of optics, that if all the bodies of a ſyſtem are impelled by a common motion, there will reſult no change in their reſpective ſituations. Let us imagine then, that a motion, equal and contrary to that of the obſerver, be given to the rays of light, and generally to all the other bodies, and let us ſee what phenomena ſhould reſult in the apparent poſition of the ſtars. We may leave out of the queſtion the diurnal motion of the earth, which is not, even at the equator, $\frac{1}{60}$th part of that in its orbit round the ſun. We may here ſuppoſe, alſo, without ſenſible error, that all the rays which each point of the diſc of a heavenly body tranſmits to us, are parallel to each other, and to that ray which would come from the centre of the ſtar to the centre of the earth if it were tranſparent. Thus the phenomena which the ſtars would preſent to an obſerver, placed at the centre of the earth, and which depend on the motion of light combined with that of the earth, are nearly the ſame for every obſerver on its ſurface. Moreover, we may neglect the ſmall excentricity of the terreſtrial orbit.

In the interval of 8′ 5″, which the light employs to traverſe the terreſtrial orbit, the earth deſcribes a ſmall arc of this orbit, equal to 20.″2; now it follows, from the law of the compoſition of motion, that if through the centre of a ſtar, we imagine a ſmall circle parallel to the ecliptic, and whoſe diameter ſubtends in the heavens an angle of 40.″5, the direction of the motion of light, combined with the motion of the earth, and applied in a contrary direction, will meet this circumference in a point where it is interſected by a plane drawn through the centre of the ſtar tangentially to the terreſtrial orbit. The ſtar, therefore, ſhould move upon this circumference, and deſcribe it every year in ſuch a manner, that it ſhould conſtantly be leſs advanced by 100 degrees, than the ſun in its apparent orbit.

This phenomenon is exactly that which we have explained, after the obſervations of Bradley, to whom we are indebted both for the diſcovery and its cauſe. (See ABERRATION.) To reduce theſe ſtars to their true poſition, it is ſufficient to place them in the centre of the ſmall circle they appear to us to deſcribe.

Their annual motion, therefore, is only an illuſion produced by the combination of the motion of light with that of the earth. The relation of this motion, with the poſition of the ſun, would lead to a ſuſpicion, that it was only apparent, but the foregoing explanation proves it beyond a doubt. It affords a ſenſible demonſtration of the motion of the earth round the ſun, in the ſame manner as the increaſe of degrees, and of the force of gravity in going from the equator to the poles, proves its revolution on its axis.

The aberration of light affects the poſitions of the ſun, the planets and their ſatellites, and comets, but in a different manner, according to their particular motions. To diveſt them of this, and to have the true poſition of the ſtars, let us ſuppoſe, at every inſtant, a motion impreſſed on all theſe bodies equal and contrary to that of the earth, which thus may be ſuppoſed at reſt: this, as obſerved above, neither alters their poſitions nor appearances. Then it is evident, that a heavenly body, the moment we obſerve it, is no longer in the direction of the luminous ray which ſtrikes our ſight; it has left it in conſequence of its real motion combined with that of the earth, which we ſuppoſed impreſſed in a contrary direction. The combination of theſe two motions, as ſeen from the earth, forms the apparent, or, as it is termed, the geocentric motion. We ſhall have then the true poſition of the object, by adding to the obſerved geocentric longitude and latitude its geocentric motion in longitude and latitude, for the interval of time which light employs to come from the heavenly body to the earth. Thus, the centre of the ſun ſeems conſtantly leſs advanced by 62″.5 in its orbit, than if its light was tranſmitted to us inſtantaneouſly.

The aberration of light changes the relations of celeſtial phenomena, both as to ſpace and as to duration. At the moment we ſee them they no longer exiſt. We do not ſee the termination of Jupiter's eclipſes till twenty-five or thirty minutes after they have recovered their light, and the variations of light of ſome of the changeable ſtars precede by many years the inſtant of their obſervations. But the cauſe of theſe illuſions being well underſtood, we can always refer the phenomena of the ſolar ſyſtem to their true place and epoch.

The conſideration of the celeſtial motions leads us then to diſplace the earth from the centre of the world where we had placed it, deceived by appearances, and by the natural propenſity of man to regard himſelf as the principal object in nature. The globe, which we inhabit, is a planet in motion on itſelf and round the ſun. In conſidering it in this point of view, all the phenomena are explained in the moſt ſimple manner, all the celeſtial motions become uniform, and the analogies are preſerved. Like Jupiter, Saturn, and Uranus, the earth is accompanied by a ſatellite, it turns on itſelf like Venus, Mars, Jupiter, and Saturn, and probably the other planets; it like them borrows its light from the ſun, moves round it in the ſame direction, and according to the ſame laws. Finally, the hypotheſis of the earth's motion unites in its favour ſimplicity, analogy, and every thing which characterizes the true ſyſtem of nature. We ſhall ſee that, following it in its conſequences, the celeſtial phenomena are brought even in their minuteſt details to one ſingle law, of which they are only the neceſſary developements. The motion of the earth will thus acquire all the certainty of which phyſical truths are ſuſceptible. And it may reſult either from the great number and variety of phenomena which it explains, or from the ſimplicity of the laws on which it is made to depend. None of the branches of natural knowledge unite theſe advantages in a higher degree than the theory of the ſyſtem of the world, founded on the motion of the earth. This motion ennobles our conceptions of the univerſe, by affording, for a meaſure of the diſtances of the heavenly bodies, an immenſe baſe, the diameter of the terreſtrial orbit. By this we have accurately determined the dimenſions of the planetary orbs.

Thus the motion of the earth, after having by illuſions, of which it is itſelf the cauſe, retarded our knowledge of the planetary motions for a great length of time, at laſt conducted us to them, and that in a more accurate manner than if we had been placed in the centre of their ſyſtem.

From the point of view in which the compariſon of the celeſtial obſervations has placed us, let us conſider the heavenly bodies, and ſhew the perfect identity of their appearances with thoſe which we obſerve. Whether the heavens revolve round the axis of the world, or the earth moves itſelf in a contrary direction to the heavens, ſuppoſed at reſt, it is clear that the ſtars will preſent themſelves to us in the ſame manner. There will be no other difference, but that in the firſt caſe they will come and place themſelves ſucceſſively over the different terreſtrial meridians, which, in the ſecond, will place themſelves under the ſtars. The motion of the earth being common to all bodies ſituated on its ſurface, and to the fluids which cover it, their relative motions are the ſame as if the earth was at reſt. Thus, in a veſſel whoſe motion is uniform, every thing moves as if the veſſel were at reſt. A projectile, thrown directly upwards, falls on the ſame ſpot from which it was projected; it ſeems to deſcribe a vertical line to thoſe in the veſſel, but ſeen from the ſhore, it really deſcribes a parabolic curve. Thus, the rotation of the earth cannot be ſenſible on its ſurface, except by the effects of the centrifugal force, which flattens the terreſtrial ſpheroid at the poles, and diminiſhes the force of gravity at the equator; two phenomena, with which the meaſure of the degrees at the meridian, and of the pendulum, have made us acquainted.

In the revolution of the earth round the ſun, its centre, and all the points of its axis of rotation, being moved with velocities equal and parallel, this axis remains always parallel to itſelf; on impreſſing then, at every inſtant, to all the parts of the earth, a motion equal and contrary to that of its centre, it would reſt immoveable, like its axis of rotation. This impreſſed motion does not change at all the appearances of that of the ſun; it only tranſports, in a contrary direction to the ſun, the real motion of the earth. The appearances are conſequently the ſame in the hypotheſis of the earth at reſt, and in that of its motion round the ſun. To follow more particularly theſe appearances, let us imagine a radius drawn from the centre of the ſun to that of the earth; this radius will be perpendicular to the plane which ſeparates the hemiſphere, which is enlightened from that which is in obſcurity. A ſpectator, at the point where this interſects the terreſtrial ſurface, will ſee the ſun perpendicularly above him, and every point of the terreſtrial parallel through which this radius ſucceſſively paſſes, in conſequence of its diurnal motion, will have, at noon, the ſun in its zenith. Thus, whether the ſun turns round the earth, or the earth round the ſun, and on its own axis, this axis preſerving a parallel poſition, it is evident that this radius will trace the ſame curve on the ſurface of the earth; it will in each caſe cut the ſame parallels to the equator, when the ſun has the ſame apparent longitude. This luminary will be equally elevated above the horizon, and the days wil be of the ſame length. Thus the ſeaſons and the days are the ſame in the hypotheſis of the immobility of the ſun, or of its motion round the earth; and the explanation of the ſeaſons will be equally intelligible by either hypotheſis. The planets all move in the ſame direction round the ſun, but with different velocities: but the length of their revolutions increaſe in a greater ratio than their diſtances from the ſun. Jupiter, for inſtance, employs nearly twelve years to perform its revolution; but the radius of his orbit is only five times leſs than that of the earth: its real velocity is, therefore, leſs than that of the earth. This diminution of velocity in the planets, as they recede from the ſun, applies generally to all the planets, from Mercury, which is the neareſt, to Uranus, which is the moſt remote; and it reſults from the laws which we ſhall hereafter demonſtrate, that the mean velocities of the planets are reciprocally as the ſquare roots of their mean diſtances from the ſun.

Let us conſider a planet, whoſe orbit is ſurrounded by that of the earth, and follow it from its ſuperior to its inferior conjunction; its apparent or geocentric motion is the reſult of its real motion combined with that of the earth, conſidered as moving in a contrary direction In the ſuperior conjunction, the real motion of the planet is contrary to that of the earth; its geocentric motion is then the ſum of the two motions; and it has then the ſame direction as the geocentric motion of the ſun, which reſults from the real motion of the earth transferred in a contrary direction to the ſun, and thus the apparent motion of the planet is direct.

In the inferior conjunction, the motion of the planet has the ſame direction as that of the earth, and as it is greater, the geocentric motion preſerves the ſame direction; but it is only the exceſs of the real motion of the planet above that of the earth: it has, therefore, a motion contrary to that of the ſun, and conſequently it is retrograde.

It is eaſy to conceive, that in the interval from the direct to the retrograde motion, the planet ſhould appear without motion, or ſtationary, and that this will happen between the greateſt elongation and the inferior conjunction, when the geocentric motion of the planet, reſulting from its real motion, and that of the earth applied in a contrary direction, is directed in the ſame line as the vernal ray to the planet. Theſe phenomena are entirely conformable to the motions that are obſerved to take place in the planets Mercury and Venus.

The motion of the planets, whoſe orbits comprehend thoſe of the earth, has the ſame direction in their oppoſitions as the motion of the earth, but it is leſs; and being combined with this laſt motion, applied in a contrary direction, it takes a motion contrary to its primitive direction, the geocentric motion of the planet is then retrograde: in the conjunctions it is direct, the ſame as in the ſuperior conjunctions of Mercury and Venus.

In transferring to the ſtars (but in a contrary direction) the motion of the earth, they ſhould deſcribe every year a circumference equal and parallel to the terreſtrial orbit, and of which the diameter ſhould ſubtend an angle equal to that which this orbit ſubtends at the diſtance of the ſtar. This apparent motion has a great reſemblance to that which reſults from the combination of that of the earth with that of light, and by which the ſtars ſeem annually to deſcribe a circle parallel to the ecliptic, the angle of which ſubtends an arc of 125″; but it differs in this, that theſe ſtars have the ſame poſition as the ſun on the firſt circumference; whereas, in the ſecond, they are leſs advanced than the ſun, by 100″. By this circumſtance, the two motions may be diſtinguiſhed from each other, and it appears that the firſt is inſenſible, the immenſe diſtance of the ſtars from us rendering inſenſible the angle which the terreſtrial orb ſubtends when viewed from them. The axis of the world being nothing more than the prolongation of the earth's axis of rotation, we ſhould refer to this axis the motion of the poles of the celeſtial equator, indicated by the phenomena of *preceſſion* and *nutation*, which ſee. Thus, at the ſame time that the earth moves on its own axis, and round the ſun, its axis of rotation moves very ſlowly round the poles of the ecliptic, but ſubject to ſmall oſcillations, of which the period is the ſame as that of the motion of the nodes of the lunar orbit.

The *figure* of the earth is a ſubject which has never ceaſed to intereſt the curioſity of the ſpeculative part of mankind from the earlieſt dawn of ſcience to the preſent day.

To its firſt inhabitants it muſt have appeared a wide extended plain, on the extremities of which the vaſt dome of the heavens would appear to reſt. The ancients, however, had various opinions with regard to the figure of the earth. Some, as Anaximander, held it to be cylindrical; others, as Leucippus, gave it the form of a drum. But the principal opinion was, that it was flat; and the viſible horizon was the boundary of the earth, and the ocean the boundary of the horizon; that the heavens and earth above this ocean were the whole viſible univerſe, and that all beneath the ocean was Hades; and of this opinion were not only ſeveral of the ancient poets and philoſophers, but alſo ſome of the Chriſtian fathers, as Lactantius, St. Auguſtine, &c.

The progreſs of the ſcience of aſtronomy is the continued triumph of the powers of intellect over the firſt erroneous conceptions of the ſenſes; and its hiſtory is ſo connected with that of the human mind, that we cannot help feeling a ſtrong inclination to know at what time, and by what people, the hypotheſis of the ſpherical figure of the earth was firſt received.

If, in natural philoſophy, the value of an hypotheſis may be eſtimated by the number of difficult phenomena it ſuddenly explains, few diſcoveries will be found to have been more important than that which aſſigned to the earth its true magnitude and figure. But it is in vain that we now attempt to trace its hiſtory; it took place in thoſe dark ages of antiquity, when the revolutions of empires were but imperfectly recorded, much leſs the calm ſpeculations of a few quiet and thoughtful men.

The idea of the earth being a globe is now ſo familiar to us, that arguments in proof of it are almoſt unneceſſary. We may every day meet with people who have been round it, and the moſt uninformed ſeaman can eaſily comprehend that he is ſailing on a globular ſurface, when he finds that by proceeding forward in any direction, he ultimately arrives at the point from which he departed. Yet, familiar as is this fact to us, many ages muſt have elapſed before it could have been univerſally received. So difficult was it to conceive how the inhabitants of the oppoſite hemiſphere could exiſt with their heads downwards without great inconvenience, that we find St. Auguſtine, in the 5th century, vehemently contending againſt the poſſibility of the exiſtence of antipodes. The earlieſt aſtronomical records, which can be received as authentic, do not go back farther than about 800 years before the Chriſtian era, as at that time eclipſes ſeem to have been both obſerved and regiſtered by more than one of the eaſtern nations. Aſtronomy muſt then have been cultivated as a ſcience at leaſt for ſome centuries, and therefore, we may conclude with certainty, that the ſpherical figure of the earth was known above one thouſand years before our era, and, probably, by ſome of the eaſtern nations many centuries earlier. The obſervations which led to the diſcovery were, doubtleſs, thoſe of the phenomena cauſed by the diurnal motion of the earth, combined with thoſe produced by change of ſituation, in removing towards the north or ſouth.

We may ſuppoſe the ſpherical figure of the heavens to have been firſt eſtabliſhed, by obſerving that thoſe ſtars, ſufficiently elevated towards the North pole, performed their entire revolution round the poles without interruption, from which it might by an eaſy inference be concluded, that the other ſtars purſued their courſe in the ſame manner when concealed from view.

The arguments for the nearly ſpherical or globular figure of the earth may be ſummed up in the following particulars: 1. When you ſtand upon the ſhore, the ſpherical form of the ſea is evident to the eye. 2. When a ſhip leaves the ſhore, and goes out to ſea, you firſt loſe ſight of the hull, and then of the maſt, gradually from the bottom to the top: and when a ſhip approaches the ſhore, you firſt ſee the top of the maſt, and then the lower parts gradually appear, till at laſt the whole ſhip becomes viſible. Theſe appearances could not take place if the ſea were a plane, for in that caſe every part of the ſhip would diſappear at once, after quitting the ſhore, and appear together on its approach to the ſhore; or rather, the hull, being the largeſt and moſt conſpicuous part of the ſhip, would laſt diſappear, and appear firſt, which is contrary to the well-known fact. But the appearances exactly correſpond to the ſpherical or ſpheroidical figure of the ſea, in which caſe the convexity of the water would produce the phenomena that are actually obſerved. 3. From the voyages of the navigators Maghellan, ſir Francis Drake, lord Anſon, captain Cook, and many others, who have ſailed round the earth, ſetting off in one direction, and after continuing their courſe, returning to the ſame place in an oppoſite direction; or ſailing towards the eaſt and returning weſt, or *vice verſâ*, we may infer that the earth is nearly of a globular figure. 4. Theſe circumnavigators, in the courſe of their voyage, have obſerved all the phenomena, both of the heavens and the earth, to corrreſpond to, and to evince this ſpherical figure. 5. The moon is frequently ſeen eclipſed by the ſhadow of the earth; and in all eclipſes that ſhadow appears circular, what way ſoever it be projected, whether towards the eaſt, weſt, north, or ſouth, and howſoever its diameter vary, according to the greater or leſs diſtance from the earth; hence it follows, that the ſhadow of the earth, in all ſituations, is really conical, and conſequently, the body that projects it, that is, the earth, is nearly ſpherical. 6. In travelling towards the ſouth, the northern ſtars are depreſſed, and we loſe ſight of them, and the ſouthern ſtars are elevated and brought to view, and *vice verſâ*; and the ſun arrives at the meridian of places that are more eaſterly ſooner than to the meridian of thoſe towards the weſt, in proportion to the diſtance of the meridians meaſured upon the equator; which phenomena are owing to the ſphericity of the earth. 7. The ſame globular figure is likewiſe inferred from the operation of *levelling* (which ſee); in which it is found neceſſary to make an allowance for the difference between the apparent and true level. In ſhort, all the appearances, both upon the earth and in the heavens, are ſuch as they ſhould be, upon the ſuppoſition that the figure of the earth is globular, but none of them will correſpond to that of a plane ſurface. As for the inequalities on its ſurface, owing to mountains and vallies, they are of no moment in the eſtimation of its general figure, being of no greater account, with reſpect to relative proportion, than the aſperities on the ſurface of a lemon with regard to the lemon itſelf; or the ſmalleſt grain of ſand to a common globe. Indeed the change of figure, ariſing from the diurnal rotation of the earth, and appearing in an elevation of the equatorial and a flattening of the polar parts, is more ſenſible; but this does not materially affect the popular phenomena; though the ſcientific aſtronomer knows how to make a due allowance for them. See the ſequel of this article, and the article DEGREE.

When the ſpherical hypotheſis of the earth was once admitted, a tolerable conception would ſoon be formed of its magnitude. A perſon travelling northward, and obſerving the pole elevated one degree more than at the place of his departure, would eaſily conclude he had travelled over $\frac{1}{360}$th part of the whole circumference of the earth. The firſt approximation that was made by a method of this kind, however inaccurate, muſt (compared with the ſtate of ignorance that preceded it) have been, at that time, a moſt important addition to the ſtock of natural knowledge; and, indeed, except with a view to ſome very refined ſcientific inveſtigations, the general idea which the ancients had of the magnitude of the earth, differs but little from that of the moderns: for we are ſo entirely incapable of forming any accurate idea of number or magnitude, when either exceeds a certain limit, that a traveller who is told that the diſtance from London to York is about 200 miles, forms, perhaps, in one ſenſe, a more accurate idea of its diſtance than the philoſopher in his cloſet, who has computed the exact number of inches by trigonometrical calculation.

The magnitude of the earth may be eaſily eſtimated by the meaſure of a meridional degree; but the reſult will be different, according to the meaſure that is aſſumed. According to Caſſini, who adopted Picard's meaſure of a degree, the ambit or circumference of the earth is 123750720 Paris feet, or 134650777 Engliſh feet; whence, ſuppoſing the earth ſpherical, its diameter muſt be 7967 ſtatute miles; and multiplying the ſquare of the diameter by 3.1416, its ſurface will be 199407056 miles; and multiplying the cube of the diameter by the decimal .5236, we ſhall have 264779426393 cubic miles for the ſolid content of the globe of the earth. But if we take 364546 feet for the length of a degree in latitude 45° (ſee the table under DEGREE), we may conſider this as a mean length: hence, 364546 × 360 (= 131236560 feet) will be the circumference of the earth, conſidered as a ſphere; and ſince the circumference of every circle is to its radius as 6.28318 to 1, we have 6.28318 : 1 : : 131236560 : 20886964 feet, or 3955 miles, the radius of the earth; and, conſequently, its diameter is 7910 miles; its ſurface 196563942 miles, and its ſolidity 212600665836 cubic miles.

Dalby makes the earth's equatorial radius 3489932 fathoms, and its ſemi-axis 3473656 fathoms. (Phil. Tranſ. vol. for 1791.) Subſequent meaſurements make the ſame reſpectively equal to 3491420 and 3468007 fathoms, or to 7935 and 7882 miles. (Phil. Tranſ. vol. for 1795.) See the article DEGREE. As an approximation to the beſt eſtimation, but without laying much ſtreſs upon it, we ſhall reckon the two axes of the earth reſpectively equal to 7977 and 7940 Engliſh miles. Theſe are commonly called the equatorial and polar diameters of the earth. Hence we may deduce the ſolid contents of the earth. One of the rules for finding the ſolid contents of a ſpheroid, according to the doctrine of menſuration, is to multiply two-thirds of the revolving axis by the area of the generating ellipſe, (*viz.* the ellipſe, by the revolution of which the ſpheroid is generated,) and the product will be the content of the ſpheroid. (See Spheroid.) The axes, then, being aſſumed, as above ſtated, 7940 and 7977 miles reſpectively, the area of the generating ellipſe is (7940 × 7977 × 0.7854 =) 49745178,252; and its area multiplied by two-thirds of the longer axis, gives the ſolidity equal to (49745178.252 × $\frac{2}{3}$ × 7977 =) 264544857944.136 cubic miles. This determination evidently reſts upon the ſuppoſition that no conſiderable vacuity exiſts within the body of the earth. But there are reaſons for ſuppoſing that the earth is more denſe towards the centre than towards the ſurface. (See De la Lande's Aſtron. vol. ii. art. 3589.) And independently of this, all the mineralogical and geological obſervations ſhew, that the earth is not homogeneous. For the method of eſtimating the mean denſity of the earth, ſee the article Density.

It is not exactly known to whom we are indebted for the firſt ſuggeſtion of the oblate figure of the earth.

Picard, in his meaſure of the earth, publiſhed in 1671, ſpeaks of a conjecture propoſed to the academy, that ſuppoſing the diurnal motion of the earth, heavy bodies ſhould deſcend with leſs force at the equator than at the poles, and obſerves, that for the ſame reaſon, there ſhould be a difference in the length of the pendulum vibrating ſeconds in different latitudes.

It was in this ſame year that Richer was ſent to Cayenne, and among other objects of his voyage, he was charged by the academy to obſerve the length of the pendulum vibrating ſeconds. He returned in 1672, and mentions his obſervation of the pendulum as the moſt important he had made. The ſame meaſure which had been marked at Cayenne on a rod of iron, according to the length which had been found neceſſary to make the pendulum vibrate ſeconds, being brought back, and compared with that marked at Paris, the difference was found to be a line and a quarter, that at Cayenne being the ſhorteſt. The vibrations of the pendulum on which the experiment was made were very ſmall, and continued ſenſible for 52 minutes of time, and were compared with an excellent clock which vibrated ſeconds. Moreover, the clock which Richer took to Cayenne having been adjuſted to beat ſeconds at Paris, retarded two minutes a day at Cayenne, ſo that no doubt remained of the diminution of the force of gravity at the equator.

This was the firſt direct proof of the diurnal motion of the earth. Huygens was then led to ſuſpect that the ſame cauſe might produce a protuberance of the equatorial parts of the earth, and a correſponding depreſſion of the poles. Caſſini had already obſerved the oblate figure of Jupiter, which analogy ſtrongly favoured the ſuppoſition of a ſimilar phenomenon on the earth. The moſt obvious method of aſcertaining the fact being by direct meaſurement, aſtronomers were ſent to various parts of the world to meaſure the value of different degrees: of the reſult of their labours we have given a moſt ample detail under Degree.

Huygens was certainly the firſt perſon who attempted to determine the figure of the earth by direct calculation; but he aſſumed an hypotheſis, which, ſince the diſcovery of the law of univerſal gravitation, has been found to be inadmiſſible: this hypotheſis ſuppoſes that the whole of the attractive force reſides in the centre of the earth, and that its power varies as the ſquare of the diſtance. Upon this ſuppoſition Huygens computes the ellipticity of the earth to be $\frac{1}{578}$, the centrifugal force at the equator being $\frac{1}{289}$ of the force of gravity.

Newton, upon the ſuppoſition of the earth's having been an homogeneous fluid, eſtimates the ellipticity at $\frac{1}{230}$.

But Clairaut was the firſt mathematician who gave a general ſolution of this problem, adapted to the hypotheſis of a variable denſity. The reſult which he obtained from his inveſtigation was as curious as unexpected; it appeared that if the denſity of the ſtrata, of which the earth is compoſed, increaſes towards the centre, the ellipticity will be leſs than in the hypotheſis of Newton, and greater than in that of Huygens; and moreover, that the fraction expreſſing the ellipticity being added to the fraction expreſſing the augmentation of gravity at the poles, will together always make a conſtant quantity, which is equal to $\frac{5}{2}$ of the fraction which expreſſes the proportion which the centrifugal force at the equator bears to that of gravity. We ſhall find that it is by means of this theorem that we are enabled to aſcertain the true figure of the earth by experiments on pendulums, in a more accurate manner than can be done by the meaſurement of degrees.

We ſhall now ſubjoin the whole theory of this ſubject as given by La Place, and for his calculations ſhall ſubſtitute thoſe which are derived from taking into conſideration the meaſurements that have been made in England and Sweden, which bring the reſult much nearer to the true ſpheroidical figure than the degrees that had been taken by La Place, in the ſecond volume of La Mechanique Celeſte.

The force of gravity towards the planets is compoſed of the attractions of all their particles. If their maſs was fluid, and without motion, their ſtrata would be ſpherical, thoſe nearer the centre being the more denſe. The force of gravity at their exterior ſurface, and at any diſtance whatever without the ſphere, would be exactly the ſame, as if the whole maſs of the planet was compreſſed into the centre of gravity. It is in conſequence of this remarkable property, that the ſun, the planets, comets, and ſatellites, act upon each other, very nearly, as if they were ſo many material points. At very great diſtances the attraction of the particles of a body of any figure, which are the moſt remote, and thoſe which are neareſt the particle attracted, compenſate each other in nearly the ſame manner as if they were united in the centre of gravity, and if the ratio of the dimenſions of the body be conſidered as a very ſmall quantity of the firſt order, this reſult will be exact to a quantity of the ſecond order. But in a ſphere, it is rigorouſly true, and in a ſpheroid differing but little from a ſphere, it is of the ſame order as the product of its excentricity, by the ſquare of the ratio of its radius to the diſtance of the point attracted. This property of the ſphere of attracting, as if its maſs was concentrated in its centre, contributes greatly to the ſimplicity of the motions of the heavenly bodies. It does not belong excluſively to the law of nature; it equally appertains to the law of the attraction varying proportionally to the ſimple diſtance, and cannot belong to any other law, but thoſe formed by the addition of theſe two. And of all the laws which render the force of gravity nothing, at an infinite diſtance, that of nature is the only one in which the ſphere poſſeſſes this property.

According to this law, a body placed within a ſpherical ſtratum of uniform thickneſs, is equally attracted by all its parts, ſo as to remain at reſt in the midſt of the various attractions which act upon it. The ſame circumſtance takes place in an elliptic ſtratum, when the exterior and interior ſurfaces are ſimilar and ſimilarly ſituated. Suppoſing, therefore, the planets to be ſpheres of homogeneous matter, the force of gravity in their interior muſt diminiſh as the diſtance from the centre, for the exterior part relatively to the attracted particle contributes nothing to its gravity, which entirely conſiſts of the attraction of the internal ſphere, whoſe radius is equal to the diſtance of this point from the centre. But this attraction is equal to the maſs of the ſphere divided by the ſquare of the radius, and the maſs is as the cube of this ſame radius. The force of gravity on the attracted particle is therefore equal $\frac{R^3}{R^2}$, or, ſimply, to the radius. But if, (as is probably the caſe,) the ſtrata are more denſe as they approach the centre, the force of gravity will diminiſh in a leſs ratio than in the caſe of homogeneity. But the rotatory motion of the planets cauſes them to differ a little from the ſpherical figure, the centrifugal force ariſing from this motion cauſing the particles ſituated at the equator to recede from the centre, and produce a flattening of the poles.

Let us conſider, firſt, the effects of this circumſtance in the moſt ſimple caſe of the earth's being an homogeneous fluid; and the whole force of gravity reſiding in its centre, and varying reciprocally as the ſquare of the diſtance from this point. It will then be eaſy to prove that the terreſtrial ſpheroid is an ellipſoid of revolution, for if we conceive two columns of fluids communicating with each other at the centre, (*Plate* X. *Aſtron. fig.* 72.) one terminating at the pole, the other at any point in the ſurface, theſe two columns ought to be in equilibrio. The centrifugal force alters nothing of the weight of the column directed to the pole, but diminiſhes the weight of the other column. This force is nothing at the centre of the earth, and at the ſurface is proportional to the radius of the terreſtrial parallel or very nearly as the coſine of the latitude, but the whole of this force is not entirely employed in diminiſhing the force of gravity: for theſe two forces, making an angle with each other equal to the latitude, the centrifugal force decompoſed according to the direction of gravity is weakened in the ratio of the coſine of this angle to radius. At the ſurface of the earth the centrifugal force diminiſhes the force of the gravity by the product of the centrifugal force at the equator by the ſquare of the coſine of the latitude, thus, the mean value of this denomination in the length of a fluid column is the half of this product, and ſince the centrifugal force is $\frac{1}{289}$ of the force of gravity at the equator, this value is $\frac{1}{578}$ of the force of the gravity multiplied by the ſquare of the coſine of the latitude. And ſince it is neceſſary, for the maintenance of the equlibrium, that the column by its length ſhall compenſate the diminution of its weight, it ſhould ſurpaſs the polar column by $\frac{1}{578}$ of its length multiplied by the above coſine. And the augmentation of the radii from the pole to the equator, being proportional to the ſquares of theſe coſines, we conclude that the earth would be an ellipſoid of revolution, the equatorial and polar axis of which were in the proportion of 578 to 577.

To determine the law of gravity at the ſurface of the earth in this caſe, we ſhould obſerve that the force of gravity at any point on this ſurface is leſs than that at the pole, from its being ſituated farther from the centre, this diminution is nearly equal to the double of the augmentation of the terreſtrial radius; it is equal, therefore, to the product of the $\frac{1}{289}$th part of the force of gravity by the ſquare of the coſine of the latitude. The centrifugal force diminiſhes likewiſe the force of gravity by the ſame quantity; thus, by the union of theſe two cauſes, the diminution of gravity from the pole to the equator is equal $\frac{1}{144\frac{1}{2}} = 0.00694$ multiplied by the ſquare of the coſine of the latitude.

But it is found by experience, both from the meaſures of various degrees, and determination of the lengths of pendulums, that the ellipticity is greater than $\frac{1}{578}$, and the diminution of the force of gravity leſs than 0.00694, for we ſhall find the diminution of the force of gravity experimentally determined to be about 0.005.

We may therefore conclude, that the force of gravity is not directed to a ſingle point, but is compoſed of the joint attractions of all particles of the earth.

This being the caſe, the law of gravity depends on the figure of the terreſtrial ſpheroid, which depends itſelf on the law of gravity. It is this mutual dependence of the two unknown quantities on each other, that renders the inveſtigation of the figure of the earth very difficult. But, fortunately, the elliptic figure, the moſt ſimple next to the ſphere, ſatisfies the condition of equilibrium of a fluid maſs, ſubject to a motion of rotation, and of which all the particles attract each other reciprocally as the ſquares of the diſtance.

Newton, upon this hypotheſis, and ſuppoſing the earth a homogeneous fluid, found the ratio of the equatorial to the polar axis to be 230 to 229.

To determine the law of the variation of the force of gravity upon this hypotheſis, we may conſider two different points ſituated on the ſame radius drawn from the centre to the ſurface of an homogeneous fluid in equilibrio. It has been before obſerved, that all the elliptic ſtrata, ſituated without a point, contribute nothing to its gravity; the reſulting force of all the attractions which act on it, is derived entirely from the attraction of the interior ſpheroid, ſimilar to the entire ſpheroid, and whoſe ſurface paſſes through the point in queſtion. The ſimilar and ſimilarly ſituated particles of theſe two ſpheroids attract the interior point, and the correſponding point of the exterior ſurface, proportionally to their maſſes divided by the ſquares of their diſtances. Theſe maſſes are in the two ſpheroids as the cubes of their ſimilar dimenſions, and the ſquares of their diſtances are as the ſquares of theſe dimenſions. The attractions, then, on ſimilar particles, are proportional therefore to theſe dimenſions. From which it follows, that the entire attraction of the two ſpheroids are in the ſame ratio, and the directions parallel. The centrifugal forces of the two points now under conſideration are likewiſe proportional to the ſame dimenſions. Therefore the force of gravity in each of them being the reſult of theſe two forces, will likewiſe be proportionate to their diſtances from the centre of the fluid maſs.

Now, if we conceive two fluid columns directed, as before, to the centre of the ſpheroid, one from the pole, the other from any point on the ſurface, it is evident, that if the ellipticity of the ſpheroid is very ſmall, that is, if it differs but little from a ſphere, that the force of gravity decompoſed according to the directions of theſe columns will be nearly the ſame as the total gravity.

Dividing, therefore, theſe columns into an equal number of parts infinitely ſmall and proportional to their lengths, the weight of the correſponding parts will be to each other as the products of the lengths of the columns by the force of gravity at the points of their ſurface where they terminate. The whole weight of theſe columns will therefore be to each other in this ratio. And as theſe weights muſt be equal to be in equilibrio, the force of gravity at their ſurface muſt conſequently be reciprocally as the length of theſe columns. Thus the length of the radius of the equator ſurpaſſing the radius at the pole a 230th part, the force of gravity at the pole ſhould likewiſe exceed that at the equator a 230th part. This ſuppoſes the elliptic figure ſufficient for the equilibrium of a fluid homogeneous maſs. This Maclaurin has demonſtrated in a beautiful manner, from which it reſults, that the equilibrium is rigorouſly poſſible, and that if the ellipſoid differs little from a ſphere, the ellipticity will be equal $\frac{5}{4}$ths of the quantity which expreſſes the proportion of the centrifugal force to that of gravity under the equator. To the ſame motion of rotation, there may exiſt two correſponding figures of equilibrium. But the equilibrium cannot exiſt with every motion of rotation. The ſhorteſt period of rotation of an homogeneous fluid in equilibrio of the ſame denſity as the earth is 0.10089 of a day, and this limit varies reciprocally as the ſquare root of the denſity.

When the rotation becomes more rapid, the fluid maſs becoming more flattened at the poles, its period of rotation becomes leſs, and ultimately falls within the appropriate limits of a ſtate of equilibrium. After a great many oſcillations, the fluid, in conſequence of the friction and reſiſtances which it experiences, fixes itſelf at laſt in that ſtate which is *unique*, and determined by the primitive motion of rotation.

The preceding reſults afford us an eaſy method of veryfying the hypotheſis of the homogeneity of the earth. The irregularity of the meaſured degrees may be ſuppoſed to leave too much uncertainty, as to the ellipticity, to enable us to decide if it really is ſuch as the above hypotheſis requires. But the regular increaſe of the force of gravity from the equator to the pole, as determined by experiments on the pendulum, is ſufficient to throw great light upon the ſubject. In taking, as unity, the force of gravity at the equator, its increaſe at the pole, according to the hypotheſis of homogeneity, ſhould be equal $\frac{1}{230}$ = 0.00435. But by obſervation (as will hereafter be ſhewn,) this increaſe is 0.005; the earth, therefore, is not homogeneous. And, indeed, it is natural to ſuppoſe, that the denſity of the ſtrata increaſe as they approach the centre; it is even neceſſary for the ſtability of the equilibrium of the waters of the ocean, that their denſity ſhould be leſs than the mean denſity of the earth; otherwiſe, when agitated by the winds and other cauſes, they would overflow their limits, and inundate the adjoining continents. The homogeneity of the earth being thus excluded, by obſervation, we muſt, to determine its figure, ſuppoſe the ſea covering a nucleus compoſed of different ſtrata, diminiſhing in denſity from the centre to the ſurface. Clairaut has demonſtrated, that the equilibrium is ſtill poſſible, in the ſuppoſition of an elliptic figure at the ſurface, and of the ſtrata of the interior nucleus. In the moſt probable hypotheſis, relative to the law of the denſities and ellipticities of theſe ſtrata, the ellipticity of the earth is leſs than in the caſe of homogeneity, and greater than if the force of gravity was directed to a ſingle central point; but the increaſe of the force is greater than in the firſt caſe, and leſs than in the ſecond. But there exiſts, between the increaſe of the force of gravity, taken as unity at the equator and the ellipticity of the earth, this remarkable analogy, that in all the hypotheſes relative to the conſtitution of the internal nucleus which the ſea incloſes, the ellipticity of the earth is juſt ſo much leſs than that which would take place in the caſe of homogeneity, as the augmentation of the force of gravity exceeds that which ſhould exiſt, according to the ſame ſuppoſition, and reciprocally; ſo that the fractions expreſſing the ellipticity and the augmentation of the force of gravity, always, together, make a conſtant quantity equal $\frac{5}{2}$ds of the fraction $\frac{1}{289}$, which expreſſes the ratio of the force of gravity to the centrifugal force at the equator. This, on the earth, is equal 0.0086500.

In ſuppoſing an elliptic figure to the ſtrata of the terreſtrial ſpheroid, the increaſe of its radii, the increaſe of the force of gravity, and the diminution of the degrees from the pole to the equator, will vary as the ſquares of the coſine of the latitude; and theſe are connected with the ellipticity of the earth in ſuch a manner, that the total increaſe of the radii is equal to the ellipticity; and the total diminution of the degree is equal to the ellipticity, multiplied by three times the degree at the equator, (ſee Degree, where this has been demonſtrated); and the total increaſe of the force of gravity is equal to the force of gravity at the equator, multiplied by the exceſs of 0.0086500 above the ellipticity. Thus, the ellipticity of the earth may be determined, either by direct meaſurement of degrees, or by obſervations on the length of the pendulum.

The obſervations of the pendulum give 0.005 for the increaſe of the force of gravity, which, taken from $\frac{1}{113.2}$, gives $\frac{1}{320}$ for the ellipticity of the earth. If this hypotheſis of the ellipſe be conformable to nature, it ſhould agree with the various meaſurements that have been made in different countries to aſcertain the value of the meridional degrees. We have ſeen how diſcordant many of theſe meaſures are, when compared with the above hypotheſis; nevertheleſs, ſince La Place was occupied with theſe inveſtigations, the late meaſurements in England and Sweden appear to give the general reſult of the earth's figure nearer to a regular ellipſe, than could be at that time inferred from the meaſure of Maupertuis.

To embrace, in the moſt general manner poſſible, the theory of the figure of the earth and planets, it is neceſſary to determine the attraction of ſpheroids differing little from ſpheres, and formed of ſtrata variable both in figure and denſity, according to any law whatever. It will remain, then, to determine the figure which will agree with the equilibrium of a fluid expanded over its ſurface; for we muſt imagine the planets covered with a fluid ſimilar to the earth, or their figure would be entirely arbitrary.

A remarkable equation of partial differences, relative to the attraction of ſpheroids, lead the author, without the aid of integrations, to general expreſſions for the radii of the ſpheroids; for the attractions upon any points whatever, either within, on the ſurface, or without it; for the condition of the equilibrium of the fluids that ſurround them; for the law of gravity, and for the variation of the degrees at the ſurface.

All theſe quantities are connected with each other by analogies extremely ſimple; from which reſults an eaſy method of verifying all the hypotheſes that may be formed to repreſent either the variation of the force of gravity, or that of the values of different degrees of the meridian.

Thus Bouguer, with a view of reconciling the degrees meaſured at the equator in France and in Lapland, ſuppoſed the earth to be a ſpheroid of revolution, in which the increaſe of the degrees, from the equator to the pole, was proportional to the fourth power of the ſine of the latitude. This hypotheſis is ſhewn to be defective.

The above-mentioned expreſſions give a direct and general ſolution of the problem, which conſiſts in determining the figure of a fluid maſs in equilibrio, ſuppoſing it ſubjected to a movement of rotation, compoſed of an infinity of fluids of different denſities, whoſe particles attract each other directly as their maſſes, and inverſely as the ſquares of their diſtances. In this general ſuppoſition, the fluid neceſſarily takes the form of an ellipſoid of revolution, of which all the ſtrata are elliptic, whoſe denſities diminiſh, at the ſame time that their ellipticities increaſe from the centre to the ſurface.

The limits of ellipticity, of the whole ellipſoid, are $\frac{5}{4}$ and $\frac{1}{2}$ of the ratio of the centrifugal force, of the force of gravity at the equator.

The firſt limit is relative to the hypotheſis of homogeneity, and the ſecond to the ſuppoſition of the ſtrata, infinitely near the centre being infinitely denſe; and, conſequently, the whole maſs of the ſpheroid acting as if concentrated in that point. In the latter caſe, the force of gravity being directed to a ſingle point, and varying inverſely as the ſquare of the diſtance, the figure of the earth would be ſuch as has been above determined; but, in the general hypotheſis, the line which determines the direction of the force of gravity, from the centre to the ſurface of the ſpheroid, is a curve, every element of which is perpendicular to the ſtratum through which it paſſes.

It is remarkable, that the variations obſerved in the length of the pendulum, follow, pretty correctly, the law of the ſquares of the coſines of the latitudes; at the ſame time that the variations in the meaſured degrees differ very ſenſibly from this law. The general theory of the attractions of ſpheroids afford a ſimple explanation of this phenomenon; it ſhews us that the terms which, in the value of the terreſtrial radius, differ from this law, become more ſenſible in the expreſſion of the force of gravity, and ſtill more ſenſible in the expreſſion of degrees, where they may acquire a value ſufficiently great to produce the phenomenon under conſideration.

This theory likewiſe ſhews us, that the limits of the total increaſe of the force of gravity, taken at the equator as unity, are the products of 2 and $\frac{5}{4}$, the ratio of the centrifugal force, to the force of gravity under the equator; the firſt limit referring to the caſe of an infinite denſity at the centre; the ſecond to the caſe of homogeneity. The increaſe, as derived from obſervation, being between theſe limits, indicates that the ſtrata are more denſe, as they approach the centre, conformable to the laws of hydroſtatics. Thus, the theory ſeems to accord with obſervation, as far as could be expected, conſidering our ignorance of the internal conſtitution of the earth.

To determine the Figure of the Earth from the following Obſervations of the Length of the Pendulum.

Place of Obſervation.	Lat. in decimal Deg.	Length of the Pend. vibrating. Centeſ. Seconds of Mean Time.	Corrected Length.	Error *.
1. Peru	0.°00	0.″99669	0.99676	+ 0.00007
2. Porto-Bello	10.61	0.99689	0.99692	+ 0.00003
3. Pondicherry	13.25	0.99710	0.99700	— 0.00010
4. Jamaica	20.00	0 99745	0.99730	— 0.00015
5. Petit-Goare	20.50	0.99728	0.99732	+ 0.00004
6. Cape of Good Hope	37.69	0 99877	0.99852	— 0.00025
7. Toulouſe	48 44	0 99950	0 99945	— 0.00005
8. Vienna	53 57	0.99987	0.99991	+ 0.00004
9. Paris	54.26	1.00000	0.99997	— 0.00003
10. Gotha	56.63	1.00006	0.00002	— 0 00004
11. London	57 22	1.00018	1.00023	+ 0.00005
12. Peterſburg	64.72	1.00074	1.00086	+ 0.00012
13. Ponoi	66.60	1.00101	1.00100	— 0.00001
14. Avengſberg	74.22	1.00137	1.00155	+ 0.00018
15. Pello	74.53	1.00148	1.00157	+ 0.00009

* The ſum of the poſitive errors will nearly be equal to the ſum of the negative, according to the required condition of the problem.

Mr. La Place's method of finding the moſt probable ellipſis, correſponding to a ſet of obſervations ſimilar to the above, or that which ſhall ſatisfy the following conditions; namely, that the ſum of all the errors ſhall = 0, and the ſum of all the errors taken poſitively, a minimum.

Let $a^{(1)}$, $a^{(2)}$, $a^{(3)}$, be the obſerved lengths of the pendulum; $k^{(1)}$, $k^{(2)}$, $k^{(3)}$, the ſquares of the ſines of the correſponding latitudes. Suppoſe theſe lengths to be expreſſed by this formula, $z + ky$. And let $x^{(1)}$, $x^{(2)}$, $x^{(3)}$, be the errors of obſervation. Then we ſhall have the following equations:

$$\left.\begin{array}{l} a^{(1)} - z - k^{(1)} y = x^{(1)} \\ a^{(2)} - z - k^{(2)} y = x^{(2)} \\ a^{(3)} - z - k^{(3)} y = x^{(3)} \\ \\ a^{(n)} - z - k^{(n)} y = x^{(n)} \end{array}\right\} \text{A.}$$

Add theſe equations, and divide their ſum by n, making the quotient equal to zero; the condition being, that the ſum of the errors = 0; then,

$$\text{A} - z - ky = 0. \quad \text{B.}$$

Subtract this equation from each of the equations A, ſeparately, and new equations will be obtained of the following form:

$$\left.\begin{array}{l} h^{(1)} - q^{(1)} y = x^{(1)} \\ b^{(2)} - q^{(2)} y = x^{(2)} \\ b^{(3)} - q^{(3)} y = x^{(3)} \end{array}\right\} \text{O.}$$

&c. &c.

Compute the quotients $\frac{h^{(1)}}{q^{(1)}}$, $\frac{h^{(2}}{q^{(2)}}$, $\frac{h^{(3)}}{q^{(3)}}$, &c. and arrange them according to their magnitudes, neglecting their ſigns. Let the quotients thus arranged be denoted thus:

$$h^{(1)},\ h^{(2)};\ h^{(3)}. \quad \text{P.}$$

And obſerve the order of the firſt terms of equations O, which correſpond to them.

Then to find that value of y, which ſhall render the ſum of all the errors taken poſitively a minimum; add the quantities $h^{(1)}$, $h^{(2)}$, $h^{( )}$, till their ſum begins to ſurpaſs half the ſum of all theſe quantities added together; and calling this ſum F, a quantity r may be ſo determined, that

$$\left.\begin{array}{l} h^{(1)} + h^{(2)} + h^{(3)} \;\; - \;\; + h^{(r)} > 2\,\text{F} \\ h^{(1)} + h^{(2)} + h^{(3)} \;\; - \;\; + h^{(r-1)} \angle \tfrac{1}{2}\text{F} \end{array}\right\} \text{Q.}$$

Then $y = h^{(r)}$, becauſe, according to the preſent method, that error is to be ſuppoſed zero, which correſponds to that length in the equations O, which gives this value of y. The value of Z may then be obtained by the following equation:

$$\text{Z} = \text{A} - \text{K}y.$$

Application of this Method to the above Obſervations.

The obſerved lengths of the pendulum, with the ſquares of the ſines of the latitude of the places of obſervation, give the following equations:

$$\begin{array}{l} \text{Obſ. Length.} \qquad \text{Sin.}^2\ \text{L.} \\ \left.\begin{array}{r} 0.99669 - z - y\,0.00000 = x^{(1)} \\ .99689 - z - y\,0.02752 = x^{(2)} \\ .99710 - z - y\,0.04270 = x^{(3)} \\ .99745 - z - y\,0.09549 = x^{(4)} \\ .99728 - z - y\,0.10016 = x^{(5)} \\ .99877 - z - y\,0.31142 = x^{(6)} \\ .99950 - z - y\,0.47551 = x^{(7)} \\ .99987 - z - y\,0.55596 = x^{(8)} \\ 1.00000 - z - y\,0.56672 = x^{(9)} \\ 1.00006 - z - y\,0.57624 = x^{(10)} \\ 1.00018 - z - y\,0.61244 = x^{(11)} \\ 1.00074 - z - y\,0.72307 = x^{(12)} \\ 1.00101 - z - y\,0.74909 = x^{(13)} \\ 1.00137 - z - y\,0.84478 = x^{(14)} \\ 1.00148 - z - y\,0.84829 = x^{(15)} \end{array}\right\} \text{A.} \end{array}$$

Theſe added together, and divided by 15, give

$$0.99923 - z - y\,0.43529 = 0. \quad \text{B.}$$

This equation, taken ſucceſſively from every one of the equations A, gives O as follows:

$$\left.\begin{array}{r}
-0.00254 + y\,0.43529 = x^{(1)} \\
-0.00234 + y\,0.40777 = x^{(2)} \\
-0.00213 + y\,0.39259 = x^{(3)} \\
-0.00178 + y\,0.33980 = x^{(4)} \\
-0.00195 + y\,0.33513 = x^{(5)} \\
-0.00046 + y\,0.12387 = x^{(6)} \\
0.00027 - y\,0.04022 = x^{(7)} \\
0.00064 - y\,0.12067 = x^{(8)} \\
0.00077 - y\,0.13143 = x^{(9)} \\
0.00083 - y\,0.14095 = x^{(10)} \\
0.00095 - y\,0.17715 = x^{(11)} \\
0.00151 - y\,0.28778 = x^{(12)} \\
0.00178 - y\,0.31380 = x^{(13)} \\
0.00214 - y\,0.40949 = x^{(14)} \\
0.00225 - y\,0.41300 = x^{(15)}
\end{array}\right\} \text{O.}$$

The quotients $\frac{b^{(1)}}{q^{(1)}}$, $\frac{b^{(2)}}{q^{(2)}}$, arranged as above directed, will ſtand thus:

0.0067131
0.0058886
0.0058586
0.0058352
0.0058186
0.0057385
0.0056724
0.0054479
0.0054255
0.0053627
0.0053037
0.0052471
0.0052384
0.0052260
0.0037136

The firſt term of which, $b^{(1)}$, correſponds to $\frac{b^{(7)}}{q^{(7)}}$; the ſecond term, $b^{(2)}$, correſponds to $\frac{b^{(10)}}{q^{(10)}}$. The whole correſpond in the following order:

7, 10, 9, 1, 5, 2, 13, 15, 3, 11, 8, 12, 4, 14, 6.

The ſum of the firſt ſix is leſs than half the ſum of all the terms: therefore r, in equation Q, is equal to 7.

Now the 7th term correſponds to the 13th, in the equations O.

The value of y is therefore to be found from this equation, where $x^{(13)} = 0$.

Therefore $y = \frac{0.00178}{0.31380} = 0.0056724$.

And from equation B; $z = 0.99676 =$ the length of the pendulum at the equator.

But this value of y is the fraction ſought, which, according to the theory of Clairaut, ſhould, with another fraction expreſſing the ellipticity, make together the conſtant quantity 0.0086500.

Therefore, the ellipticity $= 0.00865 - 0.0056724 = 0.0029776 = \frac{1}{335.7}$.

Such is the determination of La Place; in which it appears to us that a miſtake has been committed in employing y as found by the above equations, inſtead of its value, found by making the pendulum at the equator equal unity.

The rule of La Place, in his own words, is as follows:

Let $\alpha\varepsilon$ be the exceſs of the length of the pendulum at the pole above that at the equator, divided by the length of the latter; then,

$$\alpha\varepsilon = \alpha\left(\tfrac{1}{2}\phi - b\right),$$

$$\text{And } \alpha\varepsilon + ab = \frac{5}{2}\alpha\phi = .00865.$$

To apply this rule:

$$\begin{array}{rl}
z = 0.9967600 & = \text{pendulum at the equator.} \\
\hline
z + y \times \text{ſin.}^2 90^\circ = 1.0024324 & = \text{pendulum at the pole.} \\
\hline
\end{array}$$

Exceſs = .0056724, which, divided by .9967600, gives $\alpha\varepsilon = 0.0056908$.

And the ellipticity $ab = 0.00865 - \alpha\varepsilon = 0.0089592 = \frac{1}{307.93}$.

Table of the Length of the Pendulum to every 10° of Latitude, calculated by the above Formulæ.

0°	1.0000000
10°	1.0001716
20°	1.0006657
30°	1.0014227
40°	1.0023513
50°	1.0033395
60°	1.0042681
70°	1.0050251
80°	1.0055192
90°	1.0056908

In the following calculation, we have introduced the value of the degree meaſured in England by colonel Mudge, and ſubſtituted the northern degree of Swanberg, inſtead of that of Maupertuis, which was taken by La Place. The reader will ſee that the reſult is much more ſatisfactory.

To determine the moſt probable Ellipſe from actual Meaſurement of Degrees.

	Latitude.	Toiſes.	Arc Meaſ.	Error.
1. Peru	0° 0′	56753	3	+0.5
2. India	12° 32′	56763	1	−14
3. Cape of Good Hope	33° 18′	57037	1	+137
4. Pennſylvania	39° 12′	56888	1	−70
5. Italy, Boſcovich	43° 1′	56979	1	−12
6. France	46° 12′	57018.5	10	−0.5
7. Auſtria	47° 47′	57074	1.5	+41
8. England	52° 2′ 20″	57068	3	−2
9. Sweden	66° 20′ 10″	57196	1.5	+14

$$\left.\begin{array}{rrrl}
1. & 170259 & -\ 3z & -\ y\,0.00000^{(1)} \\
2. & 56763 & -\ z & -\ y\,0.04709^{(2)} \\
3. & 57037 & -\ z & -\ y\,0.30156^{(3)} \\
4. & 56888 & -\ z & -\ y\,0.39946^{(4)} \\
5. & 56979 & -\ z & -\ y\,0.46541^{(5)} \\
6. & 570185 & -\ 10z & -\ y\,5.20930^{(6)} \\
7. & 85611 & -\ 1.5z & -\ y\,0.82275^{(7)} \\
8. & 171204 & -\ 3z & -\ y\,1.86486^{(8)} \\
9. & 85794 & -\ 1.4z & -\ y\,1.25835^{(9)}
\end{array}\right\} \text{A.}$$

$1310720 - 23z - y\,10.36878$, which, divided by 23, gives equation $A - z - Py = 0$.

$$56988 - z - y\,0.45081 = 0.$$

This equation, taken from equations A, gives the equations O, thus:

$$\left.\begin{array}{rl} 1. & -235 + y\,0.45081 = x^{(1)} \\ 2. & -225 + y\,0.40372 = x^{(2)} \\ 3. & +49 + y\,0.14925 = x^{(3)} \\ 4. & -100 + y\,0.05135 = x^{(4)} \\ 5. & +9 - y\,0.01460 = x^{(5)} \\ 6. & +30 - y\,0.07012 = x^{(6)} \\ 7. & +86 - y\,0.09769 = x^{(7)} \\ 8. & +80 - y\,0.17081 = x^{(8)} \\ 9. & -208 - y\,0.38809 = x^{(9)} \end{array}\right\}\text{O.}\quad \begin{array}{r} 521 \\ 557 \\ 328 \\ 194 \\ 616 \\ 435 \\ 880 \\ 468 \\ 536 \end{array}$$

$$\begin{array}{r} 880 \\ 616 \\ 557 \\ 536 \\ 521 \\ 468 \\ 435 \\ 328 \\ 194 \end{array} \left\{\begin{array}{c} 7 \\ 5 \\ 2 \\ 9 \\ 1 \\ 8 \\ 6 \\ 3 \\ 4 \end{array}\right\} \begin{array}{l} y\,0.14653 \\ y\,0.01460 \\ y\,0.40372 \\ y\,0.58213 \\ y\,1.35243 \\ y\,0.51243 \\ y\,0.70120 \\ y\,0.14925 \\ y\,0.05135 \end{array}$$

The fifth term of the above co-efficients is the firſt that begins to ſurpaſs the half ſum of the whole, and it correſponds to N° 1, from which term in equations O, y is to be deduced.

$$\text{Since } -235 + y\,0.45081 = 0,$$
$$y = 521.$$

Subſtituting this value in equation

$$56988 - z - y\,0.45081$$
$$z = 56753.$$

And the ellipticity, which is equal to $\frac{521}{3 \times 56753} = \frac{1}{327}$.

The ellipticity obtained by La Place, in his "Mecanique Celeſte," is $\frac{1}{312}$.

Calculation repeated with only the five meaſures that ſeem moſt deſerving of confidence.

	° ′ ″	Toiſes.	
1. Peru	0 0 0	56753	2
2. India	12 32 0	56763	1
3. France	46 12 0	57018.5	10
4. England	52 2 20	57068	3
5. Sweden	66 20 10	57196	1.5

$$\left.\begin{array}{l} 56753 - z - y\,0.00000 = x^{(1)} \\ 56763 - z - y\,0.04709 = x^{(2)} \\ 57018.5 - z - y\,0.52093 = x^{(3)} \\ 57068 - z - y\,0.62162 = x^{(4)} \\ 57196 - z - y\,0.83890 = x^{(5)} \end{array}\right\}\text{A.}$$

$$\begin{array}{l} 113506 - 2z - y\,0.00000 \\ 56763 - z - y\,0.4709 \\ 570185 - 10z - y\,5.20930 \\ 171204 - 3z - y\,1.86486 \\ 85794 - 1.5z - y\,1.25835 \end{array}$$

Theſe equations, added together, and divided by the ſum of the multipliers, give

$$56997 - z - y\,0.47883$$

This, ſubtracted from each of the equations A, gives the equations O.

$$\left.\begin{array}{l} 244 - y\,0.47883 = x^{(1)} \\ 234 - y\,0.43174 = x^{(2)} \\ -21.5 + y\,0.04210 = x^{(3)} \\ -71 + y\,0.14279 = x^{(4)} \\ -199 + y\,0.36007 = x^{(5)} \end{array}\right\}\text{O.}$$

$$\begin{array}{r} 552 \\ 542 \\ 510.7 \\ 510 \\ 497 \end{array} \left\{\begin{array}{c} 5 \\ 2 \\ 3 \\ 1 \\ 4 \end{array}\right\} \begin{array}{l} y\,54010 \\ y\,43174 \\ y\,42100 \\ y\,95766 \\ y\,42837 \end{array}$$

The third term is the firſt that ſurpaſſes the half ſum of the five terms, which anſwers to N° 3, therefore the value of y is to be deduced from its correſponding equation, and is equal to 510.7, which number expreſſes the exceſs in toiſes of the polar above the equatorial degree; z, the equatorial degree, is deduced from equation $56997 - z - y\,47883$, by ſubſtituting the value of $y = 510.7$. Hence $z = 56752.5$.

The ellipticity, which is equal $\frac{510.7}{3 \times 56752.5}$, (ſee DEGREE,) is thus found equal $\frac{1}{333.4}$.

	Obſervations.	Obſervations corrected.	Error.
Peru	56753	56752.5	+ 0.5
India	56763	56776.	− 13
France	57018.5	57018.5	0
England	57068	57070	− 2
Sweden	57196	57181.8	+ 14.2

If we take the ellipticity a mean between this laſt determination, and that given by the pendulum, it will be $\frac{1}{336}$, and nearer than this, it will probably never be known.

Inveſtigation of Clairaut's theorem, on which the above calculations are founded.

Let us ſuppoſe a ſphere of ſolid matter, equally denſe at equal diſtances from the centre, and covered with a leſs denſe fluid, and let us ſuppoſe that the whole has a form ſuitable to the velocity of its rotation. It is this form that we are to find out. With this view, let us ſuppoſe, that all the matter by which the ſolid globe or nucleus is denſer than the fluid is collected in the centre. We have ſeen that this will make no change in the gravitation of any particle of the recumbent fluid.

Thus we have a ſolid globe covered with a fluid of the ſame denſity, and beſides the mutual gravitation of the particles of the fluid, we have a force of the ſame nature, acting on every one of them directed to the central redundant matter.

Now let the globe liquefy or diſſolve. This can induce no change of force on any particle of the fluid. Let us then determine the form of the new fluid ſpheroid, which will maintain itſelf in rotation. This being determined, let the globe again become ſolid. The remaining fluid will not change its form, becauſe no change is induced on the force acting on any particle of the fluid. Call this hypotheſis A.

In order to determine the ſtate of equilibrium, or the form which inſures it, which is the chief difficulty, let us form another hypotheſis B, differing from A only in this circumſtance, that the matter collected in the centre, inſtead of attracting the particles of the incumbent fluid, with a force decreaſing in the inverſe duplicate ratio of their diſtances, attracts them with a force increaſing in the direct ratio of their diſtances, keeping the ſame intenſity at the diſtance of the pole as in hypotheſis A. This fictitious hypotheſis, ſimilar to Hermann's, is choſen, becauſe a maſs ſo conſtituted will maintain the form of an accurate elliptical ſpheroid, by a proper adjuſtment of the proportion of its axis to the velocity of its rotation. This will eaſily appear, for we have ſeen that the mutual gravitation of the particles of the elliptical fluid ſpheroid produces in each particle a force which may be reſolved into two forces, one of them perpendicular to the axis, and proportionate to the diſtance from it, and the other perpendicular to the equator, and proportional to the diſtance from its plane. There is now, by hypotheſis B, ſuperadded on each particle a force proportional to its diſtance from the centre, and directed to the centre. This may alſo be reſolved into a force perpendicular to the axis, and another perpendicular to the equator, and proportional to their diſtances from them. Therefore, the whole combined forces acting on each particle, may be thus reſolved into two forces in thoſe directions and thoſe proportions. Therefore, a maſs ſo conſtituted, will maintain its elliptical form, provided the velocity of its rotation be ſuch that the whole force at the pole and the equator are inverſely as the axis of the generating ellipſe.

We are to aſcertain this form, or this required magnitude, of the centrifugal force. Having done this, we ſhall reſtore to the accumulated central matter its natural gravitation, or its action on the fluid in the inverſe duplicate ratio of the diſtances, and then ſee what change muſt be made on the form of the ſpheroid in order to reſtore the equilibrium.

Let B A *b a* (*fig.* 73.) be the fictitious elliptical ſpheroid of hypotheſis B. Let B E *b e* be the inſcribed ſphere. Take E G perpendicular to C E, to repreſent the force of gravitation of a particle in E to the central matter correſponding to the diſtance C E or C B. Draw C G: draw alſo A I perpendicular to C A, meeting C G in I. Deſcribe the curve G L R, whoſe ordinates G E, L A, R M, &c. are proportional to $\frac{1}{CE^2}$, $\frac{1}{CA^2}$, $\frac{1}{CM^2}$, &c. Theſe ordinates will expreſs the gravitations of the particles E, A, M, &c. to the central matter by hypotheſis A.

In hypotheſis A the gravitation of A is repreſented by A L; but in hypotheſis B it is repreſented by A I. For in hypotheſis B, the gravitations to this matter are as the diſtances. E G is the gravitation of E in both hypotheſes. Now $EG : AL = CA^2 : CE^2$; but $EC : AI = CE : CA$. In hypotheſis A the weight of the column A E is repreſented by the ſpace A L G E, but by A I G E in hypotheſis B. If, therefore, the ſpheroid of hypotheſis B was in equilibrio, while turning round its axis, the equilibrium is deſtroyed by merely changing the force acting on the column E A.

There is a loſs of preſſure or weight ſuſtained by the column E A. This may be expreſſed by the ſpace L G I, the difference between the two areas E G I A and E G L A. But the equilibrium may be reſtored, by adding a column of fluid A M, whoſe weight A L R M ſhall be equal to L G I, which is very nearly equal $\frac{LI \times AE.}{2}$

In order to find the height of this column, produce G E on the other ſide of E, and make E F to E G as the denſity of the fluid to the denſity by which the nucleus exceeded it. E F will be to E G as the gravitation of a particle in E to the globe (now of the ſame denſity with the fluid) is to its gravitation to the redundant matter collected in the centre. Now, take D E to repreſent the gravitation of E to the fluid contained in the concentric ſpheroid E β *e* β, which is ſomewhat leſs than its gravitation to the ſphere E B *e b*. Draw C D N. Then A N repreſents the gravitation of A to the whole fluid ſpheroid. In like manner, N I is the united gravitation of A to both the fluid and the central matter, in the ſame hypotheſis. But in hypotheſis A, this gravitation is repreſented by N L.

Let N O repreſent the centrifugal force affecting the particle A, taken in due proportion to N A or N L, its whole gravitation in hypotheſis A. Draw C K O. D K will be the centrifugal force at E. The ſpace O K G I will expreſs the whole ſenſible weight of the fluid in A E, according to hypotheſis B, and O K G L will expreſs the ſame, according to hypotheſis A. L G I is the difference, to be compenſated by means of a due addition A M.

This addition may be defined by the quadrature of the ſpaces G E A L and G L I. But it will be abundantly exact to ſuppoſe that G L R ſenſibly coincides with a ſtraight line, and then to proceed in this manner. We have, by the nature of the curve G L R,

$$AL : EG = EC^2 : AC^2$$

Alſo H A, or $EG : AI = EC : AC$

Therefore $AL : AI = EC^3 : AC^3$.

Now, when a line changes by a very ſmall quantity, the variation of a line proportional to its cube is thrice as great as that of the line proportional to the root. H I is the quantity proportional to E A the increment of the root E C. I L is proportional to the variation of the cube, and is therefore very nearly equal to thrice H I.

Therefore ſince $EG : HI = EC : AE$, we may

ſtate $EG : LI = EC : 3AE$,

or $3EG : LI = EC : AE$.

Now, Q O L R may be conſidered as equal to $QR \times AM$, or as equal to $KG \times AM$, and L G I may be conſidered as equal to $LI \times \frac{1}{2}AE$, and $2KG \times AM = LI \times AE$.

Therefore $2KG : AE = LI : AM$

but $EC : AE = 3EG : LI$

therefore $2KG \times EC : AE^2 = 3EG : AM$

and $2KG : \frac{AE^2}{EC} = 3EG : AM$

and $2KG : 3EG = \frac{AE^2}{EC} : AM$

That is, twice the ſenſible gravity at the equator is to thrice the gravitation to the central matter as a third proportional to radius and the elevation of the equator is to the addition neceſſary for producing the *equilibrium* required in hypotheſis A.

This addition may be more readily conceived by means of a conſtruction. Make $AE : Ee = 2KG : 3EG$. Draw *e a* parallel to E A, and draw C *e m*, cutting A N in *m*. Then *a m* is the addition that muſt be made to the column A C. A ſimilar addition muſt be made to every diameter C T, making $2KG : 3EG = \frac{TV^2}{CV} : Tt$, and the whole will be *in equilibrio*.

This determination of the ellipticity will equally ſuit thoſe caſes where the fluid is ſuppoſed denſer than the ſolid nucleus, or where there is a central hollow. For E G may be taken negatively, as if a quantity of matter were placed in the centre acting with a repelling or centrifugal force on the fluid. This is repreſented on the other ſide of the axis B *b*. The ſpace *g i l* in this caſe is negative, and indicates a diminution of the column *a c*, in order to reſtore the *equilibrium*.

It is evident that the figure reſulting from this conſtruction is not an accurate ellipſe. For, in the ellipſe, T t would be in a conſtant ratio to V T, whereas it is as V T^2 by our conſtruction. But it is alſo evident that in the caſes of ſmall deviation from perfect ſphericity, the change of figure from the accurate ellipſe of hypotheſis B is very ſmall. The greateſt deviation happens when E e is a maximum. It can never be ſenſibly greater in proportion to A E than $\frac{3}{2}$ of A E is in proportion to E C, unleſs the centrifugal force F D be very great in compariſon of the gravity D E. In the caſe of the earth, where E A is nearly $\frac{1}{230}$ of E C, if we ſuppoſe the mean denſity of the earth to be five times that of ſea water, $a\,m$ will not exceed $\frac{1}{213444}$ of E C, or $\frac{1}{924}$ of E A.

We are not to imagine that, ſince central matter requires an addition A M to the ſpheroid, a greater denſity in the interior parts of this globe requires a greater equatorial protuberancy than if all were homogeneous; for it is juſt the contrary. The ſpheroid to which the addition muſt be made is not the figure ſuited to a homogeneous maſs, but a fictitious figure employed as a ſtep to facilitate inveſtigation. We muſt therefore define its ellipticity, that we may know the ſhape reſulting from the final adjuſtment.

Let f be the denſity of the fluid, and n the denſity of the nucleus, and let $n - f$ be $= q$, ſo that q correſponds with E G of our conſtruction, and expreſſes the redundant central matter (or the central deficiency of matter, when the fluid is denſer than the nucleus). Let B C or E C be r, A E be x, and let g be the mean gravity (primitive), and c the centrifugal force at A. Laſtly, let π be the circumference when the radius of the circle is 1.

The gravitation of B to the fluid ſpheroid is $\frac{2}{3}\pi f r$, and its gravitation to the central matter is $\frac{2}{3}\pi q r$. The ſum of theſe, or the whole gravitation of B, is $\frac{2}{3}\pi n r$. This may be taken for the mean gravitation on every point of the ſpheroidal ſurface.

But the whole gravitation of B differs conſiderably from that of A.

C A, or C E, is to $\frac{1}{5}$ A E as the primitive gravity of B to the ſpheroid is to its exceſs above the gravitation (primitive) of A to the ſame. That is, $r : \frac{1}{5} x = \frac{2}{3}\pi f r : \frac{2}{15}\pi f x$, and $\frac{2}{15}\pi f x$ expreſſes this exceſs.

In hypotheſis B, we have C E to C A as the gravitation of B or E to the central matter is to the gravitation of A to the ſame. Therefore C E is to E A as the gravitation of E to this matter is to the exceſs of A's gravitation to the ſame. This exceſs of A's gravitation is expreſſed by $\frac{2}{3}\pi q x$, for $r : x = \frac{2}{3}\pi q r : \frac{2}{3}\pi q x$.

Without any ſenſible error, we may ſtate the ratio of g to c as the ratio of the whole gravitation of A to the centrifugal tendency excited in A by the rotation. Therefore $g : c = \frac{2}{3}\pi n r : \frac{2\pi n r c}{3g}$, and this centrifugal tendency of the particle A is $\frac{2\pi n r c}{3g}$. This is what is expreſſed by N O in our conſtruction.

The whole difference between the gravitations of B and A is therefore $\frac{2}{15}\pi f x - \frac{2}{3}\pi q x + \frac{2\pi n r c}{3g}$. The gravitation of B is to this difference as $\frac{2}{3}\pi n r$ to $\frac{2}{15}\pi f x - \frac{2}{3}\pi q x + \frac{2\pi n r c}{3g}$ or (dividing all by $\frac{2}{3}\pi n$) as r to $\frac{f x}{5n} - \frac{q x}{n} + \frac{c r}{g}$.

Now the equilibrium of rotation requires that the whole polar force be to the ſenſible gravitation at the equator as the radius of the equator to the ſemiaxis. Therefore we muſt make the radius of the equator to its exceſs above the ſemiaxis as the polar gravitation to its exceſs above the ſenſible equatorial gravitation. That is, $r : x = r : \frac{f x}{5n} - \frac{q x}{n} + \frac{c r}{g}$, and therefore $x = \frac{f x}{5n} - \frac{q x}{n} + \frac{c r}{g}$. Hence we have $\frac{c r}{g} = x \times \frac{q x}{n} - \frac{f x}{5n}$. But $q = n - f$. Therefore $\frac{c r}{g} = x + \frac{n x}{n} - \frac{f x}{n} - \frac{f x}{5n}, = x + x - \frac{6 f x}{5n}, = 2x - \frac{6 f x}{5n} = x \times \left(2 - \frac{6f}{5n}.\right)$

Wherefore $x = \frac{c r}{g \times \left(2 - \frac{6f}{5n}\right)}, = \frac{5 n c r}{g \times \overline{10n - 6f}}$, which is more conveniently expreſſed in this form $x = \frac{5 c r}{2g} \times \frac{n}{5n - 3f}$. The ſpecies, or ellipticity of the ſpheroid, is $\frac{x}{r}, = \frac{5c}{2g} \times \frac{n}{5n - 3f}$.

Such then is the elliptical ſpheroid of hypotheſis B; and we ſaw that, in reſpect of form, it is ſcarcely diſtinguiſhable from the figure which the maſs will have when the fictitious force of the central matter gives place to the natural force of the denſe ſpherical nucleus. This is true at leaſt in all the caſes where the centrifugal force is very ſmall in compariſon with the mean gravitation.

We muſt therefore take ſome notice of the influence which the variations of denſity may have on the form of this ſpheroid. We may learn this by attending to the formula

$$\frac{x}{r} = \frac{5c}{2g} \times \frac{n}{5n - 3f}.$$

The value of this formula depends chiefly on the fraction $\frac{n}{5n - 3f}$.

If the denſity of the interior parts be immenſely greater than that of the ſurrounding fluid, the value of this fraction becomes nearly $\frac{1}{5}$, and $\frac{x}{r}$ becomes nearly $= \frac{c}{2g}$, and the ellipſe nearly the ſame with what Hermann aſſigned to a homogeneous fluid ſpheroid.

If $n = 5f$; then $\frac{n}{5n - 3f} = \frac{5}{22}$; and in the caſe of the earth, $\frac{x}{r}$ would be nearly $= \frac{1}{508.6}$, making an equatorial elevation of nearly ſeven miles.

If $n = f$, the fraction $\frac{n}{5n - 3f}$ becomes $\frac{1}{2}$, and $\frac{x}{r} = \frac{5c}{4g}$, which we have already ſhewn to be ſuitable to a homogeneous ſpheroid, with which this is equivalent. The protuberance or ellipticity in this caſe is to that when the nucleus is incomparably denſer than the fluid in the proportion of 5 to 2. This is the greateſt ellipticity that can obtain when the fluid is not denſer than the nucleus.

Between theſe two extremes, all other values of the formula are competent to homogeneous ſpheroids of gravitating fluids, covering a ſpherical nucleus of greater denſity, either uniformly denſe or conſiſting of concentric ſpherical ſtrata, each of which is uniformly denſe.

From this view of the extreme caſes, we may infer in general, that as the incumbent fluid becomes rarer in proportion to the nucleus, the ellipticity diminiſhes. M. Bernouilli (Daniel), miſled by a gratuitous aſſumption, ſays in his theory of the tides, that the ellipticity produced in the aërial fluid which ſurrounds this globe will be 800 times greater than that of the ſolid nucleus; but this is a miſtake, which a juſter aſſumption of *data* would have prevented. The aërial ſpheroid will be ſenſibly leſs oblate than the nucleus.

It was ſaid that the value of the formula depended chiefly on the fraction $\frac{n}{5n-3f}$. But it depends alſo on the fraction $\frac{5c}{2g}$, increaſing or diminiſhing as c increaſes or diminiſhes, or as g diminiſhes or increaſes. It muſt alſo be remarked that the theorem $\frac{x}{r}=\frac{5c}{4g}$ for a homogeneous ſpheroid was deduced from the ſuppoſition that the eccentricity is very ſmall. When the rotation is very rapid, there is another form of an elliptical ſpheroid, which is in that kind of *equilibrium*, which, if it be diſturbed, will not be recovered, but the eccentricity will increaſe with great rapidity, till the whole diſſipates in a round flat ſheet. But within this limit, there is a kind of ſtability in the *equilibrium*, by which it is recovered when it is diſturbed. If the rotation be too rapid, the ſpheroid becomes more oblate, and the fluids which accumulate about the equator, having leſs velocity than that circle, retard the motion. This goes on however ſome time, till the true ſhape is overpaſſed, and then the accumulation relaxes. The motion is now too ſlow for this accumulation, and the waters flow back again towards the poles. Thus an oſcillation is produced by the diſturbance, and this is gradually diminiſhed by the mutual adheſion of the waters, and by friction, and things ſoon terminate in the reſumption of the proper form.

When the denſity of the nucleus is leſs than that of the fluid, the varieties which reſult in the form from a variation in the denſity of the fluid are much greater, and more remarkable. Some of them are even paradoxical. Caſes, for example, may be put, (when the ratio of n to f differs but very little from that of 3 to 5,) where a very ſmall centrifugal force, or very ſlow rotation, ſhall produce a very great protuberance, and, on the contrary, a very rapid rotation may conſiſt with an oblong form like an egg. But theſe are very ſingular caſes, and of little uſe in the explanation of the phenomena actually exhibited in the ſolar ſyſtem. The *equilibrium* which obtains in ſuch caſes may be called a *tottering equilibrium*, which, when once diſturbed, will not be again recovered, but the diſſipation of the fluid will immediately follow with accelerated ſpeed. Some caſes may be imagined, where there is a deficiency of matter in the centre, or even a hollow.

The chief diſtinction between the caſes of a nucleus covered with an equally denſe fluid, and a denſe nucleus covered with a rarer fluid, conſiſts in the difference between the polar and equatorial gravities; for we ſee that the difference in ſhape is inconſiderable. It has been ſhewn already that, in the homogeneous ſpheroid of ſmall eccentricity, the exceſs of the polar gravity above the ſenſible equatorial gravity is nearly equal to $\frac{gx}{5r}$ (for $r:\frac{1}{5}x=g:\frac{gx}{5r}$). When, in addition to this, we take into account the diminution c, produced by rotation, we have $\frac{gx}{5r}+c$ for the whole difference between the polar and the ſenſible equatorial gravity. But, in a homogeneous ſpheroid, we have $x=\frac{5cr}{4g}$. Therefore the exceſs of polar gravity in a homogeneous revolving ſpheroid is $\frac{c}{4}+e$ or $\frac{5c}{4}$. We may diſtinguiſh this exceſs in the homogeneous ſpheroid by the ſymbol E.

But, in hypotheſis B, the equilibrium of rotation requires that r be to x as g to $\frac{gx}{r}$, and the exceſs of polar gravity in this hypotheſis is $\frac{gx}{r}$. But we have alſo ſeen that in this hypotheſis $\frac{x}{r}=\frac{5c}{2g}\times\frac{n}{5n-3f}$. Therefore the exceſs of polar gravity in this hypotheſis is $\frac{5c}{2}\times\frac{n}{5n-3f}$. Let this exceſs be diſtinguiſhed by the ſymbol ε.

The exceſs of polar gravity muſt be greater than this in hypotheſis A. For, in that hypotheſis the equatorial gravity to the fluid part of the ſpheroid is already ſmaller. And this ſmaller gravity is not ſo much increaſed by the natural gravitation to the central matter, in the inverſe duplicate ratio of the diſtance, as it was increaſed by the fictitious gravity to the ſame matter, in the direct ratio of the diſtances. The ſecond of the three diſtinctions, between the gravitations of B and A, was $-\frac{qx}{n}$. This muſt now be changed into $+\frac{2qx}{n}$, where $-\frac{qx}{n}$ is repreſented by HI in *fig.* 72; and the exceſs, forming the compenſation for hypotheſis A, is repreſented by HL, nearly double of HI, and in the oppoſite direction, diminiſhing the gravitation of A. The difference of theſe two ſtates is $\frac{3qx}{n}$, by which the tendency of A to the central matter in hypotheſis A falls ſhort of what it was in hypotheſis B. Therefore, as $\frac{fx}{5n}-\frac{qx}{n}+\frac{cr}{g}$ is to $\frac{3qx}{n}$, ſo is the exceſs ε to a quantity ε', which muſt be added to ε, in order to produce the difference of gravities e, conformable to the ſtatement of hypotheſis A. Now, in hypotheſis B, we had $x=\frac{fx}{5n}-\frac{qx}{n}+\frac{cr}{g}$, and we may, without ſcruple, ſuppoſe x the ſame in hypotheſis A. Therefore $\varepsilon:\varepsilon'=x:\frac{3qx}{n},=1:\frac{3q}{n}$, and $\varepsilon'=\varepsilon\times\frac{3q}{n}=\varepsilon\times\frac{3n-3f}{n},=\frac{5c}{2}\times\frac{n}{5n-3f}\times\frac{3n-3f}{n},=\frac{5c}{2}\times\frac{3n-3f}{5n-3f}$. Add to this ε, which is $\frac{5c}{2}\times\frac{n}{5n-3f}$, and we obtain for the exceſs e of polar gravity in hypotheſis A $=\frac{5c}{2}\times\frac{4n-3f}{5n-3f}$.

Let us now compare this exceſs of polar gravity above the ſenſible equatorial gravity in the three hypotheſes: 1ſt, A, ſuited to the fluid ſurrounding a ſpherical nucleus of greater denſity: 2d, B, ſuited to the ſame fluid, ſurrounding a central nucleus which attracts with a force proportional to the diſtance: and 3d, C, ſuited to a homogeneous fluid ſpheroid, or encloſing a ſpherical nucleus of equal denſity. Theſe exceſſes are

$$\text{A} \qquad \frac{5c}{2} \times \frac{4n-3f}{5n-3f}.$$

$$\text{B} \qquad \frac{5c}{2} \times \frac{n}{5n-3f}.$$

$$\text{C} \quad \frac{5c}{4}, \text{ or } \frac{5c}{4} \times \frac{5n-3f}{5n-3f}.$$

It is evident that the ſum of A and B is $\frac{5c}{2} \times \frac{5n-3f}{5n-3f}$, which is double of C, or $\frac{5c}{4} \times \frac{5n-3f}{5n-3f}$, and therefore C is the arithmetical mean between them.

Now we have ſeen that $\frac{5c}{2g} \times \frac{4n-3f}{5n-3f}$ expreſſes the ratio of the exceſs of polar gravity to the mean gravity in the hypotheſis A. We have alſo ſeen that $\frac{5c}{2g} \times \frac{n}{5n-3f}$ may ſafely be taken as the value of the ellipticity in the ſame hypotheſis. It is not perfectly exact, but the deviation is altogether inſenſible in a caſe like that of the earth, where the rotation and the eccentricity are ſo moderate. And laſtly, we have ſeen that the ſame fraction that expreſſes the ratio of the exceſs of polar gravity to mean gravity, in a homogeneous ſpheroid, alſo expreſſes its ellipticity, and that twice this fraction is equal to the ſum of the other two.

Hence may be derived a beautiful theorem, firſt given by M. Clairaut, that "the fraction expreſſing twice the ellipticity of a homogeneous revolving ſpheroid is the ſum of two fractions, one of which expreſſes the ratio of the exceſs of polar gravity to mean gravity, and the other expreſſes the ellipticity of any ſpheroid of ſmall eccentricity, which conſiſts of a fluid covering a denſer ſpherical nucleus."

If therefore any other phenomena give us, in the caſe of a revolving ſpheroid, the proportion of polar and equatorial gravities, we can find its ellipticity, by ſubtracting the fraction expreſſing the ratio of the exceſs of polar gravity to the mean gravity from twice the ellipticity of a homogeneous ſpheroid. Thus, in the caſe of the earth, twice the ellipticity of the homogeneous ſpheroid is $\frac{1}{115}$. A medium of ſeven compariſons of the rate of pendulums gives the proportion of the exceſs of polar gravity above the mean gravity $= \frac{1}{180}$. If this fraction be ſubtracted from $\frac{1}{115}$, it leaves $\frac{1}{319}$ for the medium ellipticity of the earth. Of theſe ſeven experiments, five are ſcarcely different in the reſult. Of the other two, one gives an ellipticity not exceeding $\frac{1}{355}$. The agreement in general is incomparably greater than in the forms deduced from the compariſons of degrees of the meridian. All the compariſons that have been publiſhed concur in giving a conſiderably ſmaller eccentricity to the terraqueous ſpheroid than ſuits a homogeneous maſs, and which is uſually called Newton's determination. It is indeed his determination, on the ſuppoſition of homogeneity; but he expreſsly ſays, that a different denſity in the interior parts will induce a different form, and he points out ſome ſuppoſititious caſes, not indeed very probable, where the form will be different. Newton has not conceived this ſubject with his uſual ſagacity, and has made ſome inferences that are certainly inconſiſtent with his law of gravitation.

That the protuberancy of the terreſtrial equator is certainly leſs than $\frac{1}{231}$ proves the interior parts to be of a greater mean denſity than the exterior, and even gives us ſome means for determining how much they exceed in denſity. For by making the fraction $\frac{5c}{2g} \times \frac{4n-3f}{5n-3f} = \frac{1}{180}$ as indicated by the experiments with pendulums, we can find the value of n.

The length of the ſeconds pendulum is the meaſure of the accelerating force of gravity. Therefore let l be this length at the equator, and $l + d$ the length at the pole. We have $\frac{5c}{2g} \times \frac{4n-3f}{5n-3f} = \frac{d}{l}$, whence $\frac{4n-3f}{5n-3f} = \frac{2gd}{5cl}$. This equation, when properly treated, gives $\frac{n}{f} = \frac{15cl-6gd}{20cl-10gd}$, &c. &c.

We have information very lately of the meaſurement of a degree, by major Lambton in the Myſore in India, with excellent inſtruments. It lies in lat. 12° 32′, and its length is 60494 Britiſh fathoms. We are alſo informed by Mr. Melanderhielm of the Swediſh academy, that the meaſure of the degree in Lapland, by Maupertuis, is found to be 208 toiſes too great. This was ſuſpected.

The ſame principles may be applied to any other planet as well as to this earth. Thus, we can tell what portion of the equatorial gravity of Jupiter is expended in keeping bodies on his ſurface, by comparing the time of his rotation with the period of one of his ſatellites. We find that the centrifugal force at his equator is $\frac{8}{93}$ of the whole gravity, and from the equation $\frac{5cr}{4g} = x$, we ſhould infer that if Jupiter be a homogeneous fluid or flexible ſpheroid, his equatorial diameter will exceed his polar axis nearly 10 parts in 113, which is not very different from what we obſerve; ſo much however as to authorize us to conclude that his denſity is greater near the centre than on his ſurface.

Theſe obſervations muſt ſuffice as an account of this ſubject. Many circumſtances, of great effect, are omitted, that the conſideration might be reduced to ſuch ſimplicity as to be diſcuſſed without the aid of the higher geometry. The ſtudent who wiſhes for more complete information muſt conſult the elaborate performances of Euler, Clairaut, D'Alembert, and La Place. The diſſertation of Thomas Simpſon on the ſame ſubject is excellent. The diſſertation of F. Boſcovich will be of great ſervice to thoſe who are leſs verſant in the fluxionary calculus, that author having every where endeavoured to reduce things to a geometrical conſtruction. To theſe we would add the Coſmographia of Friſius, as a very maſterly performance on this part of the ſubject.

Under the article Degree we gave a very ample extract from the account which Col. Mudge had publiſhed in the Philoſophical Tranſactions. This great operation has been ſince concluded by a continuation of the former arc, as far as Burleigh-moor, near the mouth of the Tees in the north of Yorkſhire. The whole amplitude meaſured is now 3° 57′ 13″.4. The particulars of this continuation have not yet been laid before the public, but they will ſoon be publiſhed by the Board of Ordnance. But the writer of this article having, through the politeneſs of Col. Mudge, been favoured with the moſt important reſults relating to it, we have the ſatisfaction of being able to preſent them to our readers.

The bearings of the ſides of the triangles uſed in finding the meridional diſtance from Burleigh-moor to Dunnoſe, from the ſeveral parallels to the meridian of Burleigh-moor, will be as follows:

Greenhoe-moor from Burleigh moor	9°	7′	2″	S.W.
Hemingbrough-ſpire from Greenhoe-moor - - -	5	35	45	S. E.
Clifton-beacon from Hemingbrough-ſpire - -	24	50	42	S,W.
Hatherſedge from Clifton-beacon -	62	0	3	S.W.
Orpit from Hatherſedge - -	5	18	6	S. E.
Bardon-hill from Orpit - -	21	13	23	S. E.
Arbury-hill from Bardon-hill -	71	35	11	S. E.
Brill from Arbury-hill - -	12	22	34	S. E.
Whitehorſe-hill from Brill - -	50	24	0	S.W.
Highclerc from Whitehorſe-hill -	27	39	53.5	S. E.
Butſer-hill from Highclerc - -	34	12	30.5	S. E.
Dunnoſe from Butſer-hill -	21	6	26	S.W.

Theſe bearings give the diſtances from the meridian of, and perpendicular at Burleigh-moor, as follows:

Greenhoe-moor from the meridian	9658.8	W.	60186.4
Hemingbrough-ſpire -	13145	E.	293404.2
Clifton-beacon - -	39203.2	W.	406462.9
Hatherfedge-beacon -	120635.6	W.	449759.8
Orpit - - -	111242.2	W.	550982.9
Bardon hill - -	62048.2	W.	677661.5
Arbury-hill - -	38228.2	W.	856508.2
Brill - - -	6822.8	W.	999633.1
Whitehorſe-hill - -	119782.4	W.	1093081.4
Highclerc - -	69376.7	W.	1189233.3
Butſer-hill - -	13847	E.	1311654.3
Dunnoſe - - -	36778	W.	1442802.9

In the Philoſophical Tranſactions of the Royal Society for the year 1793, the diſtance of Clifton-beacon (Beacon-hill) from the perpendicular to the meridian of Dunnoſe, is ſhewn to be 1036334.4 feet, and its diſtance from the ſame meridian is ſtated in the following page as being 4770 feet. If the calculation there ſpecified be carried from Clifton-beacon to Burleigh-moor, through the ſame triangles as uſed in determining the diſtance from Burleigh-moor to the point where a line from Dunnoſe parallel to the perpendicular cuts the meridian of that ſtation, we ſhall have the following bearings for computation, *viz.*

Clifton-beacon from Hatherſedge -	61°	52′	17″	N. E.
Hemingbrough-ſpire from Clifton-beacon - -	24	42	56	N. E.
Greenhoe-moor from Hemingbrough-ſpire - -	5	42	50.5	N.W.
Burleigh-moor from Greenhoe-moor	8	59	15	N. E.

Aſſuming the diſtance of Clifton-beacon from the meridian of Dunnoſe as above-mentioned to be 4470 feet, and from the perpendicular at that ſtation as 1036334.4 feet, we ſhall get

	Feet.		Feet.	
Hemingbrough-ſpire from the meridian	47323.7	E.	1149511.1	from the perpendr.
Greenhoe-moor from do.	23992.6	E.	1382676.6	
And Burleigh-moor	33514.8		1442884.7	

Now the latitude of Dunnoſe is $\frac{7}{17}''$ greater than the latitude of the point where the parallel from that ſtation cuts the meridian of Burleigh-moor $\frac{7}{17}'$ of a ſecond in the heavens, correſponds to 42 feet on the ſurface of the earth. Hence 1442802.9 + 42 = 1442845 feet may be taken for the diſtance between the parallels of Burleigh-moor and Dunnoſe, as derived from the firſt mode of calculation.

In like manner the latitude of Burleigh-moor being $\frac{11}{30}''$ leſs than the latitude of the point where a line from that ſtation parallel to the perpendicular at Dunnoſe cuts its meridian, we ſhall have 1442884.7 — 37.4 = 1442847.3 feet, for the diſtance between the parallels as determined by carrying up the calculations with the direction of the meridian obſerved at Dunnoſe in the year 1797. Theſe reſults differ ſomething more than two feet, and at a mean may be taken as 1442846 feet, to which, adding 6.5 feet, the diſtance of the ſtation from the point where the ſector was ſet up at Dunnoſe, we get 1442853.8 feet for the true meridional diſtance.

In the paper preſented to the Royal Society, and printed in the Philoſophical Tranſactions for the year 1803, giving an account of the meaſurement of an arc of the meridian, the difference of latitude between the parallels of Dunnoſe and Clifton, in Yorkſhire, is ſhewn to be 2° 50′ 23″.38; the terreſtrial ſubſtance of the arc being 1036337 feet. (See page 487 of the ſame volume.)

If the former operation as well as the preſent one be ſuppoſed correct, their reſults muſt be conſiſtent, unleſs we ſuppoſe the plumb line of the ſector at Burleigh-moor to have been affected by attraction, ariſing from the earth's unequal denſity, in a greater or leſs degree than at Clifton-beacon. Setting aſide the conſideration of elliptical arcs not being proportional to angles formed by the meeting of the verticals or interſections of the radii of curvatures at their extremities, yet, in the preſent caſe, the total arc not exceeding two degrees, we may uſe a ſtatement of ſimple proportion. Taking, therefore, the terreſtrial arc between Dunnoſe and Clifton as 1036337, and its ſubtenſe in the heavens as 2° 50′ 23″.38; and alſo the total meridional diſtance between the parallels of Dunnoſe and Burleigh-moor as 1442853.8 feet, we ſhall have 1036337 feet : 2° 50′ 23″.38 (10223″.38) :: 1442847.8 feet : 14233.6 = 3° 57′ 13″.6, the ſubtenſe of that arc, or the difference of latitude between thoſe parallels; but this arc has been found, by obſervation, to be 3° 57′ 13″.4, almoſt exactly the ſame as the computed reſult.

The length of the degree on the meridian at the middle point between Dunnoſe and Burleigh-moor, of which the latitude is 52° 34′ 45″, is 60822.6 fathoms. In the account of the former meaſurement, the length of the degree in 52° 2′ is ſtated to be 60820 fathoms, which is nearly the ſame. Were the earth an ellipſoid, and the diameter of its polar and equatorial axis in the ratio of 229 to 230, the degree in 52° 34′ ſhould be nearly 60830 fathoms, if the length of that in 52 be taken 60820.

From this paragraph commences the account of the meaſurement between the parallels of Blackdown, in Dorſetſhire, and Delamere-foreſt, in Cheſhire, the ſtation on Delamere-foreſt being nearly 10 miles eaſt from Cheſter.

When the great circular inſtrument was placed over the point at Delamere-foreſt, the direction of the meridian was obſerved. The bearing of the ſtaff at Kilſare, from the north meridian, was found, as may be ſeen from the obſervations made at that ſtation, to be 138° 1′ 31″. The angle between Aſhley-heath and the ſame ſtaff was alſo taken and ſeen to be 73° 24′ 7″.5. Theſe two angles give 31° 25′ 38″.5 for the ſouth-eaſt bearing of Aſhley-heath from the meridian of Delamere-foreſt with Blackdown, a principal ſtation in Dorſetſhire, gives the bearings of the following ſides from that meridian, *viz.*

Aſhley-

Aſhley-heath from Delamere foreſt	31°	25′	38″.5	S. E.
Brown-clay-hill from Aſhley-heath	16	38	10	S.W.
Malvern-hill from Brown-clay-hill	23	25	12	S. E.
Trelect-beacon from Malvern-hill	32	14	58.5	S.W.
Dundry-beacon from Trelect-beacon	6	37	9.75	S.E.
Mendip-hill from Dundry-beacon	19	4	46	S. E.
Aſh-beacon from Mendip-hill	3	28	51.75	S. E.
Mintern from Aſh-beacon	5	22	58	S. E.
Blackdown from Mintern	10	30	53.5	S.W.

Theſe bearings, with their reſpective ſides, give,

Aſhley-heath from the meridian	67472.1	E.	110418.2	from the perpend^{r}
Brownclay-hill from do.	19203.2	E.	279161.0	
Malvern-hill from do.	77902.2	E.	407476.5	
Trelect-beacon	5975.3	W.	538989.9	
Dundry-beacon	9628.2	E.	665692.9	
Mendip-hill	32246.2	E.	731085 9	
Aſh-beacon	368962.2	E.	807525.7	
Mintern	42446.6	E.	866431.5	
Blackdown.	31546.3	E.	925158.5	

The parallel of Blackdown cuts the meridian of Delamere foreſt 30 feet farther ſouthward than the parallel to the perpendicular, therefore 925158 + 30 = 925188.5 feet, is the correct diſtance between the parallels of latitude of the two ſtations.

The bearings of Minſter, Aſh-beacon, Mendip, and Dundry-beacon, from the parallels to the meridian and perpendicular at Blackdown, are given in the Philoſophical Tranſactions for the year 1800.

If the calculation be carried on from the ſide of Dundry-beacon and Mendip, through the ſame ſeries of triangles as before uſed, we ſhall have,

Trelect-beacon from Dundry-beacon	6°	1′	26″	N.W.
Malvern-hill from Trelect-beacon	32	20	43	N. E.
Brownclay-hill from Malvern-hill	23	19	27	N.W.
Aſhley-heath from Brownclay-hill	16	43	55	N. E.
Delamere-foreſt from Aſhley-heath	31	19	58	N.W.

Theſe bearings, with their reſpective ſides, and the diſtance from Dundry-beacon to the meridian and perpendicular, *viz* 21488 feet W. and 259503 feet, give

Trelect-beacon from the meridian.	35980.2	W.	386230.2	feet from the perp.
Malvern-hill	47221.4	E.	517612.2	
Brownclay-hill	11250.8	W.	653225.7	
Aſhley-heath	37288.9	E.	814689.7	
Delamere-foreſt	30000.7	W.	925214.7	

From the meridional diſtance thus found (925214.7 feet) 34 feet muſt be ſubtracted, the perpendicular at Dunnoſe cutting the meridian 34 feet north of the parallel of Delamere foreſt, therefore, 925214.7 − 34 = 925180.7 feet for the corrected diſtance. By calculating with the bearings from Delamere-foreſt downwards, the diſtance has been found to be 925188.5 feet, giving a difference of 9 feet nearly, between the two reſults; the mean, 925184.6 feet, may be taken for the true meridional diſtance between the two ſtations.

The diſtance between the parallels of Blackdown and Dunnoſe is accurately 25005.3 feet, as proved in the Philoſophical Tranſactions for 1800. Therefore, 925184.6 + 25005.3 = 950189.9 feet, is the true diſtance between the parallels of thoſe ſtations.

Now we have portions of two meridians, ſpringing from the ſame ſouthern parallel, and running up the extent of 3° 57′ 13″.4, and the other of 2° 36′ 12″.2. If the ſurface of the earth, in the ſeat of our operations, be uniform in its meridional figure, the ſubtenſe of the arc between Dunnoſe and Delamere-foreſt, ſhould be nearly in the ratio of their amplitudes; this being the caſe, we ſhall have 1442853.8 feet (the meridional diſtance between Dunnoſe and Burleigh-moor) 3° 57′ 13″.6, its amplitude : : 950189.9 feet (the meridional diſtance between Dunnoſe and Delamere-foreſt) : 2° 36′ 13″.38 the amplitude of its arc. From the obſervations made at Delamere-foreſt, with the zenith ſector, in 1806, combined with thoſe at Dunnoſe in 1802, with the ſame inſtrument, it is found that the difference in latitude of thoſe is 2° 36′ 12″.2, making a difference of 1″ nearly between the calculated and obſerved amplitudes, conſtituting a difference, ſetting aſide the conſideration of the ſpheroidal figure of the earth, of $\frac{4}{10}$ths of a ſecond in one degree. Perhaps, under the conſideration of each meridional line being obtained independently of each other, and admitting that neither of them can be meaſured with perfect accuracy together with the chance of the amplitudes being, in ſome ſmall degree, either in exceſs or defect, we may conſider the reſult as ſufficiently conſiſtent and ſatisfactory, and take 60823 fathoms, in the latitude of 52° 34′ (or the centre of England) as the length of one degree.

Amplitude of the arc compriſed by the parallels of latitude of Dunnoſe and Burleigh-moor, near the mouth of the Tees, in the north of Yorkſhire = 3° 57′ 13″.4.

Amplitude of the arc compriſed by the parallels of latitude of Dunnoſe and Delamere-foreſt ſtation = 2° 36′ 12″.2.

N. B. The obſervations made with the zenith ſector at Burleigh-moor and Delamere-foreſt were numerous, and when reduced agreed well with each other.

Since writing the article DEGREE, we have beeh favoured by Mr. Troughton with a rule for placing the repeating circle exactly in the plane of two given objects, and which will be found extremely uſeful to ſuch of our readers as may have occaſion to uſe that excellent inſtrument.

Rule.—For placing the reflecting circle in the plane which paſſes through the eye of the obſerver, and the two objects whoſe angular diſtance is about to be taken.

Firſt, ſet the tripod of the inſtrument with one of its feet-ſcrews as near as you can gueſs in a line with that object, which of the two, you judge to be neareſt the horizon; and with the plane of the circle vertical, and the lower teleſcope horizontal (both to the exactneſs of two or three minutes), bring the teleſcope to the object, partly by turning in azimuth, and partly by ſcrewing or propping the foot-ſcrew.

Next, turn the circle round upon the croſs-axis of the ſtand, until it ſeems by the eye to occupy the proper poſition; and then, a ſecond time bring the teleſcope to the object by the foot ſcrew and turning in azimuth.

Laſtly, complete the operation, by bringing the upper teleſcope to the other object, by its own proper motion, in conjunction with that of turning round the croſs-axis.

The principle of the above rule is this; the croſs-axis of the ſtand and lower teleſcope being made parallel, and pointed to the object; the circle may be turned round that axis without changing the angular poſition of the teleſcope.

EARTH, *Magnetiſm of.* All the obſervations, and all the experiments that have been made, concerning this grand natural agent, tend to prove, that all magnetiſm is derived from the earth; or, that the earth is the great and original magnet. Iron, which, if not the only one, is at leaſt by far the principal metallic ſubſtance with which magnetiſm is concerned, has been liberally ſcattered by the hand of nature amongſt its works. In all the intermediate ſtates, from its moſt oxydated to its beſt metallic form, iron is to be met with in greater or leſs quantity in every part of the earth, from the ſurface to as great a depth as mankind has been able to penetrate. In great many places, vaſt maſſes of iron are found, which are in great meaſure magnetic; and out of which the natural magnets are obtained.

It can hardly be doubted, that the collected magnetical action of all theſe maſſes of iron, and of ferruginous bodies, forms the magnetic power of the earth; and that of courſe the earth, taking it altogether, muſt be conſidered as a complete, though heterogeneous, magnet.

If we compare the phenomena of this grand terreſtrial magnet with thoſe which are uſually exhibited by ſuch ſmall magnets as are in uſe amongſt philoſophers, the ſimilarity will be found ſo very great and ſtriking, as to leave no farther doubt with reſpect to their being exactly the ſame in kind, though vaſtly different in ſize. A ſmall magnetic needle, laid pretty near a larger magnet, diſpoſes itſelf in the direction of the poles of the latter; and alters its inclination, according as it is ſituated nearer to, or farther from, any one of thoſe poles. The compaſſes commonly uſed in navigation, and the dipping needles, which are nothing more than ſmall magnets laid near a large one (*viz.* the earth), ſhew exactly the ſame phenomena. The progreſſive variation of the magnetic needle upon the ſurface of the earth has been alleged as a peculiar phenomenon, which could not be imitated by laying a ſmall magnetic needle near a common magnet. But the cauſe of this is, that the ſmall magnets, which are uſually employed in philoſophical experiments, are not liable to thoſe alterations to which the earth is neceſſarily ſubject; and to which alterations the variation of the magnetic needle is moſt evidently owing. In fact, if a ſmall compaſs be laid within a moderate diſtance of a pretty large magnet, be it natural or artificial, and this magnet be ſubjected to the ſame alterations as the earth is ſubject to, the needle of the ſmall compaſs will be found to alter its direction accordingly. Theſe alterations principally are the action of one magnet upon another, the action of heat and cold, the effects of chemical compoſition and decompoſition, and a local derangement. The approximation of two or more magnets towards each other, or their ſeparation, produces a very conſiderable alteration in the powers of any one of them: and ſuch ſeparation or approximation may be eaſily conceived to be produced within the earth by the action of volcanoes, of earthquakes, &c. Mr. Canton ſhewed, in a moſt deciſive manner, that the action of a magnet is diminiſhed by heat, and increaſed by cold; upon which facts, Dr. Lorimer eſtabliſhed his rational hypotheſis of the variation. (See DECLINATION.) Mr. Cavallo's experiments, deſcribed in the fourth part of his "Treatiſe on Magnetiſm," ſhew that the action of acids, and particularly of the ſulphuric acid, upon iron, produces a remarkable alteration, with reſpect to its magnetic attraction. See MAGNETISM.

Reaſoning then upon theſe facts, we muſt naturally conclude, that ſince the body of the earth contains ferruginous bodies in various ſtates, ſituations, and ſizes; the magnetic needle muſt be directed by the united actions of all thoſe bodies. But as thoſe bodies are undergoing a continual alteration, ariſing from the viciſſitudes of heat and cold, from chemical action, and other cauſes, their united effects muſt act differently upon the needle at different times: whence the variation of its direction is derived. At Naples, the magnetic needle is generally agitated during an eruption of mount Veſuvius. To all theſe, we may add another cauſe of alteration in the direction of the magnetic needle, which is the *aurora borealis;* for, though we are as yet ignorant of the cauſe of that ſurpriſing phenomenon, yet is is certain that the magnetic needle is frequently diſturbed during the appearance of the *aurora borealis.*

Following the analogy between the phenomena of the earth and thoſe of ſmall magnets, it is well known, that when a piece of iron is brought within a certain diſtance of a magnet, the iron itſelf becomes inſtantly a magnet. The very ſame thing takes place when the earth is conſidered as the magnet. Thus, take a bar of ſoft iron, about two or three feet in length, and about an inch or two in thickneſs, (a common kitchen poker is very fit for the experiment,) and place it ſtraight up; or, which is much better, place it in the direction of the magnetical line, which is indicated by the dipping needle. Put a magnetic needle upon a pin, and, holding the pin in your hand, preſent the needle ſucceſſively to the various parts of the bar, from top to bottom, and you will find, that, in this iſland, the lower half of the bar is poſſeſſed of the north polarity, capable of repelling the north, and of attracting the ſouth, pole of the needle; and the upper half is poſſeſſed of the ſouth polarity, capable of repelling the ſouth, and of attracting the north, pole of the needle. The attraction is ſtrongeſt at the very extremities of the bar, where, if the bar be pretty long, it will even attract ſmall iron filings. It diminiſhes from the extremities towards the middle; and it vaniſhes at about the middle, where no one pole of the needle is attracted in preference to the other. In ſhort, in that ſituation, the iron bar is as much a magnet as any piece of iron that ſtands within the influence of a common magnet. If you turn the bar upſide down, that extremity of it which was poſſeſſed of a ſouth magnetic polarity, when it ſtood uppermoſt, will now become poſſeſſed of a north polarity; and the other extremity will become poſſeſſed of the ſouth polarity. In the ſouthern parts of the world, the lower part of the iron bar ſhews a ſouth polarity; or, in general, when in any part of the world the iron bar is ſituated in the magnetic line, each extremity of the bar will acquire the polarity correſpondent to the pole of the earth neareſt to it. When iron bars remain for a number of years in a ſituation nearly parallel to the magnetical line, they generally acquire a permanent magnetiſm; and ſuch is the caſe with curtain-irons, iron croſſes on the tops of churches, ſteeples, &c.

The only phenomenon, which has not been obſerved to take place with reſpect to the earth, and which is the moſt ſtriking property of a common magnet, is the attraction of a piece of iron. For inſtance, if a piece of iron be preſented to either of the poles of a common magnet, it will be powerfully attracted by it; but if it be preſented to the middle of the ſurface of the magnet, the attraction will be hardly perceptible, or next to nothing. Now, in conformity to this, it might be expected, that a piece of iron would be attracted more powerfully downwards, when near the poles of the earth, than when near the equator; and this attraction, being combined with the attraction of gravitation, ought to be manifeſted by the difference of the weights of the ſame piece of iron, when weighed near the poles, and when weighed near the equator: for, if the magnetic attraction of the earth upon it be at all ſenſible, the piece of iron ought to weigh more in the former caſe than in the latter. We are inclined to believe, that if this experiment were tried, with all the precautions which may be deemed neceſſary, it would be found to anſwer; *viz.* that the ſame piece of iron would be found to weigh more near the poles, and leſs near the equator.

The magnetic poles of the earth do not coincide with its aſtronomical poles, nor are they directly oppoſite to each other. But this is likewiſe the caſe with the common natural magnets, and even with moſt of the artificial ones; though, in the latter, the uniformity of the ſubſtance and of the ſhape may be carefully attended to. This diſpoſition of the poles evidently ariſes from the heterogeneous nature of the materials in the ſmall magnets, and eſpecially in the earth. It is owing to the ſame irregular diſpoſition of materials, that the lines of declination follow ſeveral odd and circuitous directions, as is ſhewn under the article DECLINATION *of the Magnetic Needle.* The hypotheſis of an internal magnet, or of two internal magnets, which were ſuppoſed to exiſt, and to move in a peculiar manner, within the body of the earth, and to which the variation of the needle was attributed, cannot poſſibly demand a formal refutation at the preſent time, when the concurrence of various facts and obſervations evidently ſhew its abſurdity.

The great queſtion is, whether the earth has only two magnetic poles, or more than two, as is the caſe with ſeveral irregular ſmall magnets; and, likewiſe, where are thoſe poles actually ſituated? But it is much to be regretted, that, in anſwer to this queſtion, we can offer nothing beſides conjectures.

With reſpect to the number of the poles, we may pretty well judge, (from the remarkable circumſtance that the lines of declination do not croſs each other,) that the earth has only two; *viz.* that on its northern parts there muſt be a magnetic polarity, which attracts the north pole of the magnetic needle; and on its ſouthern parts there muſt be a magnetic polarity, which attracts the ſouth pole of the needle. It is generally ſuppoſed, that thoſe magnetic poles lie on the ſurface of the globe; but if we attentively conſider the ſituation which they may more likely have, it will appear that, in all probability, they are not ſituated near the ſurface of this globe, but at ſome depth below it: at leaſt, this muſt be the caſe with the ſouth pole; for, ſince the water of the ſea is incapable of magnetiſm, and the ſouthern hemiſphere, eſpecially about the ſouth pole, contains a great deal more water than land, it is plain that the ſouth magnetic pole muſt be ſituated at leaſt near the bottom of the ſea: in conſequence of which, the variation of the needle in that hemiſphere muſt be different from what it would be, if the magnetic pole were ſituated on the ſurface of the terraqueous globe. The ſame obſervation may be made with reſpect to the ſituation of the north magnetic pole. Beſides this, we muſt alſo conſider the irregularities ariſing from the unequal and irregular ſituation of land and ſea; it being natural to conceive, that large tracts of land on one ſide of the magnetic needle will draw it away from the real meridian: whereas, a large ocean cannot produce any ſuch effect. This, however, is ſubject to a great deal of variety, ariſing from the nature of the land, the depth of the ſea, the nature of the ground at the bottom of the ſea, &c.

With reſpect to the latitudes and longitudes of the magnetic poles of the earth, we are ſtill leſs ſatisfactorily informed. Mr. Euler, in the "Memoirs of the Academy of Berlin," places the north magnetic pole in lat. 75°; Lemonnier, in his "Lois du Magnetiſme," places it in lat. 73°; Buffon places it in lat. 71°; La Lande places it in lat. 77° 4′; and Churchman of America places it in lat. 60°. The longitude of the above-mentioned pole, La Lande ſuppoſes to be 110° 35′ W. of Paris. But from the obſervations made at Hudſon's bay, the longitude of the ſame from Paris ſeems to be 86°, (a mean of the two is 98°). Euler makes it 115°; Buffon makes it 100°; and Lemonnier makes it only 50°.

The ſituation of the ſouth magnetic pole is ſtill more doubtful. Dr. Lorimer ſays, "It is very remarkable, that when captain Cook, in his ſecond voyage, croſſed the line of no declination, which paſſes through the continent of New Holland, the declination of his compaſs altered about 14° in two days' run: again, in his laſt voyage, though not ſo far ſouth, the alteration of the declination, in proportion to the diſtance, was greater than uſual near to that line. The dipping needle likewiſe ſhews a conſiderable degree of inclination upon this line. In ſhort, from various conſiderations, it would appear, that if this earth has the common properties of a natural magnet with only two poles, one of them muſt be ſituated in this line; and, though not within the 60° of latitude, as Mr. Euler imagined, yet it may poſſibly be found not far from the 70°. If, therefore, it appears practicable to ſail to the 70° of ſouth latitude, or beyond it, about the meridian of Botany Bay, keeping in eaſt declination; and then to run weſtward, till the weſt declination becomes evident; if, at the ſame time, they have a dipping needle on board, that without much trouble could give the magnetic inclination at ſea with a tolerable degree of accuracy, and about a hundred weight of ſoft iron, with a good balance, I cannot help thinking that ſome curious diſcovery might be made.

"The ingenious Mr. Maupertuis, in his letter to the king of Pruſſia, on the advancement of the ſciences, among other curious articles, having mentioned a northern voyage, adds, "to obſerve the phenomena of the load-ſtone, on the very ſpot from whence it is ſuppoſed to draw its original influence." But ſuch voyages were not in the power of Frederick the Great. It is to our preſent gracious ſovereign, George III., that the world will ever be indebted for ſuch noble, extenſive, and diſintereſted undertakings. All acceſs to the north pole having been proved impracticable, by the voyages of lord Mulgrave and captain Cook, it now only remains to be determined, whether it is poſſible to come at the ſouth magnetic pole; which, for the reaſons already mentioned, ſeems at leaſt more probable, if it be judiciouſly attempted." Cavallo's Magnetiſm, p. 262, &c.

The laſt obſervations which need be added to this article relate to the various magnetic force in different parts of the earth, and at ſome height above it.

In theſe northern parts of the world, it has been obſerved that, *ceteris paribus*, the north end of a magnet is the ſtrongeſt; and the contrary is ſaid to be the caſe in the ſouthern parts of the earth. Thus, in the above-mentioned experiment of the bar of ſoft iron, which acquires magnetiſm from the earth, its lower extremity generally ſhews the ſtrongeſt power. Mr. Humboldt found, that the intenſity of the magnetic force increaſes from the equator to the poles, excepting trifling local irregularities. He found that the ſame compaſs, which at Paris performed 245 oſcillations in 10 minutes, performed not more than 211 in Peru; and it conſtantly varied in the ſame direction; *viz.* the number of the oſcillations always decreaſed in approaching the equator, and it always increaſed in advancing towards the north. (Journal de Phyſique, an. 13.) In an aeroſtatic voyage of Meſſrs. Guy Luſac, and Biot, performed in Auguſt, 1804, when they aſcended to the height of 13,124 Engliſh feet, it was obſerved that the magnetic property ſhewed no appreciable diminution from the ſurface of the earth to the above-mentioned height. Its action within thoſe limits was conſtantly manifeſted by the ſame effects, and according to the ſame laws. This was determined by the oſcillation of a magnetic needle.

EARTH, *Theory of the.* Under the article COSMOGONY we have given a conciſe abſtract of the opinions of the ancient philoſophers concerning the univerſe, the bodies of which it conſiſts, and the time and manner of their formation. Theſe particulars are alſo detailed, with ſome variety and amplification, under the biographical articles of the moſt eminent philoſophers of antiquity and the denominations by which their reſpective ſyſtems are diſtinguiſhed. Under the article CHAOS, we have briefly recited the ſentiments of ſeveral ancient and modern philoſophers, concerning the primitive ſtate of the earth, and under the article CREATION, we have given the ſcriptural account of its formation into an habitable globe. We propoſed in this place to detail the modern theories of the earth, commencing with that of Des Cartes; but we have already, in ſome degree, anticipated our intention by the ſtatements, which we were under a neceſſity of introducing under the article DELUGE, for the purpoſe of illuſtrating the cauſes and effects of that memorable cataſtrophe. It now remains that we ſhould ſupply what is wanting, in order to render our account of the different theories of the earth as complete as the nature and limits of this work will allow.

In the terraqueous globe ſome writers have diſtinguiſhed three parts or regions, *viz.* 1. The external part or cruſt, which is that from which vegetables ariſe, and animals are nouriſhed. 2. The middle, or intermediate part, which is poſſeſſed by foſſils, extending farther than human labour has ever yet penetrated. 3. The internal, or central, part, which is unknown to us, though many authors have ſuppoſed it to be of a magnetic nature; by others, it has been conjectured to be a maſs, or ſphere of fire; by others, an abyſs, or collection of waters, ſurrounded by the ſtrata of earth; and by others, a hollow, empty ſpace, inhabited by animals, who have their ſun, moon, planets, and other conveniencies within the ſame. Others divide the body of the globe into two parts, *viz.* the external part, which they call the cortex, including the whole depth or maſs of the ſtrata of the earth; and the internal, which they call the nucleus, being of a different nature from the former, and poſſeſſed of fire, water, or the like; but it is needleſs to dwell on theſe fanciful conjectures.

The figure of the earth has been already aſcertained and deſcribed under a preceding article (ſee EARTH, in *Aſtronomy*); and here it will be ſufficient to obſerve, that the natural cauſe of this figure is, according to ſir Iſaac Newton, the great principle of attraction, which the Creator has aſſigned to all the matter of the univerſe; and by which, whatever be its preciſe origin or the intermediate inſtruments of its operation in ſubordination to the energy of the Deity, all bodies, and all the parts of bodies, mutually attract one another. In conformity to the operation of this principle of gravity combined with the diurnal rotation of the earth on its axis, our globe, like other planetary bodies, ſimilarly circumſtanced, is higher under the equator than at the poles; ſo that its figure is nearly that of an oblate ſpheroid, ſwelling out towards the equatorial parts, and flattened, or contracted, towards the poles. If the earth was originally in a fluid ſtate, or compoſed of yielding materials, its revolution round its axis would neceſſarily make it aſſume ſuch a figure; becauſe the centrifugal force being greateſt towards the equator, the parallels of diurnal rotation increaſing towards this limit, the fluid, or yielding matter, would there riſe and ſwell moſt: and that its figure really ſhould be ſo now, ſeems neceſſary, in order to keep the ſea in the equinoctial regions, from overflowing the earth about theſe parts.

The external part of the globe either exhibits inequalities, as mountains or vallies; or it is plain and level; or dug in channels, fiſſures, beds, &c. for rivers, lakes, ſeas, &c. Theſe inequalities in the face of the earth are ſuppoſed, by moſt naturaliſts, to have ariſen from a rupture or ſubverſion of the earth by the force either of the ſubterraneous fires or waters. The earth, in its natural and original ſtate, Des Cartes, and after him Burnet, &c. (ſee the ſequel of this article) ſuppoſe to have been perfectly round, ſmooth, and equable; and they account for its preſent rude and irregular form principally from the great deluge. In the external, or cortical part of the earth, we diſcover various ſtrata, which are ſuppoſed by ſome to have exiſted in the primitive earth, and which others have aſcribed to the ſediments of various floods; the waters of which being replete with materials of different kinds, as they dried up or oozed through, depoſited theſe various matters, which in time hardened into ſtrata of ſtone, ſand, coal, clay, &c.

The Ariſtotelian philoſophy, with regard to the univerſe (for an account of which, ſee ARISTOTLE, PERIPATETICS, and alſo COSMOGONY) was ſuperſeded by that of Des Cartes, which was, in fact, a revival of the Atomic (ſee ATOMIC,) or that of DEMOCRITUS and EPICURUS, with ſome corrections and emendations. (See CARTES and CARTESIAN.) This of courſe was ſupplanted by the NEWTONIAN ſyſtem. (See NEWTON and NEWTONIAN.) It is hardly neceſſary to obſerve, that the Carteſian coſmogony was ſomewhat modified by Mr. Hutchinſon, who attempted to graft his on the authority of revelation, literally interpreted. The ſubordinate agents in his coſmogony were fire, light, and air; the operations of which he and his followers have unſucceſsfully endeavoured to explain and to accommodate to the ſyſtem of nature.

Some of the principal difficulties that occur in forming a ſatisfactory theory of the earth are thoſe that relate to its figure, the diſtribution of its water, the origin and permanence of its mountains, the diſpoſition of its internal ſtrata, and the introduction of vegetable and marine productions, ſuch as leaves, &c. and ſhells into the moſt ſolid rocks of marble and limeſtone.

The *firſt* theory we ſhall mention, is that of Mr. Thomas Burnet, who was a man of genius and taſte, and who was the firſt who treated of this ſubject in a ſyſtematic manner, in his "Telluris Theoria ſacra, &c." publiſhed at London in the year 1680. Under the ſplendour of his conceptions and the elegance of his ſtyle, he has had the art to conceal feeble arguments, and erroneous principles of philoſophy. His work, though it acquired great reputation, was criticiſed by many of the learned, and particularly by Keill, in a treatiſe, entitled "An Examination of the Theory of the Earth." Burnet ſuppoſes that the primeval earth was a fluid maſs, compoſed of heterogeneous materials, the heavieſt of which deſcended to the centre, and there formed a hard and ſolid body. The water was collected round this body, and all lighter fluids, particularly the air, aſcended above the water or encompaſſed the whole. Between the orbs of water and air was interpoſed an oily matter, upon which the impure earthy particles, blended with the air, deſcended, and formed with it a cruſt of earth and oil. This cruſt was the firſt habitable part of the earth, and the abode of men and other animals. The earth in this ſtate had no variety of ſeaſons, becauſe its equator was ſuppoſed to be coincident with the plane of the ecliptic. The ſoil, formed in the manner above ſtated, was light and rich, and adapted to the various purpoſes of vegetation. The ſurface of the earth was level and uniform, without mountains, ſeas, or other inequalities. In this ſtate it remained about 16 centuries; till by degrees the heat of the ſun dried the forementioned cruſt, and produced at firſt ſuperficial and afterwards deeper fiſſures, ſo as thoroughly to penetrate it. The earth at length was rent in pieces, and the waters guſhed out, with ſuch force and in ſuch abundance, as to overwhelm the dry land and occaſion the univerſal deluge. After a certain period the water ſubſided into the cavities that were left between the ſolid maſſes of earth; and as theſe cavities were filled with water, the earth appeared in the moſt elevated parts, and the lower parts or valleys were occupied by the water, which formed the ocean. See Deluge.

This theory, announced in England by Burnet, is ſaid to have been firſt communicated by Franceſco Patrizio, a profeſſor at Ferrara and Rome, above a century before, in a dialogue, entitled "Il Lamberto." M. Buffon has not unaptly ſtyled this theory an elegant romance; the product of mere imagination, and unſupported by any obſerved phenomena.

About the ſame time the celebrated Leibnitz publiſhed, in the Leipſic Tranſactions, a ſketch of an oppoſite ſyſtem, under the title of "Protogæa." According to this writer, the earth, and alſo the other planets, were originally fixed and luminous ſtars, which, after burning for many ages, were extinguiſhed from a deficiency of combuſtible matter, and became opake bodies. The fire, by fuſion of the matter compoſing the earth, produced a vitrified cruſt; ſo that the baſis of all terreſtrial bodies is glaſs, of which ſand and gravel are the fragments. The other ſpecies of earth reſulted from a mixture of ſand with water and fixed ſalts; and, when the cruſt had cooled, the moiſt particles, which had been elevated in the form of vapour, fell down and formed the ocean. Theſe waters at firſt covered the whole ſurface, and even overtopped the higheſt mountains: and the author alleges that the ſhells and other ſpoils of the ocean, which every where abound, are indelible proofs of the ſea's having formerly covered the earth. This theory, though ingenious, is altogether hypothetical, and inapplicable to the preſent ſtate of the earth.

The ſignal changes that have taken place on the ſurface of the earth were long ago aſcribed by Xanthus, the Lydian, to earthquakes and ſubterraneous fires, which have from time to time elevated and depreſſed the bed of the ſea, which is thus rendered very unequal; and thus he accounted for the immenſe quantities of ſhells and foſſils, found on the ſummits of the higheſt mountains. Our countryman, Ray, revived this opinion, in his "Phyſico-Theological Diſcourſes," publiſhed in the year 1692. This author ſuppoſes that the waters, which originally overflowed the earth, gradually ſubſided, that dry land firſt appeared in the territories that are adjacent to the ſpots inhabited by the progenitors of our race immediately after their creation: and that, as it extended itſelf by degrees, a conſiderable time elapſed before the waters had retired to their proper beds. During this interval, the ſhell-fiſh having multiplied, were univerſally diſtributed by the agitation of the waters; and when the bottom of the ſea was raiſed by the earthquakes which accompanied the deluge, and formed the mountains, beds of marine productions were thrown up along with it.

For an account of Dr. Woodward's theory, we refer to the article Deluge.

Mr. Whiſton, who publiſhed his "New Theory of the Earth," at London, in 1708, begins with an account of the creation of the world; and he alleges, probably not without reaſon, (ſee Creation,) that the deſcription of Moſes, in the firſt chapter of Geneſis, is not an exact, or philoſophical account of the creation and origin of the univerſe; but only an hiſtorical narrative of the formation of the terreſtrial globe. The earth, in his eſtimation, formerly exiſted in a chaotic ſtate; and at the time mentioned by Moſes, it merely received a form, ſituation, and conſiſtence, ſuitable to the habitation of mankind. Accordingly, he ſays, that the primitive earth was an uninhabitble comet, ſubject to ſuch alternations of heat and cold, that its conſtituent matter, being ſometimes liquefied and ſometimes frozen, was in the form of a chaos, or an abyſs, ſurrounded with utter darkneſs; ſo that as the ſacred writer ſays, *darkneſs covered the face of the deep.* This chaos (ſee Chaos) was the atmoſphere of the comet, a body compoſed of heterogeneous materials, in the centre of which was a globular, ſolid, hot nucleus, about 2000 leagues in diameter. This was an extenſive maſs of a denſe fluid, the various materials of which were agitated and blended in the utmoſt confuſion. Such he conceives to have been the condition of the earth at the era of the creation. But in proportion as the eccentricity of the comet's orbit decreaſed, and it became more nearly circular, the materials of the circumambient fluid arranged themſelves according to their ſpecific gravities, and formed the earth, the water, and the air. Thus the immenſe volume of chaos was reduced to a ſphere of moderate magnitude, including the unchanged central nucleus, which retained its primeval heat, which the author calculates may continue 6000 years. An earthy ſubſtance, conſiſting of the heavier parts of the chaotic atmoſphere, mixed with aqueous particles, encompaſſed the central globe of fire, and was encloſed by a body of water, round which was formed the cruſt of earth deſtined to be the habitation of mankind. On this cruſted ſurface there were irregularities, compoſed of the heavieſt parts of the earth, which ſunk deeply into the ſubjacent fluid, and formed plains and valleys; whilſt thoſe of leſs weight remained at a greater elevation, and conſtituted mountains. We ſhall here obſerve, that, according to Mr. Whiſton, the annual motion of the earth commenced when it received its new form; but that its diurnal motion was not given to it till the fall of Adam; that the ecliptic interſected the tropic of Cancer in a point preciſely oppoſite to the ſituation of Paradiſe, which lay on the N.W. frontier of Aſſyria; that, before the deluge, the year began at the autumnal equinox, and that the orbits of the earth and planets were then perfect circles; that the deluge commenced in the manner related under that article, on the 18th of November, in the year of the Julian period 2365, or 2349 B. C., and that before the deluge, the ſolar and lunar year were the ſame, and conſiſted of exactly 360 days, but that the figure of the earth was changed from that of a ſphere into a ſpheroid. This latter effect was produced by the centrifugal force reſulting from the diurnal motion of the earth, and by the attraction of the comet; for the earth, when paſſing through the tail of the comet, was ſo ſituated, that its equatorial parts were neareſt to it; and, of courſe, the comet's attraction, concurring with the earth's centrifugal force, elevated the equatorial regions with the greater facility; becauſe the cruſt was broken in an infinite number of places, and becauſe the flux and reflux of the abyſs puſhed more violently againſt the equator than any where elſe. In accounting for the changes, which the earth has undergone in conſequence of the deluge, Mr. Whiſton adopts Woodward's theory, and coincides with him in his remarks on the preſent ſtate of the earth.

In 1729, M. Bourguet projected a theory of the earth, but did not live to execute the ſyſtem which he had planned. The fundamental propoſitions of his theory were the following: that the earth was formed at once, and not ſucceſſively;—that its figure and diſpoſition demonſtrate, that it was formerly in a fluid ſtate;—that the preſent condition of the earth is very different from what it was for ſome ages after its firſt formation;—that the matter of the globe was originally ſofter than after its ſurface was changed;—that the condenſation of its ſolid parts diminiſhed gradually with its velocity; ſo that after a certain number of revolutions round its axis, and round the ſun, its original ſtructure was ſuddenly diſſolved;—that this happened at the vernal equinox;—that the ſea-ſhells inſinuated themſelves into the diſſolved matters;—that the earth, after this diſſolution, aſſumed its preſent form;—and that, as ſoon as the fire, or heat, operated upon it, its conſumption gradually begun, and, at ſome future period, it will be blown up with a dreadful exploſion, accompanied with a general conflagration, which will augment the atmoſphere, and diminiſh the diameter of the globe;—and then the earth, inſtead of ſtrata of ſand, or clay, will conſiſt only of beds of calcined materials, and mountains compoſed of amalgams of different metals.

In 1740, Lazaro Moro, an Italian geologiſt, publiſhed a work at Venice, in which he partially adopts the hypotheſis of Ray. His profeſſed deſign was to account for the remains of marine animals found in mountains at a diſtance from the ſea. With this view, he conjectured, that the earth, in general, and its mountains in particular, were elevated from the bottom of the ſea by the force of ſubterraneous fires, which began to burn ſoon after the creation. At firſt a portion of land was raiſed up, in which no ſhells are found, as the ocean had not then been ſtocked with fiſh. Afterwards, large quantities of ſhells and other marine ſubſtances were thrown up with the ſoil, and diſpoſed in ſtrata, according to their ſpecific gravity. But how the ſtrata were conſolidated, and the ſhells were found in the ſtrata mineralized, he has not informed us. Mr. Raſpe, in his "Specimen Hiſtoriæ Naturalis Globi Terraquei," publiſhed at Leipzic, A. D. 1763, inclines to the hypotheſis of Moro.

For other theories by Scheuchzer, Steno, Hooke, De La Pryme, &c. &c. we refer to the article DELUGE.

The theory of M. Buffon next claims our particular notice. The author has embelliſhed it with the beauties of language, and rendered it plauſible and intereſting, by an elaborate diſcuſſion of the arguments, which he alleges in ſupport of it, and of the objections which he conceived might be urged againſt it. We can only preſent to view ſome of its moſt prominent features, and refer thoſe, who wiſh for further ſatisfaction and amuſement, to his own account of it. The earth, and alſo the other planets, were, according to the hypotheſis of M. Buffon, portions of the body of the ſun, which were detached from it by the oblique ſtroke of a comet. Theſe maſſes of igneous particles, iſſuing from the ſun in the form of torrents and not of globes, and afterwards aſſuming a globular figure by the mutual attraction of their parts, receded from it with an accelerated motion to ſuch a diſtance, as to admit of their acquiring a circular, or elliptical movement round the ſun. Their revolutions on their axes he aſcribes to the obliquity of the original ſtroke impreſſed by the comet. By means of the rotatory motion of the earth, on its axis, and of the fluidity of the matter, of which it conſiſted at its firſt formation, it acquired the figure of an oblate ſpheroid. The earth, being removed to a conſiderable diſtance from the ſun, gradually cooled; and the vapours, which in their expanded ſtate reſembled the tail of a comet, condenſed by degrees, and fell down in the form of water upon the ſurface. The water depoſited a ſlimy ſubſtance, mixed with ſulphur and ſalts, part of which was carried, by the motion of the waters, into the perpendicular fiſſures of the ſtrata, and produced metals, and the reſt remaining on the ſurface gave riſe to the vegetable mould, which abounds in different places, with more or leſs of animal or vegetable particles, the organization of which is not obvious to the ſenſes. The interior parts of the globe were originally compoſed of vitrified matter, which the author apprehends to be their preſent ſtate. Above this vitrified matter were placed thoſe bodies, which the fire had reduced to the ſmalleſt particles, as ſands, which are merely portions of glaſs; and above theſe pumice ſtones and the ſcoriæ of melted matter, which produced the different clays. The whole was covered with water to the depth of 500 or 600 feet, which originated from the condenſation of the vapours, when the earth began to cool. This water depoſited a ſtratum of mud, mixed with all thoſe matters, which are capable of being ſublimed, or exhaled by fire; and the air was formed of the moſt ſubtle vapours, which, from their levity, roſe above the water. "Such," ſays our author, "was the condition of the earth, when the tides, the winds, and the heat of the ſun, began to introduce changes on its ſurface. The diurnal motion of the earth, and that of the tides, elevated the waters in the equatorial regions, and neceſſarily tranſported thither great quantities of ſlime, clay, and ſand; and, by thus elevating thoſe parts of the earth, they, perhaps, ſunk thoſe under the poles about two leagues, or the 230th part of the whole: for the waters would eaſily reduce into powder pumice ſtones, and other ſpongy parts of the vitrified matter upon the ſurface; and thus excavate ſome places and elevate others, which, in time, would produce iſlands and continents, and all thoſe inequalities on the ſurface, which are more conſiderable towards the equator, than towards the poles. Indeed, both the land and ſea have moſt inequalities between the tropics, as is evident from the incredible number of iſlands peculiar to thoſe regions."

In order to accommodate his theory to the preſent ſtate of the globe, he ſurveys and recounts the phenomena which it exhibits, and the parts of which it conſiſts, in their various diſpoſitions and arrangements, as far as our obſervation is capable of being extended.

The ſurface of this immenſe globe exhibits to our obſervation, heights, depths, plains, ſeas, marſhes, rivers, caverns, gulfs, and volcanoes, "without any apparent order in the diſpoſition of them." Upon penetrating into the bowels of the earth, we diſcover metals, minerals, ſtones, bitumens, ſands, earth, waters, and every kind of matter, placed, as it were, by accident, and without any obvious deſign. After a more accurate inſpection, we find ſunk mountains, caverns filled up, ſhattered rocks, whole countries ſwallowed up, new iſlands emerged from the ocean, heavy ſubſtances placed above light ones, and hard bodies incloſed in ſoft ones; all of them blended in confuſion, and forming a chaos, that reſembles the ruins of a world.

In examining the bottom of the ſea, this author ſays, we perceive it to be equally irregular with the ſurface of the dry land, preſenting to our notice hills and valleys, plains and hollows, rocks and earths of every kind. Iſlands are obſerved to be the ſummits of vaſt mountains; and other mountains have their tops nearly on a level with the ſurface of the ocean. In the ſea are likewiſe diſcovered currents, which flow rapidly in various directions. We likewiſe perceive numerous agitations and convulſions in the ocean, which are owing to volcanoes, whoſe mouths, though ſituated many fathoms below the ſurface, vomit forth torrents of fire. In other parts we diſcern ſmooth and calm regions, which, nevertheleſs, are equally dangerous to the mariner. The bottom of the ocean, and the ſhelving ſides of rocks, produce many ſpecies of plants in great abundanec as well as variety. Its ſoil conſiſts of ſand, gravel, rocks, and ſhells; in ſome places a fine clay, in others a compact earth. Upon the whole, the bottom of the ſea exactly reſembles the dry land which we inhabit.

In a ſurvey of the dry land our author finds, that the great chains of mountains lie nearer to the equator than to the poles; that thoſe of the old continent tend more from eaſt to weſt than from ſouth to north, and in the new continent they have a contrary direction. He obſerves, that the prominent angles of one mountain are conſtantly oppoſite to the concave angles of the neighbouring mountains, and that they are of equal dimenſions; whether they be ſeparated by an extenſive plain or a ſmall valley. Oppoſite hills, he obſerves, are nearly of the ſame height; and mountains generally occupy the middle of continents, iſlands and promontories dividing them by their greateſt lengths. The direction of the principal rivers is nearly perpendicular to the coaſts of the ſeas, into which they diſcharge themſelves; and during the greateſt part of their courſe they follow the direction of the mountains from which they ſpring. The ſea-coaſts are generally bordered with rocks of marble and other hard ſtones; or, rather, with earth and ſand accumulated by the waters of the ſea, or depoſited by rivers. On oppoſite coaſts, ſeparated by ſmall intervals of ſea, the different ſtrata or beds of earth are compoſed of the ſame materials. Volcanoes, ſays our author, never exiſt but in very high mountains; ſome are extinguiſhed; and ſome are connected with others by ſubterraneous paſſages, and their eruptions frequently happen at the ſame time. Lakes and ſeas communicate with one another in a ſimilar manner. Mediterranean or inland ſeas receive large ſupplies of water from many large rivers without any augmentation of their bounds; and, therefore, probably diſcharge part of their ſupply by ſubterraneous paſſages.

In the proſecution of his inquiry and examination, our author finds that the upper ſtratum of the earth is univerſally the ſame ſubſtance; that this ſubſtance, from which all animal and vegetable ſubſtances derive their nouriſhment, is merely a compoſition of the decayed parts of animal and vegetable bodies, reduced into particles ſo ſmall, that their former organic ſtate is not diſtinguiſhable. Upon a deeper penetration he finds the real earth, beds of ſand, brimſtone, clay, ſhells, marble, gravel, chalk, &c. Theſe beds are parallel to one another, and of the ſame thickneſs. In neighbouring hills, beds or ſtrata of the ſame materials are uniformly found at the ſame levels, however the hills may be ſeparated. Strata of every kind, even of the moſt ſolid rocks, are uniformly divided by perpendicular fiſſures. Shells, ſkeletons of fiſhes, marine plants, &c. are often found in the bowels of the earth, and on the tops of mountains, even at the greateſt diſtance from the ſea: and theſe ſhells, fiſhes, and plants, are exactly ſimilar to thoſe which exiſt in the ocean. Petrified ſhells are found every where in great quantities, not only included in rocks of marble and lime-ſtone, as well as in earths and clays, but actually incorporated and filled with the ſubſtances in which they are incloſed. Upon the whole he concludes, from repeated obſervations, that marbles, lime-ſtones, chalks, marles, clays, and ſands, and almoſt all terreſtrial ſubſtances, wherever ſituated, are full of ſhells and other ſpoils of the ocean.

From this ſurvey, all the particulars of which we cannot enumerate, Mr. Buffon deduces the following concluſions, *viz.*

The changes which the earth has undergone during the laſt two or three thouſand years are inconſiderable, when compared with the great revolutions which muſt have happened in thoſe ages that immediately ſucceeded the creation. For, as terreſtrial ſubſtances could only acquire ſolidity by the continued action of gravity, it is eaſy to demonſtrate, that the ſurface of the earth was at firſt much ſofter than it is now; and, conſequently, that the ſame cauſes, which at preſent produce but ſlight and almoſt imperceptible alterations during the courſe of many centuries, were then capable of producing very great revolutions in a few years. It appears, indeed, to be an incontrovertible fact, that the dry land which we now inhabit, and even the ſummits of the higheſt mountains, were formerly covered with the waters of the ſea; for ſhells, and other marine bodies, are ſtill found upon the very tops of mountains. It likewiſe appears, that the waters of the ſea have remained for a long ſeries of years upon the ſurface of the earth; becauſe, in many places, ſuch immenſe banks of ſhells have been diſcovered, that it is impoſſible ſo great a multitude of animals could exiſt at the ſame time. This circumſtance ſeems likewiſe to prove, that, although the materials on the ſurface of the earth were then ſoft, and, of courſe, eaſily diſunited, moved, and tranſported, by the waters; yet theſe tranſportations could not be ſuddenly effected. They muſt have been gradual and ſucceſſive, as ſea-bodies are ſometimes found more than 1000 feet below the ſurface. Such a thickneſs of earth or of ſtone could not be accumulated in a ſhort period. Although it ſhould be ſuppoſed, that, at the deluge, all the ſhells were tranſported from the bottom of the ocean, and depoſited upon the dry land; yet, beſide the difficulty of eſtabliſhing this ſuppoſition, it is clear, that, as ſhells are found incorporated in marble and in the rocks of the higheſt mountains, we muſt likewiſe ſuppoſe, that all theſe marbles and rocks were formed at the ſame time, and at the very inſtant when the deluge took place; and that, before this grand revolution, there were neither mountains, nor marbles, nor rocks, nor clays, nor matter of any kind, ſimilar to what we are now acquainted with, as they all, with few exceptions, contain ſhells, and other productions of the ocean. Beſides, at the time of the univerſal deluge, the earth muſt have acquired a conſiderable degree of ſolidity, by the action of gravity for more than ſixteen centuries. During the ſhort time the deluge laſted, therefore, it is impoſſible that the waters ſhould have overturned and diſſolved the whole ſurface of the earth, to the greateſt depths that mankind have been able to penetrate.

It is certain, that the waters of the ſea have, at ſome period or other, remained for a ſucceſſion of ages upon what we now know to be dry land; and, conſequently, that the vaſt continents of Aſia, Europe, Africa, and America, were then the bottom of an immenſe ocean, replete with every thing which the preſent ocean produces. It is likewiſe certain, that the different ſtrata of the earth are horizontal and parallel to each other. This parallel ſituation muſt, therefore, be owing to the operation of the waters, which have gradually accumulated the different materials, and given them the ſame poſition that water itſelf invariably aſſumes. The horizontal poſition of ſtrata is almoſt univerſal: in plains, the ſtrata are exactly horizontal. It is only in the mountains that they are inclined to the horizon; becauſe they have originally been formed by ſediments depoſited upon an inclined baſe. Theſe ſtrata muſt have been gradually formed, and they are not the effect of any ſudden revolution; becauſe nothing is more frequent than ſtrata compoſed of heavy materials placed above light ones, which never could have happened, if, according to ſome authors, the whole had been blended and diſſolved by the deluge, and afterwards precipitated. On this ſuppoſition every thing ſhould have had a different aſpect from what now appears. The heavieſt bodies ſhould have deſcended firſt, and every ſtratum ſhould have had a ſituation correſponding to its ſpecific gravity. In this caſe, we ſhould not have ſeen ſolid rocks or metals placed above light ſand, nor clay under coal.

Another circumſtance demands our attention. No cauſe but the motion and ſediments of water could poſſibly produce the regular poſition of the various ſtrata of which the ſuperficial part of this earth is compoſed. The higheſt mountains conſiſt of parallel ſtrata, as well as the loweſt valleys. Of courſe, the formation of mountains cannot be imputed to the ſhocks of earthquakes, or to the eruptions of volcanoes. Such ſmall eminences, as have been raiſed by volcanoes or convulſions of the earth, inſtead of being compoſed of parallel ſtrata, are mere maſſes of weighty materials blended together in the utmoſt confuſion. But this parallel and horizontal poſition of ſtrata muſt neceſſarily be the operation of a uniform and conſtant cauſe.

We are, therefore, authoriſed to conclude, ſays our author, from repeated and incontrovertible facts and obſervations, that the dry and habitable part of the earth has for a long time remained under the waters of the ſea, and muſt have undergone the ſame changes which are at preſent going on at the bottom of the ocean.

The ocean, from the creation of the ſolar ſyſtem, has been conſtantly ſubject to a regular flux and reflux. Theſe motions, which happen twice in twenty-four hours, are principally occaſioned by the action of the moon, and are greater in the equatorial regions than in other climates. The earth likewiſe performs a rapid motion round its axis, and, conſequently, has a centrifugal force, which is alſo greateſt at the equator. This laſt circumſtance, independent of actual obſervations, proves, that the earth is not a perfect ſphere, but that it muſt be more elevated under the equator than at the poles. From theſe two combined cauſes, the tides, and the motion of the earth, it may be fairly concluded, that although this globe had been originally a perfect ſphere, its diurnal motion, and the ebbing and flowing of the tides, muſt neceſſarily, in a ſucceſſion of time, have elevated the equatorial parts, by gradually carrying mud, earth, ſand, ſhells, &c. from other climates, and depoſiting them at the equator. On this ſuppoſition, the greateſt inequalities on the ſurface of the earth ought to be, and, in fact, are found in the neighbourhood of the equator. Beſides, as the alternate motion of the tides has been conſtant and regular ſince the exiſtence of the world, is it not evident, that, at each tide, the water carries from one place to another a ſmall quantity of matter which falls to the bottom as a ſediment, and forms thoſe horizontal and parallel ſtrata that every where appear? The motion of the waters, in the flux and reflux, being always horizontal, the matter tranſported by them muſt neceſſarily take the ſame parallel direction after it is depoſited.

To this reaſoning, it may be objected, that, as the flux is equal to, and regularly ſucceeded by, the reflux, the two motions will balance each other; or, that the matter brought by the flux will be carried back by the reflux; and, conſequently, that this cauſe of the formation of ſtrata muſt be chimerical, as the bottom of the ocean can never be affected by a uniform alternate motion of the waters; far leſs could this motion change its original ſtructure, by creating heights, and other inequalities.

But, in the firſt place, as the author replies, the alternate motion of the waters is by no means equal; for the ſea has a continual motion from eaſt to weſt: beſides, the agitations occaſioned by the winds produce great inequalities in the tides. It will likewiſe be acknowledged, that, by every motion in the ſea, particles of earth, and other materials, muſt be carried from one place, and depoſited in another; and that theſe collections of matter muſt aſſume the form of parallel and horizontal ſtrata. Farther, a well-known fact will entirely obviate this objection. On all coaſts, where the ebbing and flowing are diſcernible, numberleſs materials are brought in by the flux, which are not carried back by the reflux. The ſea gradually increaſes on ſome places, and recedes from others, narrowing its limits, by depoſiting earth, ſand, ſhells, &c. which naturally take a horizontal poſition. Theſe materials, when accumulated and elevated to a certain degree, gradually ſhut out the water, and remain for ever in the form of dry land.

But, to remove every doubt concerning this important point, let us examine more cloſely the practicability of a mountain's being formed at the bottom of the ſea, by the motion and ſediments of the water. On a high coaſt which the ſea waſhes with violence during the flow, ſome part of the earth muſt be carried off by every ſtroke of the waves. Even where the ſea is bounded by rock, it is a known fact, that the ſtone is gradually waſted by the water; and, conſequently, that ſmall particles are carried off by the retreat of every wave. Theſe particles of earth or ſtone are neceſſarily tranſported to ſome diſtance. Whenever the agitation of the water is abated, the particles are precipitated in the form of a ſediment, and lay the foundation of a firſt ſtratum, which is either horizontal, or inclined, according to the ſituation of the ſurface upon which they fall. This ſtratum will ſoon be ſucceeded by a ſimilar one, produced by the ſame cauſe; and thus a conſiderable quantity of matter will be gradually amaſſed, and diſpoſed in parallel beds. In proceſs of time, this gradually accumulating maſs will become a mountain in the bottom of the ſea, exactly reſembling, both in external and internal ſtructure, thoſe mountains which we ſee on the dry land. If there happened to be ſhells in that part of the bottom of the ſea where we have ſuppoſed the ſediments to be depoſited, they would be covered, filled, and incorporated, with the depoſited matter, and form a part of the general maſs. Theſe ſhells would be lodged in different parts of the mountains, correſponding to the times they were depoſited. Thoſe which lay at the bottom, before the firſt ſtratum was formed, would occupy the loweſt ſtation; and thoſe which were afterwards depoſited, would be found in the more elevated parts.

It has been conceived, that the agitation produced by the winds and tides is only ſuperficial, and affects not the bottom, eſpecially when it is very deep. But it ought to be remembered, that, whatever be the depth, the whole maſs is put in motion by the tides at the ſame time; and that, in a fluid globe, this motion would be communicated even to the centre. The power which occaſions the flux and reflux is penetrating; it acts equally upon every particle of the maſs. Hence the quantity of its force, at different depths, may be determined by calculation. Indeed, this point is ſo certain, that it admits not of diſpute.

We cannot, therefore, heſitate in pronouncing, that the tides, the winds, and every other cauſe of motion in the ſea, muſt produce heights and inequalities in its bottom; and that theſe eminences muſt uniformly be compoſed of regular ſtrata, either horizontal or inclined. Theſe heights will gradually augment; like the waves which formed them, they will mutually reſpect each other; and if the extent of the baſe be great, in a ſeries of years they will form a vaſt chain of mountains. Whenever eminences are formed, they interrupt the uniform motion of the waters, and produce new motions, known by the name of currents. Between two neighbouring heights in the bottom of the ocean, there muſt be a current, which will follow their common direction, and, like a river, cut a channel, the angles of which will be alternately oppoſite through the whole extent of its courſe. Theſe heights muſt continually increaſe; for, during the flow, the water will depoſite its ordinary ſediment upon their ridges, and the waters which are impelled by the current will force along, from great diſtances, quantities of matter, which will ſubſide between the hills, and, at the ſame time, ſcoop out a valley with correſponding angles at their foundation. Now, by means of theſe different motions and ſediments, the bottom of the ocean, though formerly ſmooth, muſt ſoon be furrowed and interſperſed with hills and chains of mountains, as we actually find it at preſent. The ſoft materials of which the eminences were originally compoſed, would gradually harden by their own gravity. Such of them as conſiſted of ſandy and cryſtalline particles, would produce thoſe enormous maſſes of rock and flint in which we find cryſtals and other precious ſtones. Others, compoſed of ſtony particles mixed with ſhells, give riſe to thoſe beds of lime-ſtone and marble, in which vaſt quantities of ſea ſhells are ſtill found incorporated. Laſtly, all our beds of marble and chalk have derived their origin from particles of ſhells mixed with a pure earth, collected and depoſited at particular places in the bottom of the ſea. All theſe ſubſtances are diſpoſed in regular ſtrata; they all contain heterogeneous matter, and vaſt quantities of ſea-bodies ſituated nearly in proportion to their ſpecific gravities. The lighter ſhells are found in chalk; the heavier in clay and lime-ſtone. Theſe ſhells are uniformly filled with the matter in which they are found, whether it be ſtone or earth. This is an inconteſtible proof, that they have been tranſported along with the matter that fills and ſurrounds them, and that this matter was then in the form of an impalpable powder. In a word, all thoſe ſubſtances, the horizontal ſituation of which has ariſen from the waters of the ſea, invariably preſerve their original poſition.

If we inveſtigate more minutely the ſituation of thoſe materials which compoſe the ſuperficial part of the globe, we ſhall find that the different ſtrata of ſtones in quarries are almoſt all horizontal, or regularly inclined. Thoſe founded upon hard clay, or other ſolid matter, are evidently horizontal, eſpecially in plains. The diſpoſition of quarries, where flint or browniſh free-ſtone is found in detached portions, is indeed leſs regular. But even here the uniformity of nature is not interrupted; for the horizontal or regularly inclining poſition of the ſtrata is apparent in granite and brown free-ſtone, wherever they exiſt in large connected maſſes. This poſition is univerſal, except in flint and brown free-ſtone in ſmall detached portions, ſubſtances the formation of which was poſterior to thoſe juſt now mentioned. The ſtrata of granite, vitrifiable ſand, clays, marbles, calcareous ſtones, chalk, and marles, are always parallel or equally inclined. In theſe the original formation is eaſily diſcoverable; for the ſtrata are exactly horizontal, and very thin, being placed above each other like the leaves of a book. Beds of ſand, of ſoft and hard clay, of chalk, and of ſhells, are likewiſe either horizontal or uniformly inclined. Strata of every kind preſerve the ſame thickneſs through their whole extent, which is often many leagues, and might, by proper obſervations, be traced ſtill farther. In a word, the diſpoſition of ſtrata, as deep as mankind have hitherto penetrated, is the ſame.

Thoſe beds of ſand and gravel which are waſhed down from mountains, muſt, in ſome meaſure, be excepted from the general rule. The ſtrata formed by rivers are not very ancient; they are eaſily diſtinguiſhed by their frequent interruptions, and the inequality of their thickneſs. But the ancient ſtrata uniformly preſerve the ſame dimenſions through their whole extent. Beſides, theſe modern ſtrata may be diſtinguiſhed, with certainty, by the form of the ſtones and gravel they contain, which bear evident marks of having been rolled, ſmoothed, and rounded, by the motion of water. The ſame obſervation may be made with regard to thoſe beds of turf, and corrupted vegetables, which are found in marſhy grounds, immediately below the ſoil: they have no claim to antiquity, but have derived their exiſtence from ſucceſſive accumulations of decayed trees and other plants. The ſtrata of ſlime, or mud, which occur in many places, are alſo recent productions, formed by ſtagnating waters, or the inundations of rivers. They are not ſo exactly horizontal, nor ſo uniformly inclined, as the more ancient ſtrata, produced by the regular motions of the ſea. In ſtrata formed by rivers, we meet with river, but ſeldom with ſea-ſhells; and the few which occur are broken, detached, and placed without order. But, in the ancient ſtrata, there are no river-ſhells; the ſea-ſhells are numerous, well preſerved, and all placed in the ſame manner, having been tranſported and depoſited at the ſame time, and by the ſame cauſe. From whence could this beautiful regularity proceed? Inſtead of regular ſtrata, why do we not find the matters compoſing the earth huddled together without order? Why are not rocks, marbles, clays, marles, &c. ſcattered promiſcuouſly, or joined by irregular or vertical ſtrata? Why are not heavy bodies uniformly found in a lower ſituation than light ones? It is eaſy to perceive, that this uniformity of nature, this ſpecies of organization, this union of different materials by parallel ſtrata, without regard to their weights, could only proceed from a cauſe equally powerful and uniform as the motions of the ſea, produced by regular winds, by the tides, &c.

Theſe cauſes act with ſuperior force under the equator than in other climates; for there the tides are higher, and the winds more uniform. The moſt extenſive chains of mountains are likewiſe in the neighbourhood of the equator. The mountains of Africa and Peru are the higheſt in the world, often extending through whole continents, and ſtretching to great diſtances under the waters of the ocean. The mountains of Europe and Aſia, which extend from Spain to China, are not ſo elevated as thoſe of Africa and South America. According to the relations of voyagers, the mountains of the north are but ſmall hills, when compared with the mountains of the equatorial regions. Beſides, in the northern ſeas, there are few iſlands; but, in the torrid zone, they are innumerable. Now, as iſlands are only the ſummits of mountains, it is apparent, that there are more inequalities on the ſurface of the earth near the equator, than in northerly climates.

Thoſe prodigious chains of mountains which run from weſt to eaſt in the Old Continent, and from north to ſouth in the New, muſt have been formed by the general motion of the tides. But the origin of the leſs conſiderable mountains and hills muſt be aſcribed to particular motions, occaſioned by winds, currents, and other irregular agitations of the ſea.

Our author next proceeds to anſwer ſome queſtions, which require ſolution, in conſequence of the theory which he has advanced. How, *e. g.* is that earth, which has been inhabited by us and our anceſtors for ages, become an immenſe continent, dry, compact, and removed from the reach of the water, and exalted to ſuch a height above the waters, if it was formerly the bottom of an ocean? In reply to this, and ſimilar enquiries, the author ſays, we daily obſerve the ſea gaining ground on certain coaſts, and loſing it on others. We know, that the ocean has a general and uniform motion from eaſt to weſt; that it makes violent efforts againſt the rocks and the low grounds which encircle it; that there are whole provinces which human induſtry can hardly defend from the fury of the waves; and that there are inſtances of iſlands which have but lately emerged from the waters, and of regular inundations. Hiſtory informs us of inundations and deluges of a more extenſive nature. Should not all theſe circumſtances convince us, that the ſurface of the earth has experienced very great revolutions, and that the ſea may have actually given up poſſeſſion of the greateſt part of the ground which it formerly occupied? For example, let us ſuppoſe, that the Old and New Worlds were formerly but one continent, and that by a violent earthquake, the ancient Atalantis of Plato was ſunk. What would be the conſequence of ſuch a mighty revolution? The ſea would neceſſarily ruſh in from all quarters, and form what is now called the Atlantic ocean; and vaſt continents, perhaps thoſe which we now inhabit, would, of courſe, be left dry. This great revolution might be effected by the ſudden failure of ſome immenſe cavern in the interior part of the globe, and an univerſal deluge would infalliby ſucceed. Such a revolution, however, has happened, and in the opinion of the author, happened naturally; for, if a judgment of the future is to be formed from the paſt, we have only to attend carefully to what daily paſſes before our eyes. It is a fact, eſtabliſhed by the repeated obſervation of voyagers, that the ocean has a conſtant motion from eaſt to weſt. This motion, like the trade-winds, is not only perceived between the tropics, but through the whole temperate climates, and as near the poles as navigators have been able to approach. As a neceſſary conſequence of this motion, the Pacific ocean muſt make continual efforts againſt the coaſts of Tartary, China, and India; the Indian ocean muſt act againſt the eaſt coaſt of Africa; and the Atlantic muſt act in a ſimilar manner againſt all the eaſtern coaſts of America. Hence the ſea muſt have gained, and will always continue to gain, on the eaſt, and to loſe on the weſt. This circumſtance alone would be ſufficient to prove the poſſibility of the change of ſea into land, and of land into ſea. If ſuch is the natural effect of the ſea's motion from eaſt to weſt, may it not reaſonably be ſuppoſed, that Aſia, and all the eaſtern continent, is the moſt ancient country in the world? and that Europe, and part of Africa, eſpecially the weſt parts of theſe continents, as Britain, France, Spain, &c. are countries of a more recent date?

But, beſide the conſtant motion of the ſea from eaſt to weſt, other cauſes concur in producing the effect juſt mentioned. There are many lands lower than the level of the ſea, and are defended by a narrow iſthmus of rock only, or by banks of ſtill weaker materials. The action of the waters muſt gradually deſtroy theſe barriers; and, conſequently, ſuch lands muſt then become part of the ocean. Beſides, the mountains are daily diminiſhing, part of them being conſtantly carried down to the valleys by rains. It is likewiſe well known, that every little brook carries earth, and other matters, from the high grounds into the rivers, by which they are at laſt tranſported to the ocean. By theſe means the bottom of the ſea is gradually filling up, the ſurface of the earth is approaching to a level, and nothing but time is wanting for the ſea's ſucceſſively changing places with the land.

We ſhall give, ſays our author, ſome certain and recent examples of the changes of ſea into land, and of land into ſea. At Venice, the bottom of the ſea is conſtantly riſing: if the canals had not been carefully kept clean, the moats and city would, long ere now, have formed a part of the continent. The ſame thing may be ſaid of moſt harbours, bays, and mouths of rivers. In Holland the bottom of the ſea is elevated in many places; the gulf of Zuderzee and the ſtraits of the Texel cannot receive ſuch large veſſels as formerly. At the mouth of almoſt every river, we find ſmall iſlands, and banks of earth and ſand brought down from the higher grounds; and it is incontrovertible, that the ſea is conſtantly dammed up, wherever great rivers empty themſelves. The Rhine is loſt in the ſands which itſelf has accumulated. The Danube, the Nile, and all large rivers, after having tranſported great quantities of ſlime, ſand, &c. never more arrive at the ſea by a ſingle channel; they ſplit into branches, the intervals of which conſiſt of the materials which they themſelves have tranſported. Marſhes are daily drained; lands, abandoned by the ſea, are now plowed and ſown; we navigate whole countries now covered by the waters; in a word we ſee ſo many inſtances of land changed into water, and water into land, that we muſt be convinced of the continual, though ſlow, progreſs of ſuch changes in all places. Hence the gulfs of the ocean will in time become continents; the iſthmuſes will be changed into ſtraits; and the tops of the mountains will be metamorphoſed into ſhoaly rocks in the ſea.

The waters, therefore, have covered, and may ſtill cover, every part of the earth which is now dry. In the inveſtigation of the cauſes of thoſe perpendicular fiſſures with which the earth abounds, our author's reaſoning is as follows.

As the various materials which conſtitute the different ſtrata were tranſported by the waters, and depoſited in the form of ſediments, they would at firſt be in a very diluted ſtate, and would gradually harden and part with the ſuperfluous quantity of water they contained. In the proceſs of drying, they would naturally contract, and of courſe ſplit at irregular diſtances. Theſe fiſſures neceſſarily aſſumed a perpendicular direction; becauſe, in this direction, the action of gravity of one particle upon another is equal to nothing; but it acts directly oppoſite in a horizontal ſituation: the diminution in bulk could have no ſenſible effect but in a vertical line. The contraction of the parts in drying, not the contained water forcing an iſſue, as has been alleged, is the cauſe of perpendicular fiſſures; for it has often been remarked, that the ſides of theſe fiſſures, through their whole extent, correſpond as exactly as the two ſides of a ſplit piece of wood. Their ſurfaces are rude and irregular. But, if they had taken their riſe from the motion of water, they would have been ſmooth and poliſhed.

Perpendicular fiſſures vary greatly as to the extent of their openings. Some are about half an inch, or an inch, others a foot or two feet; ſome extend ſeveral fathoms, and give riſe to thoſe vaſt precipices which ſo frequently occur between oppoſite parts of the ſame rocks in the Alps and other high mountains. It is plain, that the fiſſures, the openings of which are ſmall, have been occaſioned ſolely by drying. But thoſe which extend ſeveral feet are partly owing to another cauſe; namely, the ſinking of the foundation upon one ſide, while that of the other remained firm. If the baſe ſinks but a line or two, when the height of the rock is conſiderable, an opening of ſeveral feet, or even fathoms, will be the conſequence. When rocks are founded on clay or ſand, they ſometimes ſlip a little to a ſide; and the fiſſures are of courſe augmented by this motion. Thoſe large openings, thoſe prodigious cuts, which are to be met with in rocks and mountains, could not be produced by any other means than the ſinking of immenſe ſubterraneous caverns which were unable longer to ſuſtain their incumbent load. But theſe cuts or intervals in mountains are not of the ſame nature with perpendicular fiſſures: they appear to have been ports opened by the hand of nature for the communication of nations. This ſeems to be the intention of all large openings in chains of mountains, and of thoſe ſtraits by which different parts of the ocean are connected; as the ſtraits of Thermopylæ, of Gibraltar, &c.; the gaps or ports in Mount Caucaſus, the Cordeliers, &c. A ſimple ſeparation, by the drying of the matter, could not produce this effect: large portions of earth muſt have been ſunk, ſwallowed up, or thrown down. See EARTHQUAKE and VOLCANO.

The greateſt changes upon the ſurface of the earth are occaſioned by rains, rivers, and torrents from the mountains. Theſe derive their origin from vapours raiſed by the ſun from the ſurface of the ocean, and are tranſported by the winds through every climate. The progreſs of theſe vapours, which are ſupported by the air, and tranſported at the pleaſure of the winds, is interrupted by the tops of the mountains, where they accumulate into clouds, and fall down in the form of rain, dew, or ſnow. At firſt, theſe waters deſcended into the plains without any fixed courſe; but they gradually hollowed out proper channels for themſelves. By the power of gravity, they ran to the bottom of the mountains, and, penetrating or diſſolving the lower grounds, they carried along with them ſand and gravel, cut deep furrows in the plains, and thus opened paſſages to the ſea, which always receives as much water by rivers as it loſes by evaporation. The windings in the channels of rivers have uniformly correſponding angles on their oppoſite banks; and as mountains and hills, which may be regarded as the banks of the valleys by which they are ſeparated, have likewiſe ſinuoſities with correſponding angles, this circumſtance ſeems to demonſtrate, that the valleys have been gradually formed by currents of the ocean, in the ſame manner as the channels of rivers have been produced.

Our author concludes from previous reaſoning, that the flux and reflux of the ocean have produced all the mountains, valleys, and other inequalities on the ſurface of the earth; that currents of the ſea have ſcooped out the valleys, elevated the hills, and beſtowed on them their correſponding directions; that the ſame waters of the ocean, by tranſporting and depoſiting earth, &c. have given riſe to the parallel ſtrata; that the waters from the heavens gradually deſtroy the effects of the ſea, by continually diminiſhing the height of the mountains, filling up the valleys, and choaking the mouths of rivers; and, by reducing every thing to its former level, they will, in time, reſtore the earth to the ſea, which, by its natural operations, will again create new continents, interſperſed with mountains and valleys, every way ſimilar to thoſe which we now inhabit. See Buffon's Nat. Hiſt. vol. i. Eng. Tranſl. by Smellie.

To this theory, however elegantly diſplayed and plauſibly ſupported by its ingenious author, ſeveral objections have been ſuggeſted by thoſe who are converſant with ſubjects of this nature. The original formation of the earth has been thought hypothetical by all, and by many fanciful. That a torrent of igneous particles ſhould recede from the ſun with an accelerated motion, acquire at a certain diſtance a globular figure, an elliptic motion, and a rotation round its axis, is very improbable, not to ſay unphiloſophical. The formation of mountains by winds and tides, the previous diſſolution of terreſtrial ſubſtances after vitrification by the ſun's heat, the analogy between mountains on dry land and iſlands in the ſea, and the confuſed diſpoſition of the earth's ſtrata, are circumſtances pertaining to our author's theory, which, with all his ingenuity, he has not been able ſatiſfactorily to explain and to eſtabliſh. Indeed, it is altogether incredible that the cavities of the earth ſhould contain a body of water equal in height to the moſt elevated mountains; nor is it conceivable, how the caverns of the ſea, after having raiſed up a quantity of ſand, earth, and ſhells, ſhould depoſit them again in parallel and horizontal beds; nor how torrents ſhould have exiſted at the bottom of the ocean capable of producing theſe effects, and of penetrating the ſtrata of mountains, and of dividing them into hills and vallies. Of this theory it has been juſtly obſerved, that the author introduces the action of water to deſtroy mineral bodies, and afterwards to give them a new arrangement into ſtrata; but that he makes no proviſion for the conſolidation of theſe ſtrata, nor for their angular elevation; nor has he any adequate means for explaining the unſtratified rocks, and the irregularities of the ſurface of the earth.

Profeſſor Pallas, in a "Diſſertation on the Origin and Structure of Mountains," publiſhed A.D. 1779, refutes the opinion that they were formed in the ocean. From undoubted facts he attempts to prove, that the great chain of primitive mountains, that binds together the various parts of the globe, could not have been the production of waters. This chain is granite, with a baſis of quartz, mixed with ſpars, mica, and ſmall portions of baſalt, ſcattered without order, and in irregular fragments. This rocky ſubſtance, and the ſand produced by its decompoſition, form the baſis of all the continents. Granite, ſays this author, is never found in ſtrata, or beds, but in blocks, or maſſes, which exhibit no veſtige of organic impreſſion. The ſecondary and tertiary mountains he ſuppoſes to be of a more recent origin:—the former having been produced by the decompoſition of granite; and the latter having ariſen from the wrecks of the ſea, elevated and tranſported by volcanic eruptions and conſequent inundations. See MOUNTAIN.

Of the theory of Mr. Whitehurſt, as far as it concerns the deluge, we have already given ſome account under that article. We ſhall here introduce ſome further particulars. This author agrees with many others, in ſuppoſing that the earth was originally in a ſtate of fluidity; and hence he concludes, that it has not exiſted from eternity, as ſome perſons have imagined. Its fluidity he infers from its oblate ſpheroidical form. In this fluid ſtate, its component parts were uniformly blended together, without any difference of weight, and formed a maſs of uniform conſiſtence from the ſurface to the centre; ſo that the globe, at its firſt formation, was unfit for the ſupport of animal or vegetable life. The component parts of this chaos, being heterogeneous, or endued with peculiar laws of elective attraction, ſimilar bodies were diſpoſed to unite and to form ſelect ſubſtances of various denominations, as air, water, earth, &c.; and then the chaos was progreſſively formed into a habitable world. As ſoon as the oblate ſpheroidical figure of the earth was completed, the component parts began to act more freely, according to their affinities; that is, the particles of air united to thoſe of air, thoſe of water to water, and thoſe of earth to earth; and from this union reſulted their ſpecific gravities. Accordingly, thoſe parts that were the moſt denſe approached towards the centre of gravity, and thoſe of the greateſt levity aſcended towards the ſurface; and as air is about 800 times ſpecifically lighter than water, the former was ſooner freed from the general maſs than the latter, and formed a kind of muddy impure atmoſphere, which ſurrounded the newly formed globe. Water ſucceeded the air, and encompaſſed the earth in one immenſe ocean. In proceſs of time, theſe elements were purified, and became fit for animal life. From this ſeparation of the component parts, and their aggregation into ſolid bodies, the following conſequences enſued: as the ſun and moon were coeval with the chaos, the ſolids could not uniformly ſubſide from every part of the ſurface, and become equally covered by water; for as the ſeparation of the ſolids and fluids proceeded, the tides increaſed, and removed the former from one place to another without any preciſe order. Hence the ſea became unequally deep; and whilſt theſe inequalities were gradually advanced, dry land at length appeared, and ſeparated the waters which had univerſally covered the earth. The primitive iſlands, being thus formed, became firm and dry, and fit for the reception of animals and vegetables. In this progreſſion of things, ſeveral days and nights muſt have preceded the ſun's firſt appearance in the heavens, or its becoming viſible on the fourth day, agreeably to the account of ſcripture. Previouſly to the formation of the primitive iſlands, the ocean was purified and ſtocked with marine animals; which became enveloped and buried in the mud, by the continual action of the tides: and this was more eſpecially the caſe with ſhell-fiſh, which were leaſt able to diſentangle themſelves. Theſe marine animals, being thus imbedded in the earth at various depths, bear ſufficient teſtimony, that they were interred at ſucceſſive periods of time; and that they were created before the formation of the primitive iſlands and terreſtrial animals. The beds occupied by marine ſhells, the remains of thoſe animals that periſhed on the ſpot where they were depoſited, were originally the bottom of the ocean. As to the mountains and continents, Mr. Whitehurſt apprehends, that they are the effects of ſubterraneous fire, and produced at a period of time very diſtant from that of the creation of the world, when the ſtrata had acquired firmneſs and coheſion, and the teſtaceous matter had aſſumed a ſtony hardneſs. For further particulars, ſee DELUGE.

Mr. Kirwan (Iriſh Tranſ. vol. vi.) agrees with many other writers, in ſuppoſing that the primæval earth, at leaſt as far as reſpects its ſuperficial parts, to a certain depth, was in a ſoft or liquid ſtate. This he infers from its preſent ſpheroidical ſhape, and alſo from ſome geological obſervations, which he has adduced. Its interior and more central parts, he conceives, contained, at the time of its creation, and for many ſubſequent centuries, immenſe empty caverns, which conſiſted of materials of ſufficient ſolidity to reſiſt the preſſure of the enormous maſs of liquid ſubſtance that reſted upon them. The liquidity of the ſuperficial parts muſt have proceeded either from igneous fuſion or ſolution in water. The former cauſe he rejects, and adopts the latter, which he endeavours to eſtabliſh. The aqueous fluid, which ſerved as a menſtruum for this ſolution, was heated, as he imagines, to at leaſt 33 degrees, and poſſibly much higher; and it contained the eight generic earths, all the metallic and ſemi-metallic ſubſtances now known, the various ſimple ſaline ſubſtances, and the whole tribe of inflammables, ſolid and liquid, variouſly diſtributed. Hence he concludes, that elementary fire, or the principle of heat, muſt have been coeval with the creation of matter; and that the general properties of gravitation and elective attraction may be ſuppoſed of equal date. The proportion, as he ſuppoſes, of the different materials contained in the chaotic fluid, to each other, was nearly the ſame as that which they at preſent bear to each other; the ſiliceous earth being by far the moſt copious, next to that the ferruginous, then the argillaceous and calcareous, and, laſtly, the magneſian, barytic, Scottiſh, and Jargonic, in the order now named, the metallic ſubſtances (except iron) moſt ſparingly. M. Buffon and Dr. Hutton, however, have excluded calcareous earth from the number of the primæval, aſſerting that the maſſes of it which we now obſerve proceed from ſhell-fiſh. Mr. Kirwan replies, that the ſuppoſition of ſhell-fiſh, or any animals, poſſeſſing the power of producing any ſimple earth is unfounded; and that before the exiſtence of any fiſh, the ſtony maſſes that encloſe the baſon of the ſea muſt have exiſted, and among theſe there is not any one in which calcareous earth is not found. In a fluid conſtituted like that juſt mentioned, it is evident, ſays our author, from the laws of elective attraction, that the various ſolids diffuſed through it muſt ſoon have coaleſced in various proportions, according to the laws of this attraction, and the preſence or proximity of the ingredients, and thus have cryſtallized into different groups, which deſcended to and were depoſited upon the inferior ſolid kernel of the globe. In thoſe tracts, in which the ſiliceous, and next to it the argillaceous, earth moſt abounded, (ſuch tracts being the moſt extenſive,) granite and gneiſs ſeem to have been firſt formed, in the manner which the author has explained. The high degree of heat, ariſing from different concurring cauſes which exiſted in the earth, diſengaged all the oxygen contained in the contiguous chaotic fluid; and this uniting partly with more metallic iron, partly with the ſulphurated and partly with the carbonic and bituminous ſubſtances, muſt have occaſioned a ſtupendous conflagration, the effects of which may well be ſuppoſed to have extended even to the ſolid baſis on which the chaotic fluid repoſed, and to have ſplit it to an unknown extent. Theſe volcanic eruptions were attended with important conſequences: the firſt muſt have been the diffuſion of a conſiderable heat through the whole maſs of the chaotic fluid, by which means the oxygen and mephitic airs diſperſed through it muſt have been extricated, and thus gradually formed the atmoſphere. The ſecond production was that of fixed air from the union of oxygen with the ignited carbon; and this at firſt roſe into and diffuſed itſelf through the atmoſphere; but in proportion as the chaotic fluid cooled, it was gradually abſorbed by it. This abſorption occaſioned the precipitation, and more or leſs regular cryſtallization of the calcareous earth; the greater part of which, being much more ſoluble than the other earths, ſtill remained in ſolution, after the others had been for the moſt part depoſited.

The immenſe maſſes concreted and depoſited on the interior nucleus of the earth formed the "primitive mountains." The formation of "plains" is eaſily underſtood: for in the wide intervals of diſtant mountains, after the firſt cryſtallized maſſes had been depoſited, the ſolid particles ſtill contained in the chaotic fluid, but too diſtant from each other's ſphere of attraction to concrete into cryſtals, and particularly thoſe that are known to be leaſt diſpoſed to cryſtallize, and alſo to have leaſt affinity to water, were gradually and uniformly depoſited. Of this nature argillaceous particles are known to be, intermixed, as we may well imagine, with a large proportion of ſiliceous and ferruginous particles, of all the moſt abundant, and ſome particles of the other earths: and by theſe compound and ſlightly concreted earths, the ſurface of plains was originally covered. In proceſs of time, theſe earths received an increaſe from the decompoſition of primitive mountains, which was an event of much poſterior date.

The next important event, neceſſary to fit the globe for the reception of land animals, was the diminution and receſs of the chaotic fluid, in the boſom of which the mountains were formed, and the conſequent diſcloſure of the dry land. By the operation of the preceding volcanoes, the bed of the ocean was ſcooped, moſt probably in the ſouthern hemiſphere: but no change or tranſpoſition of the ſolid materials depoſited from the chaotic fluid could lower its level, unleſs the inferior nucleus of the globe could receive it within its hollow and empty caverns. This admittance it gained through the numerous rifts occaſioned by the antecedent fires: at firſt rapidly, afterwards more ſlowly, in proportion as the perpendicular height of the fluid was diminiſhed; and thus the emerged continent, conſiſting of mountains and plains, was gradually laid bare and dried, and, by drying, conſolidated. The diſcloſure of the actual continents appears to have been gradual. The tracts at firſt uncovered were thoſe whoſe height over the preſent ſeas amounts to 8500 or 9000 feet, or more. This height comprehends moſt of the eaſtern ſummits of Siberia, between latitude 49°

and 55°, and of the extenſive regions of Great Tartary, Tibet, the deſert of Coby or Chamo, and China, reaching in ſome places to latitude 35°, and extending in the northern parts from the ſources of the Irtiſh, long. 95°, and in the more ſouthern from the heads of the Ganges and Burrampooter, long. 80°, Hoanho and Porentſho to long. 190° at the leaſt, and perhaps ſtill farther into the unknown parts of Eaſtern America. In Europe, only the ſummits of the Alps, Pyrenées, and of a few other mountains, were uncovered; but in America, the narrow but long chain of the Cordeliers muſt have raiſed its ſummits far above the ocean.

When the level of the ancient ocean was lowered to the height of 8500 or 9000 feet, and not before, it began to be ſtocked with fiſh. That the creation of the fiſh, ſays Mr. Kirwan, was ſubſequent to the emerſion of the tracts juſt mentioned, and to the reduction of the waters to the height now ſtated, is proved by the obſervations of all who have viſited thoſe countries. In theſe elevated tracts, no marine ſhells or petrifactions are found in the body of any mountain, nor in any ſtone, not even in lime-ſtone, though it abounds particularly about the ſources of the Amour. Hence our author concludes, that theſe tracts, which, like all others, were formed in the boſom of the primitive ocean, were uncovered before the creation of fiſh; and ſince they contain lime-ſtone, that this ſtone does not neceſſarily and univerſally originate from comminuted ſhells, as Buffon and others have advanced. No petrifactions or ſhells are incorporated in the rocks or ſtrata, that form ſeveral other lofty mountains. This is atteſted by De la Perouſe with reſpect to the Pyrenées, which, nevertheleſs, are moſtly calcareous. Nor are any found in Santo Velino, the higheſt of the Appennines, the height of which is 8300 feet; whereas they abound in thoſe that are lower. In the Savoyan Alps, Salenche, Saleve Mole, the Dole, all of which are calcareous, but below the height of 7000 feet, contain petrifactions; but the Buet, which is alſo for the greater part calcareous, but whoſe height exceeds 10,000 feet, contains none. (Sauſſure, paſſim.) After this elevated tract of the globe had been uncovered, there is no reaſon to ſuppoſe that it long remained diveſted of vegetables or unſtocked with animals, as it was fitted to receive them. The author proceeds to adduce ſeveral reaſons, which, in his opinion, prove, that the retreat of the ſea from the lower parts of our preſent continents was gradual, and not fully effected till after the lapſe of ſeveral centuries. (See CONTINENT and MOUNTAIN.) This retreat of the ſea continued, as our author imagines, until a few centuries before the deluge. Its ceſſation, long before this cataſtrophe took place, he infers from the hardneſs which the mountains muſt have acquired, to withſtand the ſhocks they muſt then have undergone. To acquire this hardneſs a long period of time was neceſſary, both for their deſiccation and the infiltration of thoſe particles, to which the ſtrata of ſecondary mountains owe their ſolidity. Our author cloſes his theory of the primitive earth with an attempt to accommodate it to the Moſaic account of the creation. For his application of it to the deluge, we refer to that article.

We now proceed to give an account of two other theories of the earth, which have ſuperſeded moſt of the others already recounted, and each of which has had its learned and zealous advocates. The firſt of theſe is that of Dr. James Hutton, the detail of which occupies a conſiderable part of the firſt volume of the Edinburgh Tranſactions. The author begins an elaborate developement and explication of his theory by obſerving, that in order to acquire a comprehenſive view of the mechaniſm of the globe, by which it is adapted to the purpoſe of being a habitable world, it is neceſſary to diſtinguiſh three different bodies, which compoſe the whole, *viz.* a ſolid body of earth, an aqueous body of ſea, and an elaſtic fluid of air. The central body of the globe is ſuppoſed, without ſufficient reaſon, as our author imagines, to be ſolid and inert; the fluid body of water, which by gravitation is reduced to a ſpherical form, and by the centrifugal force of the earth's rotation to an oblate figure, is eſſential to the conſtitution of the world, as it affords the means of life and motion to animals of various kinds, as it is the ſource of growth and circulation to the organized bodies of the earth, and as it is the receptacle of our rivers, and the fountain of our vapours; the irregular body of land raiſed above the level of the ocean, although it be the ſmalleſt part of our globe, is the moſt intereſting, as plants grow on its ſurface, and animal life, and alſo vegetation, are ſuſtained by it. The ſurrounding body of atmoſphere is no leſs neceſſary than the other parts, in a variety of reſpects ſufficiently obvious, and which it is needleſs for us to recite. Having thus deſcribed the mechaniſm of the globe, our author proceeds to enumerate ſome of thoſe powers by which motion is produced and activity imparted to the mere machine.

Theſe are the projectile or progreſſive power, that of gravitation, whence it derives its rotatory motions; the influence of light and heat, of cold and condenſation; and the powers of electricity and magnetiſm. Moreover, a ſolid body of land, our author obſerves, could not have anſwered the purpoſe of a habitable world, without a ſoil adapted to the growth of plants: and this ſoil conſiſts merely of the materials that are collected from the deſtruction of the ſolid land. The ſurface of this land, inhabited by man, and covered with plants and animals, is made by nature to decay, in diſſolving from that hard and compact ſtate in which it is found below the ſoil; and the ſoil itſelf is neceſſarily waſhed away by the continual circulation of the water running from the ſummits of the mountains towards the general receptacle of that fluid; thus the heights of our land are levelled with the ſhores; our fertile plains are formed from the ruins of the mountains; and the moveable materials, after previous migration, are carried forwards to the unfathomable regions of the ocean. As the vegetable ſoil is thus conſtantly removed from the ſurface of the land, whatever may be the ſupply which it receives from the diſſolution of the ſolid earth, the land gradually tends to deſtruction, which, in a courſe of ages, is inevitable. In order to counteract this deſtructibility, our author ſuggeſts, that in the conſtitution of this world there may be a reproductive operation, by which a ruined conſtitution may be again repaired, and a duration and ſtability procured to the machine, conſidered as a world ſuſtaining plants and animals. Although, according to Dr. Hutton, the Moſaic account places the commencement of the exiſtence of man upon the earth at no great diſtance; and we have no document in natural hiſtory which attributes a high antiquity to the human race; yet this is not the caſe with regard to the inferior ſpecies of animals, particularly thoſe which inhabit the ocean and its ſhores. Accordingly we find alſo in the relics of ſea animals that are diſcovered in the ſolid body of our earth evidences of an earlier exiſtence than that to which the Moſaic hiſtory ſeems to trace the origin of our earth. We are thus led to repreſent our author's ſentiments, with regard to the formation of the terreſtrial globe. The ſolid parts of the globe, he ſays, are, in general, compoſed of ſand, of gravel, of argillaceous and calcareous ſtrata; or of the various compoſitions of theſe, with other ſubſtances. Sand is ſeparated and ſized by ſtreams and currents; gravel is formed by the mutual attrition of ſtones agitated in water; and marley or argillaceous ſtrata have been collected, by ſubſiding in water with which thoſe earthy ſubſtances had been floated. Hence he is led to infer, that ſo far as the earth is formed of theſe materials, the ſolid body would appear to have been the production of water, winds, and tides. But that which renders the original of our land clear and certain, in his opinion, is the immenſe quantity of calcareous bodies, which had belonged to animals, and the intimate connection of theſe maſſes of animal production with the other ſtrata of the land. Accordingly he proceeds to prove, that all thoſe calcareous bodies, from the collection of which the ſtrata were formed, have belonged to the ſea, and were produced by it. For which purpoſe he alleges, that we find the traces of marine animals in the moſt ſolid parts of the earth; and, therefore, theſe ſolid parts muſt have been formed after the ocean was inhabited by thoſe animals, which belong to that fluid medium. Before he inveſtigates the natural hiſtory of theſe ſolid parts, and the manner in which they were formed, he undertakes to ſhew that all the maſſes of marble and limeſtone are compoſed of the calcareous matter of marine bodies. To this purpoſe, he obſerves, that there are few maſſes of marble or limeſtone in which we may not find ſome of thoſe objects, which indicate the marine origin of the maſs. Beſides, in theſe calcareous ſtrata, which are evidently of marine origin, there are many parts that are of a ſparry ſtructure, or, in other words, the original texture of theſe beds, in ſuch places, has been diſſolved, and a new ſtructure has been aſſumed, which is peculiar to a certain ſtate of the calcareous earth. This change is produced by cryſtallization, in conſequence of a previous ſtate of fluidity, which has ſo diſperſed the concreting parts, as to allow them to aſſume a regular ſhape and ſtructure proper to that ſubſtance. Moreover, in all the regions of the earth there are huge maſſes of calcareous matter, in that cryſtalline form or ſparry ſtate, in which, perhaps, no veſtige can be formed of any organized body, nor any indication that ſuch calcareous matter had belonged to animals: but, as in other maſſes, this ſparry ſtructure, or cryſtalline ſtate, is evidently aſſumed by the marine calcareous ſubſtances, in operations which are natural to the globe, and which are neceſſary to the conſolidation of the ſtrata, it does not appear that the ſparry maſſes, in which no figured body is formed, have been originally different from other maſſes, which being only cryſtallized in part, and in part ſtill retaining their original form, bear ample evidence of their marine origin. From this kind of reaſoning he concludes, that all the ſtrata of the earth, both thoſe conſiſting of hard calcareous maſſes, and others ſuperincumbent upon theſe, have had their origin at the bottom of the ſea, by the collection of ſand and gravel, of ſhells, of coralline and cruſtaceous bodies, and of earths and clays, variouſly mixed, or ſeparated and accumulated. There is, however, a part of the ſolid earth which is excluded from the reſult of this reaſoning, and this part conſiſts of certain mountains and maſſes of granite, which are thought to be older in their formation, and are very rarely found ſuperincumbent on ſtrata, which muſt be acknowledged as the productions of the ſea. We thus obtain ſolid land, the greater part of which, if not the whole, was originally compoſed at the bottom of the ſea; but this, our author ſays, is not the world which we inhabit; and therefore the queſtion is, how ſuch continents as we have upon the globe could be elevated above the level of the ſea. This queſtion he proceeds to reſolve, by ſhewing, firſt, how this change could not be effected, and then, by ſtating the mode in which he conceives the ſtrata of the globe formed at the bottom of the ſea were conſolidated. In this operation the general agents are fire and water. Rejecting, after a minute examination of its effect on various ſubſtances, and in different circumſtances, the agency of water, he adopts that of fuſion by heat, and examines its effect on the ſiliceous and calcareous ſtrata, which are the prevailing ſubſtances on the globe, all the reſt being, in compariſon of theſe, as nothing; for unleſs they be the bituminous or coal ſtrata, there is hardly any other which does not neceſſarily contain more or leſs of one or other of theſe two ſubſtances. If, therefore, it can be ſhewn, that both of theſe two general ſtrata have been conſolidated by the ſimple fuſion of their ſubſtance, no doubt will remain with regard to the nature of that operation, which has been carried on at great depths of the earth, inacceſſible to human obſervation. Our author, therefore, proceeds to prove, that theſe ſtrata have been conſolidated by ſimple fuſion, and that this operation is univerſal, in relation to the ſtrata of the earth, as having produced the various degrees of ſolidity or hardneſs in theſe bodies. Having adduced arguments and facts in proof of the firſt poſition, Dr. Hutton exemplifies the ſecond, in the caſe of chalk, which is naturally a ſoft calcareous earth, but which may be alſo found conſolidated in every different degree. Through the middle of the iſle of Wight there runs a ridge of hills of indurated chalk. This ridge runs from the iſle of Wight directly weſt into Dorſetſhire, and paſſes by Corf-caſtle towards Dorcheſter, or beyond that place. The ſea has broken through this ridge at the weſt end of the iſle of Wight, where columns of the indurated chalk remain, called the Needles: the ſame appearance being found upon the oppoſite ſhore in Dorſetſhire. In this field of chalk, we find every gradation of that ſoft earthy ſubſtance to the moſt conſolidated body of this indurated ridge, which is not ſolid marble, but which has loſt its chalky property, and has acquired a kind of ſtony hardneſs. This cretaceous ſubſtance may be found in its moſt indurated and conſolidated ſtate in the north of Ireland, not far from the Giants' Cauſeway. This body, which was once a maſs of chalk, is now a ſolid marble. Then, if it be by means of fuſion that the ſtrata of the earth have been, in many places, conſolidated, we muſt conclude, that all the degrees of conſolidation, which are indefinite, have been brought about by the ſame means. The author afterwards ſhews, that granite, which forms a part of the ſtructure of the earth, is conſolidated by means of fuſion, and in no other mode. The author proceeds to argue, that if ſtrata have been conſolidated by means of heat, acting in ſuch a manner as to ſoften their ſubſtance, then, in cooling, they muſt have formed rents or ſeparations of their ſubſtance, by the unequal degrees of contraction, which the contiguous ſtrata may have ſuffered. There is no appearance more diſtinct, than that of the perpendicular fiſſures in ſtrata. They are generally known to workmen by the terms of veins, or backs and cutters; and there is no conſiderable ſtratum without them. If it be by means of heat and fuſion that ſtrata have been conſolidated, then, in proportion to the degree of conſolidation they have undergone from their original ſtate, they ſhould, *cæteris paribus*, abound more with ſeparations in their maſs; and this concluſion is fully juſtified by appearances.

The author concludes upon the whole, from chemical principles, capable of demonſtration, that all the ſolid ſtrata of the globe have been concenſed by means of heat, and hardened from a ſtate of fuſion. The propoſition alſo admits, he ſays, of proof upon principles which are purely mechanical.

Our author's next object is to ſhew by what operation maſſes of looſe materials, collected at the bottom of the ſea, were raiſed above its ſurface, and transformed into ſolid land. The power of heat for the expanſion of bodies is, ſo far as we know, unlimited; but by the expanſion of bodies placed under the ſtrata at the bottom of the ſea, the elevation of theſe ſtrata may be effected; and therefore the queſtion to be reſolved is, how far have we reaſon to conclude, that this power of expanſion has been employed in the production of this earth above the level of the ſea? The examination of natural appearances will ſerve to evince the elevation of ſtrata by the power of heat above the level of the ſea. The ſtrata formed at the bottom of the ocean are neceſſarily horizontal, or nearly ſo, and continuous in their horizontal direction or extent. If, therefore, theſe ſtrata are cemented by the heat of fuſion, and elevated by an expanſive power acting from below, we may expect to find every ſpecies of fracture, diſlocation, and contortion, in theſe bodies, and every degree of departure from a horizontal towards a vertical poſition. The ſtrata of the globe are, accordingly, found in every poſſible poſition: from horizontal, they are often found vertical: from continuous, broken and ſeparated in every poſſible direction: and from a plane, bent and doubled. They could not have been thus originally formed; and the power that has produced this change cannot have been inferior to that which might have been required for their elevation from the place in which they had been formed. Natural appearances confirm this reaſoning; and the inference is, that the land on which we dwell has been elevated from a lower ſituation by the ſame agent, which had been employed in conſolidating the ſtrata, in giving them ſtability, and preparing them for the purpoſe of the living world. This agent is matter actuated by extreme heat, and expanded with amazing force. It is alſo a power of the ſame nature that has been employed in forming, by fracture and diſlocation, mineral veins. By tracing the effects of volcanoes, and by a variety of other inveſtigations, which we cannot purſue, our author deduces this general concluſion, that all the continents and iſlands of this globe have been raiſed by means of fire above the ſurface of the ocean; and, therefore, that almoſt the whole of what we ſee on this earth, was originally formed at the bottom of the ſea. From the conſideration of the materials which compoſe the preſent land, Dr. Hutton thinks there is reaſon to conclude, that during the time this land was forming, by the collection of its materials at the bottom of the ſea, there had been a former land containing materials ſimilar to thoſe which we find at preſent in examining the earth. We may alſo conclude, he ſays, that there had been operations ſimilar to thoſe which we now find natural to the globe, and neceſſarily exerted in the actual formation of gravel, ſand, and clay: and, moreover, that there had been in the ocean a ſyſtem of animated beings, which propagated their ſpecies, and which have thus continued their reſpective race to this day. In order to be convinced of this truth, we have merely to examine the ſtrata of our earth, in which we find the remains of animals; of every genus now exiſting in the ſea, and probably every ſpecies, and perhaps ſome ſpecies with which we are not now acquainted. There had been alſo, our author ſuppoſes, a world of plants as well as an ocean repleniſhed with living animals.

Having aſcertained the ſtate of a former earth, in which plants and animals had lived, as well as the gradual production of the preſent earth compoſed from the materials of a former world, it muſt be evident, as Dr. Hutton ſuppoſes, that here are two operations, which are neceſſarily conſecutive. The formation of the preſent earth neceſſarily involves the deſtruction of continents in the ancient world; and by purſuing in our minds the natural operations of a former earth, we clearly ſee the origin of that land, by the fertility of which, we, and all the animated bodies of the ſea, are fed. It is, in like manner, that, contemplating the preſent operations of the globe, we may perceive the actual exiſtence of thoſe productive cauſes, which are now laying the foundation of land in the unfathomable regions of the ſea, and which will, in time, give birth to future continents.

Upon our author's principles of decay and renovation, there may have been an indefinite ſucceſſion of worlds in paſt time, and there may be a ſimilar ſucceſſion in future time. The ſame proceſs, or ſeries of operations, may be repeated without end, and may have taken place for ages paſt. He obſerves, indeed, that our earth is compoſed of the materials, not of the earth which immediately preceded the preſent, but of the earth, which we may conſider as the third in aſcending backwards, and which had exiſted before the land that was above the ſurface of the ſea, while our preſent land was beneath the water of the ocean; ſo that we have three diſtinct ſucceſſive periods of exiſtence, and each of theſe, in our meaſurement of time, having an indefinite duration. The reſult of our author's inquiry, as he expreſsly ſays, is that, in the ſucceſſion of worlds, "we find no veſtige of a beginning,—no proſpect of an end." The principles of this theory have been clearly explained, and elegantly illuſtrated by profeſſor Playfair, who has alſo ſucceſsfully combated the charge of impiety, which Dr. Hutton's opponents endeavoured to attach to his opinions. In connection with this ſyſtem, we ſhould have introduced ſome remarks on volcanoes from ſir William Hamilton, and others; but having extended this article far beyond our cuſtomary limits, we muſt refer to Volcano.

Another theory, which is now held by many in high eſtimation, is called the "Neptunian," or "Wernerean," from profeſſor Werner of Freybourg, one of the moſt diſtinguiſhed mineralogiſts of the preſent day, and a zealous ſupporter of this theory. He profeſſes to baniſh every thing hypothetical, and to deduce, from accurate obſervation, ſuch concluſions as ſeem to be unavoidable. He ſets out, however, in conformity to moſt other theoriſts, with conjecture, and ſtates, that the earth, to a conſiderable depth, has been once in a ſtate of fluidity, produced, not by fire, as the Huttonians ſuppoſe, but by aqueous ſolution. The outlines of the ſyſtem, founded on this principle, are as follow: 1. The ſuperficial parts of the earth, to a certain depth, muſt have been originally in a ſoft or liquid ſtate, which may be inferred from its preſent ſpheroidal ſhape, and from a variety of geological obſervations. 2. That, at the time of the creation, and for many centuries after, the interior and more central parts contained immenſe empty caverns; and, conſequently, conſiſted of materials ſufficiently ſolid to reſiſt the preſſure of the enormous maſs of ſuperincumbent liquid ſubſtance. 3. The materials of which the ſtrata of the earth are compoſed, were at one period diſſolved, or ſuſpended in water; and from this fluid they had ſucceſſively conſolidated in various combinations, partly by cryſtallization, and partly by mechanical depoſition:—granite, as the baſis on which the greateſt number of ſtrata reſt, having been firſt formed, and the other primitive ſtrata in due order, by precipitations chiefly chemical. 4. From the period of the formation of theſe ſtrata, the water, which covered the earth, began to decreaſe in height, by retiring gradually into cavities in the internal parts of the earth; and, during this proceſs, other precipitations were effected, and the intermediate ſtrata, or ſtrata of tranſition, were formed, of which ſiliceous ſchiſtus and tranſition are the principal. 5. When the water was ſtill abating, the mechanical action of its maſs on the ſtrata already formed, occaſioned in them a partial diſintegration; the materials from this ſource, together with the remaining part of the matter originally diſſolved, by their precipitation and conſolidation, formed the ſecondary ſtrata, which are generally arranged in horizontal beds, and abundant in organic remains. 6. During the gradual conſolidation of theſe ſtrata, rents and cavities opened, into which the water, holding various ſubſtances in ſolution, retired; hence, the formation of mineral veins. 7. Volcanic fires and alluvions have produced ſome inconſiderable and partial changes on the ſurface of the earth. See Playfair's Syſtem of Geography, vol. i. See Deluge, Fossils, Shells, Strata, and Volcano.

Earth, in *Agriculture* and *Gardening*. See Soil, Land, &c.

Earth, *Untried*, the ſoil, or earth, which is ſix or ſeven inches deep, where neither ſpade nor plough has reached. This is greatly recommended by Mr. Lawrence, for amendments and improvements, both in the fruit and kitchen garden. He aſſures us, from his own experience, that no kind of compoſt, made with art, exceeds it; and adds, that if the choiceſt fruit-trees be planted herein, they preſently diſcover an uncommon healthfulneſs and vigour; and that, if any tender ſort of annuals be diſcreetly ſown in this earth, made fine by ſifting, their looks, colour, &c. ſoon diſcover that they like the ſoil. Melons and cucumbers need no other compoſt but this untried earth; and aſparagus itſelf will proſper, at leaſt, as well in this untried earth, if laid a foot and a half deep, as with all the uſual expence of dung; though for the tenderer flowers, and exotics, this earth is not found to have any extraordinary excellencies. For annual plants, produced from ſeed, a coat of this untried earth, two inches deep, may ſuffice: on other occaſions, a greater depth is required.

Earth, in *Chemiſtry* and *Philoſophy*. The ancient naturaliſts imagined, that all material ſubſtances were ultimately reſolvable into four ſimple bodies, air, fire, water, and earth, which on this account were called the four elements. The empyreum, or external ſphere of the viſible world, in which the ſun and the other ſtars perform their revolutions, was ſuppoſed to be the peculiar ſeat of fire: the region, interpoſed between the earth and the empyreum, was called the atmoſphere, the ſuperior part of which, (or the æther,) was conſidered as the peculiar reſidence of the element of air, while the lower portion, in which the clouds float, was regarded as the natural ſituation of the element of water. The earth, the loweſt and innermoſt of theſe ſpheres, was ſuppoſed to be the great reſervoir of elementary earth. The natural characters of the ſuppoſed elements were imagined to be analogous to the above hypothetical diſtribution of them. Thus fire was conſidered as the active principle of the univerſe, the ſource of animal and vegetable life, the great cauſe of change and renovation. Earth, on the contrary, was regarded as the principle of fixity, hardneſs, and ſolidity; as that to which the perſiſtency of the various forms of animated and inanimate beings was owing. The opinions of the ancient naturaliſts were received with reſpect and ſubmiſſion by the early chemiſts, whoſe reſearches they directed, and from whom they derived, in return, the ſupport of experimental arguments. In proof of the firſt it may be ſtated, that the univerſal method of analyſis adopted by the old chemiſts was, the expoſure of the ſubſtance operated on to different degrees of heat, from which circumſtance, indeed, they were familiarly known by the appellation of *Philoſophers by fire*. Of the nature of the experiments by which the above-mentioned properties of earth were ſuppoſed to be demonſtrated, the following may ſerve as a ſpecimen. If a vegetable or animal is expoſed to the action of an open fire, thoſe of its component parts that are volatilizable or combuſtible, are reſolved into flame and vapour, and air, and there remains behind a white, dry, fixed, pulverulent, earthy matter, to which, as the only permanent part of the ſubject of experiment, its form was attributed.

As chemical proceſſes came to be multiplied, it was found convenient to claſſify the earths; whence aroſe the diſtinction of metallic earths, or calces, (which were thought to be ultimately reſolvable into one general metallic or *mercurial* earth,) alkaline earths, and earths proper, that is, ſuch as were neither alkaline nor metallizable. The metallic earths were found to differ remarkably from the reſt by their ſuperior ſpecific gravity, till the diſcovery of barytes took place; the high ſpecific gravity of which occaſioned many attempts, but wholly without ſucceſs, to reduce it to the metallic ſtate. This, however, was not conſidered as abſolutely concluſive of the non-metallic nature of barytes, and in the opinion of many, was fully counterbalanced by the poſitive argument of its great weight. When Lavoiſier publiſhed his theory, he ſtated, as an analogical inference, the probability that the earths would one day be proved to be metallic oxyds; and ſoon after, the actual metallization of barytes and ſome of the other earths was announced by M. M. Ruprecht and Tondi. On the repetition, however, of their experiments by Klaproth and Savareſi, the ſuppoſed diſcovery was clearly proved to be an entire miſtake; the metallic globules which were produced in the experiments alluded to being only phoſphuret of iron, and derived from the crucible in which the fuſions were performed.

Of late years the hypotheſis of the metallic nature of the earths was entirely abandoned, and the only innovation on the old arrangement was, the detaching of the alkaline earths, barytes, ſtrontian, lime, and magneſia, and placing them with the other alkalies; and leaving ſilex, zircon, alumine, glucine, and yttria, to form the claſs of earths proper, characteriſed by infuſibility in fire, inſolubility in water, the abſence of acid or alkaline properties, and irreducibility to the metallic ſtate.

The recent ſplendid diſcoveries of profeſſor Davy on electro-chemical agency, have, however, diſcloſed a multitude of highly important facts, of which, one of the moſt intereſting is, that not only the earths, but the alkalies themſelves, are compounds of peculiar metallic baſes with oxygen, in conſequence of which the claſs of earths, heretofore diſtinguiſhed by negative properties, is done away. See Electricity and Metals.

Earth, *Animal*, is phoſphat of lime, of which the hard parts of the warm blooded animals are principally compoſed, and which remains behind after the diſſipation by combuſtion of the other ingredients.

Earth *of Dew*, an earth much valued by many former chemical experimenters, and prepared in the following manner: a large quantity of dew is to be collected, and ſet in a wooden veſſel, in a cool ſhady place, covered with a canvas, to keep out duſt and flies, there will in three weeks, and ſometimes longer, come out a putrefaction in the liquor. During the time of this putrefaction, certain films are daily formed on the ſurface of the liquor, and theſe falling down to the bottom, one after the other, form, by degrees, a ſediment of a ſort of mud. This is to be thrown away, and the dew, when ſeparated from it, is to be filtered clear, and evaporated to a dryneſs, the remainder is a greyiſh earth, which is the true earth of dew: this is very light and friable, and is of a foliated ſtructure in the maſs, looking like ſo many leaves of brown paper, ſpread very thin and even over one another. Phil. Tranſ. N° 3.

This earth, expoſed to a ſmart fire, loſes its foliated texture, and runs into a maſs, reſembling a mixture of ſalt and brimſtone melted together, but it is not at all inflammable. This, ground on a levigating ſtone, tinges the water to a purpliſh colour. A pound of this earth, properly treated by calcination and elixiviation, will yield an ounce of a pure and white ſalt, ſomewhat reſembling nitre. The chemiſts have been at great pains to procure this earth, but they do not ſeem yet to have made any very important uſe of it; and in all probability it is no other than that common ſpar which we know to be contained in all water, and which encruſts the ſides of our tea-kettles, and other veſſels, in which water is often boiled. We know, by manifold inſtances, that ſpar is rarifiable into vapour with water, and therefore it would be a greater wonder if the dew were found not to contain it, than that it does.

EARTH, in *Geography*, denotes the terraqueous globe, which we inhabit, conſiſting of land and water; the ſurface of which is diverſified by countries and ſeas of various boundaries and dimenſions. On the earth, in this view of it, are deſcribed ſeveral circles, which either properly belong to the earth itſelf, or which are transferred to it from the viſible heavens. Theſe circles are the *Equator*, *Ecliptic*, *Tropics*, *Polar circles*, *Meridians*, *Horizon*, *Parallels*, &c. which ſee reſpectively. See alſo GLOBE. In order to eſtimate the proportion of the land to the water on the ſurface of the earth, ſo far as diſcoveries had been extended in his time, Dr. Long took off the paper from a terreſtrial globe, and, ſeparating the land from the ſea, weighed the parts reſpectively; and in this way he found the proportion of the land to the ſea to be as 124 to 349. This concluſion, which after all muſt be very vague and unſatisfactory, would have been more accurate, if the land were ſeparated from the ſea before the paper was paſted on the globe. The paper of modern globes, including all the modern diſcoveries, would afford a more juſt inference. The ſeas and unknown parts of the earth, independent of ſome late diſcovered iſlands and countries, are ſaid, in conſequence of a meaſurement of ſome of the beſt maps, to contain 160,522,026 ſquare miles; the inhabited parts, 38,990,569; Europe, 4,456,065; Aſia, 10,768,823; Africa, 9,654,807; America, 14,110,874; in all, 199,512,595, being the number of ſquare miles on the whole ſurface of our globe. In conſequence of recent diſcoveries, it has been concluded that more than two-thirds of the ſurface of the terreſtrial globe are covered with water. (See OCEAN and SEA.) For an account of the land on the ſurface of the earth, ſee EUROPE, AFRICA, AMERICA, and ASIA. See alſo AUSTRALASIA, NOTASIA, and POLYNESIA, &c. &c. &c.

EARTH, *Japan*. See CATECHU.

EARTH, *Black*. See BLACK.

EARTH, *Fuller's*, in *Mineralogy*. See FULLER'S *Earth*.

EARTH, *Green*. See GREEN *Earth*.

EARTH, *Lemnian*. See BOLE.

EARTH, *Livonian*. See LIVONICA *Terra*.

EARTH *of Malta*. See MELITENSIS *Terra*.

EARTHS *of Mineral Waters*. All mineral waters contain earth of ſome kind, though very different in quantity and in nature. Theſe are found, in different waters, of very different colours and appearances, ſome white, ſome grey, ſome yellowiſh, ſome reddiſh, and ſome brown. They are alſo as different in their qualities as in their form; ſome of them are ſoluble in acids, others are not ſo; ſome fuſible in the fire; others not; and ſome retain their natural colour, after burning; others change it in the fire. By this we learn, that ſome are marley, others argillaceous, others ochreous, and ſome ſandy; others there are which are produced by the concretion of certain juices, ſaline or ſulphureous, and others not ſo. Some are ſimply mineral, others are metallic. And as many of theſe are very different from any of the known earths, even in their pure and ſeparate ſtate, they are yet much leſs diſtinguiſhable when mixed one with another, as they very frequently are in the waters of even our common ſprings, much more ſo in the mineral medicinal ones.

The ſimple infuſions of certain ſulphureous mineral earths may remarkably alter the waters of wells and fountains, without having any thing of thoſe earths remaining, after their diſtillation; in the ſame manner as nothing is ſeparable, by art, from certain liquors, rendered emetic by antimony. The hot mineral waters may contract ſome alteration from the ſulphureous and bituminous matters which they meet with in their courſe; for theſe ſubſtances all contain ſubtile ſalts, which hot water may take up, and carry away with it. See *Mineral* WATERS.

EARTH *of Nocera*. See NOCERIANA *Terra*.

EARTH *of Portugal*. See PORTUGALLICA *Terra*.

EARTH, *Samian*. See BOLE.

EARTH, *Sealed*. See BOLE.

EARTH, *Soap*. See SOAP *Earth*.

EARTH, *Yellow*. See YELLOW *Earth*.

EARTH-*Bags*, *Sacks à Terre*, in *Fortification*. See SACKS *of Earth*, and SAND-*Bags*.

EARTH-*Banks*, in *Huſbandry*, &c. are a very common fence about London, and in ſeveral other parts of England. Where ſtones are not to be had cheap, theſe are to be preferred to all other fences, both for ſoundneſs and duration.

The beſt manner of making them is this: dig up ſome turf in a graſſy place, a ſpit deep, or nearly to the breadth of the ſpade, and about four or five inches thick; lay theſe turfs with the graſs outward, even by a line on one ſide, and on the backſide of theſe lay another row of turf, having a foot ſpace of ſolid ground on the outſide, to prevent the bank from ſlipping in, if it ſhould be any way faulty. On the outſide of this make a ditch, or elſe let the ſides be lowered both ways with a ſlope two feet deep, and there will be no paſture loſt by the fence, becauſe it will bear graſs on both ſides.

The earth that is dug out of the ditches, or from the ſlopes, muſt be thrown in between the two rows of turf, till the middle is made level with the reſt. Then lay on two more rows of turf in the ſame manner, and with more of the earth fill up, and make level as before. Let this method be continued till the bank is raiſed four feet high, or more if neceſſary, only obſerving, that the higher it is to be carried, the wider the foundation muſt be made. As the bank is carried up, the ſides muſt not be raiſed perpendicular, but ſloping inward both ways, ſo that at the top it may be about two feet and a half wide. This ſort of fence, when made with leſs care, and faced with clay, is left naked, and ſerves very well in ſome places; but when it is thus managed with the turf, the joinings of the ſeveral pieces are hid in a little time, by the growth of the graſſy part of the turf on each ſide; and it makes a beautiful fence, of as green and pleaſant a colour as the reſt of the field.

The great improvement upon this plan, is the planting quickſets, or young white-thorn plants, in the middle of the top of the bank. The earth on each ſide of theſe may be raiſed up with a ſort of wall, and the rain that falls wholly preſerved for the plants. This plenty of water, and depth of fine earth, make the young plants grow quicker and more vigorouſly than in any other way; and the moſt beautiful of all hedges is formed in this manner. When this ſort of hedge is young, there muſt be placed on each ſide of it a ſhort dry hedge, of about a foot high, to keep the ſheep from cropping the young plants, but this may be taken away after a little time.

There is one caution neceſſary in regard to the making of theſe banks, which is, that they muſt never be made in a very dry ſeaſon, becauſe if much rain ſhould follow, the earth of the bank would ſwell and burſt out, or ſpoil the ſhape of the bank; but if this ſhould happen, it is eaſily enough repaired. This beautiful fence may be made at a ſmaller price than thoſe unaccuſtomed to theſe things may imagine. In good digging ground, where men work for fourteen pence a day, it may be made and planted with quick for two ſhillings a pole. It may be made proper for the keeping in of deer, only by the ſmall addition of planting, at every eight or ten feet diſtance, a poſt a little ſlanting, with a mortiſe in it: let this ſtand about two feet above the bank, and into the mortiſes all along, put a rail made of a bough of any tree, no deer will ever go over this, nor can they creep under it, as they often do when a pale tumbles down. The quick, on the top of this bank, may be kept clipped, and will grow very thick, and afford the beſt ſhelter for cattle of any fence in uſe with us. Mortimer's Huſbandry.

Earth-*Board*, that part of a plough which turns over the earth.

Earth-*Flax*. See *Plume*-Allum.

Earth-*Nut*, in *Botany*. See Arachis.

Earth-*Nut Pea*. See Lathyrus.

Earth-*Pitch*. See Bitumen.

Earth-*Pucerons*, in *Natural Hiſtory*, a name given by authors to a ſpecies of puceron very ſingular in its place of abode. In the month of March, if the turf be raiſed in ſeveral places in any dry paſture, there will be found, under ſome parts of it, cluſters of ants, and, on a further ſearch, it will be uſually found, that theſe animals are gathered about ſome pucerons of a peculiar ſpecies. Theſe are large, and of a greyiſh colour, and are uſually found in the midſt of the cluſters of ants. See Puceron.

The common abode of the ſeveral other ſpecies of pucerons is on the young branches or leaves of trees; as their only food is the ſap or juice of vegetables, probably theſe earth kinds draw out thoſe juices from the roots of the graſſes and other plants, in the ſame manner that the others do from the other parts. The ants that conduct us to theſe, are alſo our guides where to find the greater part of the others; and the reaſon of this is, that as theſe creatures feed on the ſaccharine juices of plants, they are evacuated from their bodies in a liquid form, very little altered from their original ſtate; and the ants, who love ſuch food, find it ready prepared for them, in the excrements which theſe little animals are continually voiding. Reaumur.

EARTHED Sugar. See Sugar.

EARTHEN Floors. See Floor.

Earthen *Ware*. See Pottery.

EARTHING, in the general ſenſe. See Interment.

Earthing, in *Agriculture* and *Gardening*, denotes the covering of vines, celery, and other ſhrubs and plants with earth.

EARTHQUAKE, in *Natural Hiſtory*, is a ſudden concuſſion of ſome part or other of the earth, generally accompanied with unuſual noiſes, and productive of various effects, ſuch as the emiſſion of flames, water, vapours, &c.; and agitating the ground in various degrees, from the ſlighteſt ſhocks to the moſt tremendous convulſions, and the overthrow of buildings, towns, rocks, mountains, and very extenſive tracts of land.

It has been juſtly obſerved, that of all the phenomena of nature, none is ſo apt to impreſs the human mind with terror as an earthquake. Its unlimited, its ſudden, its dreadful effects leave no certain remedy, or no refuge to the terrified individuals. Seneca, ſpeaking of it, ſays, "A tempeſtate nos vindicant portus: nimborum vim effuſam, et ſiné fine cadentes aquas, tecta propellunt: fugientes non ſequitur incendium: adverſus tonitrua et minas cœli, ſubterraneæ domus, et defoſſi in altum ſpecus remedia ſunt. Nullum malum ſine effugio eſt. Hoc malum latiſſimé patet, inevitabile avidum, publicé noxium. Non enim domos ſolum, aut familias, aut urbes ſingulas haurit, ſed gentes totas, regioneſque ſubvertit; et modo ruinis operit, modo in altam voraginem condit." Queſt. Nat. lib. vi.

There is no country upon this globe, whether continent or iſland, which is not more or leſs ſubject to earthquakes. Even the ſea is affected by them. And the hiſtories of all times record an immenſe ſeries of earthquakes, which has hardly left a month, a week, or perhaps a ſingle day, unmarked by their devaſtations in the annals of the world. But though hiſtory ſpeaks of the frequency, of the variety, and of the deſtruction, of earthquakes; yet no certain information reſpecting their origin has been tranſmitted to us from the experience of our predeceſſors, whoſe knowledge of the ſubject ſeems not to have amounted merely to conjectures and vague hypotheſes. In ſhort, we know nothing certain reſpecting the cauſe or cauſes which produce the earthquakes; neither are we acquainted with any certain indications of their going to take place, nor with any mode of averting them. Yet theſe are the objects to which the induſtry of philoſophers muſt be attentively directed; and for the attainment of which, all the facts that have been more authentically recorded ſhould be carefully collected, compared, and reflected upon. In conformity to this, we ſhall, in the firſt place, ſtate ſuch accounts of particular earthquakes as are more likely to convey a competent idea of their variety, their powers, their extent, &c.; principally dwelling upon thoſe, which, in conſequence of their being of a more recent date, have been more circumſtantially deſcribed by eye-witneſſes, ſome of whom are ſtill living. We ſhall afterwards examine the hypotheſes that have been offered in explanation of the phenomena; and ſhall endeavour to place the philoſophical part of the ſubject under a conciſe and comprehenſive form.

Several ancient authors, as Seneca, Strabo, Calliſthenes, Pauſanias, Pliny, Thucydides, &c. mention a variety of ſtupendous effects produced by earthquakes, either preceding or during their life-time; ſuch as the ſeparation of mountains, the appearance and diſappearance of iſlands, the deſtruction of a great many cities, ſome of which were ſwallowed up, together with their inhabitants, ſo effectually as not to leave even a veſtige of their former exiſtence.

In the 17th year of the Chriſtian era, under the reign of the emperor Tiberius, twelve cities of Aſia Minor were deſtroyed in one night:—a dreadful diſaſter, the memory of which, or rather of the towns that were raiſed in lieu of thoſe that were deſtroyed, is atteſted by a medal, ſtill extant, of the above-mentioned emperor, on the legend of which we find, "Civitatibus Aſiæ Reſtitutis." (Strabo. lib. xii. Tacitus Ann. lib. ii.) Euſebius adds Epheſus alſo to the above-mentioned twelve cities, which raiſes their number to thirteen. A remarkable circumſtance attending the deſtruction of theſe towns is particularly noticed by Dr. Stukeley, as peculiarly favourable to his hypotheſis, of which we ſhall ſpeak hereafter. The circumſtance is, that theſe thirteen cities muſt have occupied a circuit of about 300 miles in diameter; and though the cities themſelves were completely deſtroyed, yet neither the mountains were reverſed, nor the ſprings and fountains broken, nor was the courſe of the rivers

rivers altered. In ſhort, there was no kind of alteration produced in the ſurface of the country, which indeed remains the ſame to this day.

In the 63d year of the Chriſtian era, another violent earthquake took place in the neighbourhood of the mount Veſuvius, which was attended with extenſive deſtruction. And about 16 years after this, various other earthquakes were felt near the ſame place, which preceded that famous eruption of Veſuvius, in which the elder Pliny loſt his life.

Under the reign of the emperor Gallienus, the greateſt part of the country which forms the preſent Italy was ſhaken by earthquakes during ſeveral days. They were preceded and accompanied by horrid ſounds beneath the ſurface of the earth, and with reports like thunder. Various fiſſures of the earth, which were repeatedly opened and cloſed in a great many places, ſwallowed up a vaſt number of human beings.

In the ſecond year of the reign of Valentinian and Valens, on the morning of the 21ſt of July, A. D. 365, (Gibbon ſays, from the account of Ammianus,) the greateſt part of the Roman world was ſhaken by a violent earthquake. The impreſſion was communicated to the waters. The ſhores of the Mediterranean were left dry, by the ſudden retreat of the ſea; great quantities of fiſh were caught with the hand, and large veſſels were ſtranded on the mud. But the tide ſoon returned, with the weight of an immenſe and irreſiſtible deluge, which was ſeverely felt on the coaſts of Sicily, of Dalmatia, of Greece, and of Egypt. Large boats were tranſported, and lodged on the roofs of houſes, or at the diſtance of two miles from the ſhore; the people, with their habitations, were ſwept away by the waters; and the city of Alexandria annually commemorated the fatal day, on which 50,000 perſons loſt their lives in the inundation.

In the ſixth century, during the reign of Juſtinian in the Eaſt, which laſted 38 years, earthquakes (as it appears from the hiſtories of Procopius, Agathias, John Malala, and Theophanes) were peculiarly frequent, and remarkably deſtructive. Gibbon, in his account of thoſe times, accompanies his conciſe narrative with ſeveral obſervations of a moral or philoſophical nature, which render the paſſage peculiarly intereſting. "Without," he ſays, "aſſigning the cauſe, hiſtory will diſtinguiſh the periods in which theſe calamitous events have been rare or frequent, and will obſerve, that this fever of the earth raged with uncommon violence during the reign of Juſtinian. Each year is marked by the repetition of earthquakes, of ſuch duration, that Conſtantinople has been ſhaken above forty days; of ſuch extent, that the ſhock has been communicated to the whole ſurface of the globe, or at leaſt of the Roman empire. An impulſive or vibratory motion was felt; enormous chaſms were opened; huge and heavy bodies were diſcharged into the air; the ſea alternately advanced and retreated beyond its ordinary bounds; and a mountain was torn from Libanus, and caſt into the waves, where it protected as a mole the new harbour of Botrys, in Phœnicia. Two hundred and fifty thouſand perſons are ſaid to have periſhed in the earthquake of Antioch, on the 20th of May, 526, whoſe domeſtic multitudes were ſwelled by the conflux of ſtrangers to the feſtival of the Aſcenſion. The loſs of Berytus, on the 9th of July, 551, was of ſmaller account, but of much greater value. That city, on the coaſt of Phœnicia, was illuſtrated by the ſtudy of the civil law, which opened the ſureſt road to wealth and dignity: the ſchools of Berytus were filled with the riſing ſpirits of the age; and many a youth was loſt in the earthquake, who might have lived to be the ſcourge or the guardian of his country. In theſe diſaſters, the architect becomes the enemy of mankind. The hut of a ſavage, or the tent of an Arab, may be thrown down without injury to the inhabitant; and the Peruvians had reaſon to deride the folly of their Spaniſh conquerors, who with ſo much coſt and labour erected their own ſepulchres. The rich marbles of a patrician are daſhed upon his own head; a whole people is buried under the ruins of public and private edifices; and the conflagration is kindled and propagated by the innumerable fires, which are neceſſary for the ſubſiſtence and manufactures of a great city. Inſtead of the mutual ſympathy, which might comfort and aſſiſt the diſtreſſed, they dreadfully experience the vices and paſſions which are releaſed from the fear of puniſhment: the tottering houſes are pillaged by intrepid avarice; revenge embraces the moment, and ſelects the victim; and the earth often ſwallows the aſſaſſin or the raviſher, in the conſummation of their crimes."

One of the moſt remarkable events in the hiſtory of earthquakes occurred in the year 1538, on the coaſt of Puzzuoli, (the ancient Puteoli,) in the kingdom of Naples, and is particularly recorded by many hiſtorians, ſome of whom were eye-witneſſes of the phenomenon. Simon Porzio, Capaccio, Da Toledo, Summonte, in his "Hiſtory of the Kingdom of Naples," and others, relate that from the year 1537, until the month of September, 1538, ſhocks of earthquake were frequently felt along the coaſt of Puzzuoli; but, during the 27th and the 28th of that month, the ſhocks became much more violent, and followed each other ſo cloſely, as hardly to admit an interval of a few minutes. The ſea retired ſeveral yards from the accuſtomed ſhore. But on the 29th of the above mentioned month, at about two hours after the ſetting of the ſun, a moſt tremendous ſhock took place, which at once annihilated the lake Lucrinus; a town, with its inhabitants, was ſwallowed up by the earth, which opened itſelf in various places, and emitted flames, with ſand and red-hot ſtones. That extent of ground, which lay between the Avernian lake and a hill called mount Barbaro, began to riſe, and, with the acceſſion of the ignited matter, formed, in a ſingle night, a new hill, which is actually exiſting under the name of Monte Nuovo; and its perpendicular height from the level of the ſea is, according to a late meaſurement, equal to 1127 Engliſh feet. The habitations of the neighbourhood were completely demoliſhed, ſo that, 24 hours after, no veſtige of their exiſtence could be perceived.

Meaco, in Japan, experienced a deſtructive earthquake in 1595. It was again deſtroyed by a like calamity, which continued three hours, in September, 1596; and it was alſo deſtroyed in 1738.

In the year 1638, a terrible earthquake happened in Calabria, the ſpot which ſeems to be particularly devoted to ſuch dreadful calamities; and is deſcribed in the following manner by Kircher, who was an eye witneſs of it. "On the 24th of March, he ſays, "we launched in a ſmall boat from the harbour of Meſſina, in Sicily, and arrived the ſame day at the promontory of Pelorus. Our deſtination was for the city of Euphemia, in Calabria, but on account of the weather, we were obliged to remain three days at Pelorus. At length, wearied with the delay, we reſolved to proſecute our voyage; and although the ſea ſeemed more than uſually agitated, yet we ventured forward. The gulf of Charybdis, which we approached, ſeemed whirled round in ſuch a manner as to form a vaſt hollow, verging to a point in the centre. Proceeding onward, and turning my eyes to mount Etna, I ſaw it caſt forth large volumes of ſmoke, of mountainous ſize, which entirely covered the iſland, and blotted out even the ſhores from my view. This, together with the dreadful noiſe, and the ſulphureous ſtench, which was ſtrongly perceived, filled me with apprehenſions that ſome more dreadful calamity was impending. The ſea itſelf ſeemed to wear a very unuſual appearance; thoſe who have ſeen a lake in a violent ſhower of rain all covered over with bubbles, will have ſome idea of its agitations. My ſurpriſe was ſtill increaſed by the calmneſs and ſerenity of the weather; not a breeze, not a cloud appeared, which might be ſuppoſed to put all nature thus into motion. I therefore warned my companion, that an earthquake was approaching; and, after ſome time, making for the ſhore with all poſſible diligence, we landed at Tropea. But we had ſcarce arrived at the Jeſuits' college in that city, when our ears were ſtunned with an horrid ſound, reſembling that of an infinite number of chariots driven fiercely forward, the wheels rattling and the thongs cracking. Soon after this, a moſt dreadful earthquake enſued; ſo that the whole track upon which we ſtood ſeemed to vibrate, as if we were in the ſcale of a balance that continued waving. This motion, however, ſoon grew more violent; and being no longer able to keep my legs, I was thrown proſtrate upon the ground. After ſome time, finding that I remained unhurt amidſt the general concuſſion, I reſolved to venture for ſafety, and running as faſt as I could, reached the ſhore. I did not ſearch long here before I found the boat from which I had landed, and my companion alſo. Leaving this ſeat of deſolation, we proſecuted our voyage along the coaſt; and the next day, came to Rochetta, where we landed, although the earth ſtill continued in violent agitations. But we were ſcarcely arrived at our inn, when we were once more obliged to return to our boat; and in about half an hour we ſaw the greateſt part of the town, and the inn at which we had ſet up, daſhed to the ground, and burying all its inhabitants beneath its ruins. Proceeding onward in our little veſſel, we at length landed at Lopizium, a caſtle midway between Tropea and Euphemia, the city to which we were bound. Here, wherever I turned my eyes, nothing but ſcenes of ruin and horror appeared; towns and caſtles levelled to the ground; ſtromboli, though at ſixty miles diſtance, belching forth flames in an unuſual manner, and with a noiſe which I could diſtinctly hear. But my attention was quickly turned from more remote to contiguous danger. The rumbling ſound of an approaching earthquake, which, by this time we were grown acquainted with, alarmed us for the conſequences. It ſeemed every moment to grow louder, and to come nearer. The place on which we ſtood now began to ſhake moſt dreadfully; ſo that, being unable to ſtand, my companion and I caught hold of whatever ſhrub grew neareſt to us, and ſupported ourſelves in that manner. After ſome time, the violent paroxyſm ceaſing, we again ſtood up, in order to proſecute our voyage to Euphemia, which lay within ſight. In the mean time, while we were preparing for this purpoſe, I turned my eyes towards the city; but could only ſee a frightful dark cloud, that ſeemed to reſt upon the place. This the more ſurpriſed us, as the weather was ſo very ſerene. We waited, therefore, till the cloud was paſſed away: then turning to look for the city, it was totally ſunk; and nothing but a diſmal and putrid lake was to be ſeen where it ſtood."

The iſland of Jamaica is ſo very ſubject to earthquakes, that, as Dr. Sloane relates, its inhabitants expect one at leaſt every year. Among theſe earthquakes, Dr. Sloane deſcribes one of ſo deſtructive a nature, as perhaps to equal the ſevereſt of ſuch calamities. This earthquake took place in the year 1692. In two minutes time the ſhock deſtroyed and drowned nine-tenths of the town of Port Royal, at that time the capital of the iſland. (Phil. Tranſ. n. 209.) The houſes ſunk 30 or 40 fathoms deep. The earth opening, ſwallowed up people; and they roſe in other ſtreets, ſome in the middle of the harbour; and yet many were ſaved, though there were 2000 people loſt, and 1000 acres of land ſunk. All the houſes were thrown down throughout the iſland. One Hopkins had his plantation removed half a mile from its place. Of all the wells, from one fathom to ſix or ſeven, the water flew out at top with a vehement motion. While the houſes on one ſide of the ſtreet were ſwallowed up, on the other they were thrown on heaps; and the ſand in the ſtreet roſe like waves in the ſea, lifting up every body that ſtood on it, and immediately dropping down into pits; and at the ſame inſtant a flood of water breaking in, rolled them over and over; ſome catching hold of beams, rafters, &c. Ships and ſloops in the harbour were overſet and loſt; the Swan frigate, particularly, was thrown over by the motion of the ſea, and the ſinking of the wharf, and was driven over the tops of many houſes. It was attended with a hollow rumbling noiſe, like that of thunder. In leſs than a minute, three quarters of the houſes, and the ground they ſtood on, with the inhabitants, were all ſunk quite under water; and the little part left behind was no better than a heap of rubbiſh. The ſhake was ſo violent, that it threw people down on their knees or their faces as they were running about for ſhelter. The ground heaved and ſwelled like a rolling ſea; and ſeveral houſes, ſtill ſtanding, were ſhuffled and moved ſome yards out of their places. A whole ſtreet is ſaid to be twice as broad now as before; and in many places, the earth would crack, and open and ſhut, quick and faſt: of which openings, two or three hundred might be ſeen at a time; in ſome whereof, the people were ſwallowed up; others, the earth cloſing, were caught by the middle, and preſſed to death; as to others, the heads only appeared. The larger openings ſwallowed up houſes; and out of ſome would iſſue whole rivers of water, ſpouted up a great height into the air, and threatening a deluge to that part the earthquake ſpared. The whole was attended with ſtenches and offenſive ſmells, the noiſe of falling mountains at a diſtance, &c. and the ſky in a minute's time was turned dull and reddiſh like a glowing oven. Yet, as great a ſufferer as Port Royal was, more houſes were left ſtanding therein than on the whole iſland beſide. Scarce a planting-houſe or ſugar-work was left ſtanding in all Jamaica. A great part of them was ſwallowed up, houſes, people, trees, and all at once; in lieu of which, afterwards, appeared great pools of water, which, when dried up, left nothing but ſand, without any mark that ever tree or plant had been thereon. Above twelve miles from the ſea, the earth gaped, and ſpouted out with a prodigious force vaſt quantities of water into the air; yet the greateſt violences were among the mountains and rocks; and it is a general opinion, that the nearer the mountains the greater was the ſhake, and that the cauſe thereof lay there. Moſt of the rivers were ſtopped up for 24 hours, by the falling of the mountains, till ſwelling up, they made themſelves new tracts and channels, tearing up in their paſſage trees, &c. After the great ſhake, many of thoſe people who eſcaped got on board ſhips in the harbour, where many continued above two months; the ſhakes all that time being ſo violent, and coming ſo thick, ſometimes two or three in an hour, accompanied with frightful noiſes, like a ruſtling wind, or a hollow rumbling thunder, with brimſtone blaſts, that they durſt not come aſhore. The conſequence of the earthquake was a general ſickneſs, from the noiſome vapours belched forth, which ſwept away above 3000 perſons of thoſe who were left.

In the year 1693, the iſland of Sicily experienced a moſt tremendous earthquake, whoſe ſhocks were ſeverely felt as far as Naples on one ſide, and Malta on the other. The deſtruction occaſioned by this earthquake was immenſe; fifty four cities and towns, together with an immenſe number of villages, were either totally deſtroyed or in great meaſure damaged: and among them was counted the famous Catania, once the reſidence of monarchs, and adorned by elegant buildings, a univerſity, &c. Father Serrovita, who was riding in ſight of it, obſerved from the diſtance of a few miles, that a denſe black cloud hung over that city. Ætna at the ſame time iſſued vaſt volumes of flame; the ſea was wonderfully agitated, and a roaring noiſe proceeded from it; the birds were terrified, the animals in the fields roared and trembled; the ground ſhook violently; all ſeemed to threaten deſtruction. In the middle of this horrid ſcene, an exploſion, with a ſhock of enormous magnitude took place, which levelled Catania with the ground, and a cloud of duſt, which roſe in the air, indicated the fatal ſpot. Out of 18,900 inhabitants of that once famous city, 900 are ſaid to have ſurvived that lamentable event. But Sicily and the kingdom of Naples have experienced ſo many earthquakes, that their dates alone would form a conſiderable liſt. Among theſe, the earthquakes of the year 1783 are remarkable, not only for their duration, and for the variety of their deſtructive effects, but likewiſe for their having been carefully examined and particularly deſcribed by competent obſervers. Of thoſe, however, we ſhall ſpeak hereafter.

In the years 1737 and 1738, violent earthquakes happened at Kamtſchatka, which ruined the habitations of the natives. And about the ſame time, the volcanoes of the neighbourhood made formidable eruptions; for that country abounds in volcanoes, ſome of which are extinct, whilſt others are ſtill burning. Pekin ſuffered a terrible earthquake in the year 1739.

In South America, and eſpecially in the vicinity of volcanoes, the earthquakes are frequent and generally violent. In 1746 Callao and Lima were almoſt totally deſtroyed. But the laſt mentioned town is ſo very ſubject to earthquakes, that ſince the eſtabliſhment of the Spaniards in that country, various ſuch diſaſters have taken place. In 1746 at Quito, in Peru, not leſs than 200 ſhocks of earthquake were counted in 24 hours; and within about one year 451 ſuch ſhocks were felt. In July 1773 San Jago of Guatimala was ſo effectually deſtroyed by a terrible earthquake, that not a ſingle building was left ſtanding in it.

Great Britain, and France, though upon the whole no very great ſufferers, have not, however, been exempt from earthquakes. In France, indeed, the various extinct volcanoes it contains indicate, that in a remote period that country muſt have frequently experienced ſuch calamities; and, in fact, ſeveral occurrences of the kind are actually recorded.

The laſt ſhocks of earthquake felt in London took place on the 8th of February, and on the 8th of March, 1749. But they only affrighted the inhabitants. In the year following, on the 30th of September, an earthquake affected various parts of England. The centre of the ſhock ſeems to have been about Daventry, in Northamptonſhire. A few other ſlight ſhocks have alſo been felt in various parts of England and Wales ſince that time.

Mr. Henry, in the Phil. Tranſ. for 1778, deſcribes the earthquake which was felt at Mancheſter in 1777. It extended 140 miles; the bells tolled twice: it was obſerved that moſt noiſe was heard in the neighbourhood of conductors of electricity; and ſome ſhocks were felt.

The year 1755 was rendered memorable by the dreadful earthquake of Liſbon, the effects of which were more or leſs ſeverely felt by almoſt the whole of Europe. Of this alſo we ſhall take particular notice hereafter.

In 1759, during the months of October and November, ſeveral violent earthquakes happened in Syria. Damaſcus, and another large city of Syria, were entirely demoliſhed; and it was reckoned that 6000 human beings in the former, and nearly all the inhabitants of the latter, were buried under the ruins. Tripoli of Syria, together with ſeveral other towns, villages, &c. alſo ſuffered conſiderably at the ſame time.

During the year 1767, frequent earthquakes were felt in Germany, in Switzerland, and other circumjacent places. In 1769, Bagdad was almoſt totally deſtroyed by an earthquake. In June, 1770, the iſland of St. Domingo ſuffered a tremendous earthquake, which was attended with the opening of a volcano. In September, 1774, at Altdorf, in Switzerland, a great number of edifices were deſtroyed by ſeveral ſtrong ſhocks of earthquake. In 1775, Ternate, among the Molucca iſlands, and Iceland, ſuffered violent earthquakes, which were accompanied with eruptions of their volcanoes. In 1778, Manheim, and Smyrna, the former in April, and the latter in July, ſuffered greatly in conſequence of earthquakes. In ſhort, there is no part of the habitable world, which is not more or leſs ſubject to the deſtructive action of earthquakes. Nor are the iſlands more exempt from ſuch diſaſters. On the contrary, it appears, upon the whole, that earthquakes are more frequent and more deſtructive among them than upon continents. In fact, the Caribbee iſlands, the Azores, the Moluccas, the Philippine iſlands, &c. are peculiarly ſubject to earthquakes.

A full hiſtory of earthquakes, as far as may be collected from the annals of the various countries of the earth, would prove a diſguſting monotony, alike deſtitute of amuſement and of inſtruction; unleſs, indeed, every particular account contained an accurate deſcription of ſome ſingular phenomenon, which might be likely to throw light upon a ſubject which is equally obſcure and important. But the accounts of ſuch events, eſpecially during a remote period, are moſtly contaminated by exaggerations and uncertainties, ſo that they can afford but little aſſiſtance to the mind of a ſpeculative philoſopher. The foregoing accounts have been ſelected as the moſt ſtriking inſtances of the kind, and as being ſufficient to convey an adequate idea of the force, the extent, the variety, and the duration of earthquakes. But we have reſerved the account of two remarkable caſes for our particular examination, *viz.* the earthquake of Liſbon in 1755, and thoſe of Calabria in 1783. The wonderful effects produced by theſe earthquakes are, perhaps, not exceeded by thoſe of any other convulſion of the kind. They were alſo particularly noticed by a variety of intelligent and creditable perſons, who have recorded, with ſufficient concurrence of teſtimony, all the principal phenomena that preceded, accompanied, and followed them, ſo as to afford ample ſcope for conjecture and for hypotheſes, reſpecting the origin, the nature, and the probable method of averting, ſo great a ſcourge of the human ſpecies.

The great earthquake of Liſbon, the capital of Portugal, took place on the 1ſt of November, 1755, but its effects were felt at an immenſe diſtance from Liſbon. Previous to it ſeveral peculiarities of the weather were remarked, which are as follows. In the year 1750 Liſbon experienced a ſlight, but ſenſible tremor of the earth, and ſimilar very ſlight tremors were frequently perceived in the courſe of the four following years, which proved ſo very dry, that ſeveral ſprings and fountains, uſually abundant, failed entirely. The wind moſtly blew from the north, or the north-eaſt. The next year, *viz.* the year 1755, was very wet and rainy;

the ſummer was unuſually cool; and during the 40 days which immediately preceded the earthquake, the weather was clear, but not remarkably ſo. On the day immediately preceding that of the earthquake, a remarkable gloomineſs prevailed in the atmoſphere, and the ſun was obſcured. At laſt, on the morning of the fatal day, November the 1ſt, a thick fog aroſe early in the morning, but this was ſoon diſſipated by the heat of the ſun. There was no wind, nor the leaſt agitation of the ſea; the weather was remarkably warm. In the midſt of this univerſal ſtillneſs, at 35 minutes after nine in the morning, a ſubterranean rumbling noiſe was heard, and ſoon after a tremendous earthquake ſhook the whole city, throwing ſeveral of its buildings to the ground. The ſhocks were at firſt ſhort and quick; but they ſoon changed into another kind of vibration, which toſſed the houſes from ſide to ſide with ſo much violence, as to deſtroy by far the greateſt part of the city, killing, at the ſame time, a multitude of its inhabitants. The whole deſtructive ſcene laſted about ſix minutes, and not leſs than 60,000 perſons are ſaid to have periſhed in it. The effects in the river Tagus were equally remarkable. At the commencement of the earthquake, thoſe who were in boats at about a mile from the city perceived a noiſe, as if their boats were running aground, though they were in deep water, and at the ſame time they ſaw the houſes fall on both ſides of the river. The veſſels of all ſizes were driven from their moorings, and were violently toſſed about, repeatedly appearing to ſtrike, or actually ſtriking the ground; for in many places the bed of the river roſe above its ſurface. It is remarkable that a new quay, with ſeveral hundreds of perſons upon it, ſunk to an unfathomable depth, and not one of the dead bodies ever floated to the ſurface. At firſt, the bar was laid dry from ſhore to ſhore; but ſoon after the ſea rolling in like a mountain, inſtantly roſe to the height of about 50 feet near Belem caſtle. Another ſhock happened at about noon of the ſame day, and during this the walls of the few houſes that remained ſtanding were ſeen to open, about a foot from top to bottom, and then to cloſe again, without hardly leaving a mark of the fiſſure. Such were the diſaſters of Liſbon on that memorable day; we ſhall now gradually proceed to ſtate the effects of the ſame earthquake at other places.

At Colares, about 20 miles from Liſbon, and two miles from the ſea, on the laſt day of October, the weather was clear, and uncommonly warm. About four o'clock in the afternoon there aroſe a fog, unuſual at that time of the year, which came from the ſea, and ſpread itſelf over the vallies. Soon after the wind changing to the eaſt, the fog returned to the ſea, collecting itſelf and becoming very thick. As the fog retired, the ſea roſe with a prodigious roaring. The 1ſt of November the day broke with a ſerene ſky, the wind continued at eaſt; but about nine o'clock the ſun began to grow dim, and about half an hour after was heard a rumbling noiſe, like that of chariots, which increaſed to ſuch a degree, that it became equal to the exploſion of the largeſt cannon. Immediately a ſhock of an earthquake was felt, which was quickly ſucceeded by a ſecond, and a third; and at the ſame time ſeveral light flames of fire iſſued from the mountains, reſembling the kindling of charcoal. In theſe three ſhocks the walls of the buildings moved from eaſt to weſt. In another ſituation, from whence the ſea coaſt could be diſcovered, there iſſued from one of the hills, called the Fojo, a great quantity of ſmoke, very thick, but not very black. This ſtill increaſed with the fourth ſhock, and afterwards continued to iſſue in a greater or leſs degree. Juſt as the ſubterraneous rumblings were heard, the ſmoke was obſerved to burſt forth at the Fojo; and the quantity of ſmoke was always proportioned to the noiſe. On viſiting the place from whence the ſmoke was ſeen to ariſe, no ſigns of fire could be perceived near it.

At Oporto, near the mouth of the river Douro, the earthquake began about 40 minutes paſt nine. The ſky was very ſerene, when a dreadful hollow noiſe, like thunder, or the rattling of coaches at a diſtance, was heard, and almoſt at the ſame inſtant the earth began to ſhake. In about a minute or two the river roſe and fell five or ſix feet, and continued to do ſo for four hours. It ran up at firſt with ſo much violence, that it broke a ſhip's hawſer. In ſome parts the river opened, and ſeemed to diſcharge vaſt quantities of air; and the agitation in the ſea was ſo great about a league beyond the bar, that air was ſuppoſed to have been diſcharged there alſo.

St. Ubes, a ſea port town about 20 miles ſouth of Liſbon, was entirely ſwallowed up by the repeated ſhocks and the vaſt ſurf of the ſea. Huge pieces of rock were detached at the ſame time from the promontory at the weſt end of the town, which conſiſts of a chain of mountains containing fine jaſper of different colours.

The ſame earthquake was felt all over Spain, except in Catalonia, Arragon, and Valencia. At Ayamonte, near where the Guadiana falls into the bay of Cadiz, a little before ten o'clock on the 1ſt of November, the earthquake was felt, having been immediately preceded by a hollow ruſhing noiſe. Here the ſhocks continued for fourteen or fifteen minutes, damaged almoſt all the buildings, throwing down ſome, and leaving others irreparably ſhattered. In little more than half an hour after, the ſea and river, with all the canals, overflowed their banks with great violence, laying under water all the coaſts of the iſlands adjacent to the city and its neighbourhood, and flowing into the very ſtreets. The water came on in vaſt black mountains, white with foam at the top, and demoliſhed more than one half of a tower at the bar named De Canala. In the adjacent ſtrands every thing was irrecoverably loſt; for all that was overflowed ſunk, and the beach became a ſea, without the leaſt reſemblance of what it was before. Many perſons periſhed; for although they got aboard ſome veſſels, yet part of theſe foundered; and others being forced out to ſea, the unhappy paſſengers were ſo terrified, that they threw themſelves overboard. The day was ſerene, and not a breath of wind ſtirring.

At Cadiz, ſome minutes after nine in the morning, the earthquake began, and laſted about five minutes. The water of the ciſterns under ground waſhed backwards and forwards, ſo that a great froth aroſe. At ten minutes after eleven a wave was ſeen coming from the ſea, at eight miles diſtance, at leaſt 60 feet higher than uſual. It daſhed againſt the weſt part of the town, which is very rocky. Though theſe rocks broke a good deal of its force, it came at laſt upon the city walls, beat in the breaſt work, and carried pieces of the building, of eight or ten ton weight, to the diſtance of 40 or 50 yards. When the wave was gone, ſome parts that are deep at low water were left quite dry; for the water returned with the ſame violence with which it came. At half an hour after eleven came a ſecond wave, and after that four other remarkable ones; the firſt at ten minutes before twelve; the ſecond half an hour before one; the third ten minutes after one; and the fourth ten minutes before two. Similar waves, but ſmaller, and gradually leſſening, continued with uncertain intervals till the evening.

At Gibraltar, the earthquake was not felt till after ten. It began with a tremulous motion of the earth, which laſted about half a minute. Then followed a violent ſhock; after that, a trembling of the earth for five or ſix ſeconds; then another ſhock, not ſo violent as the firſt, which went off gradually as it began. The whole laſted about two minutes. Some of the guns on the battery were ſeen to riſe, others to ſink, the earth having an undulating motion. Moſt people were ſeized with giddineſs and ſickneſs, and ſome fell down; others were ſtupefied, and many that were walking or riding, felt no motion in the earth, but turned ſick. The ſea roſe ſix feet every fifteen minutes; and then fell ſo low, that boats and all the ſmall craft near the ſhore were left aground, as were alſo numbers of ſmall fiſh. The flux and reflux laſted till next morning, having decreaſed gradually from two in the afternoon.

At Madrid the earthquake came on at the ſame time as at Gibraltar, and laſted about ſix minutes. At firſt every body thought they were ſeized with a ſwimming in their heads; and afterwards, that the houſes were falling. It was not felt in coaches, nor by thoſe who walked on foot, except very ſlightly; and no accident happened, except that two lads were killed by the fall of a ſtone-croſs from the porch of a church.

Malaga felt a violent ſhock; the bells rung in the ſteeples, the water of a well overflowed, and as ſuddenly retired.

Saint Lucar, at the mouth of the Guadalquivir, was violently ſhocked, and the ſea broke in and did a great deal of miſchief.

At Seville ſeveral houſes were ſhaken down; the famous tower of the cathedral, called "La Giralda," opened in the four ſides; and the waters were ſo violently agitated, that all the veſſels in the river were driven aſhore.

In Africa, the earthquake was felt almoſt as ſeverely as it had been in Europe. Great part of the town of Algiers was deſtroyed. At Arzilla, in the kingdom of Fez, about ten in the morning, the ſea ſuddenly roſe with ſuch impetuoſity, that it lifted up a veſſel in the bay, and dropped it with ſuch force on the land, that it was broken to pieces; and a boat was found two muſket-ſhot within land from the ſea. At Fez and Mequinez, a great many houſes fell, and a multitude of people were buried in the ruins.

At Morocco, many people loſt their lives by the falling down of a great number of houſes: and about eight leagues from the city, the earth opened and ſwallowed up a village with all the inhabitants, who were known by the name of the "Sons of Beſumba," to the number of about 8000 or 10,000 perſons, together with all their cattle, &c. and ſoon after, the earth cloſed again in the ſame manner as before.

At Salle, a great deal of damage was done. Near a third part of the houſes was overthrown; the waters ruſhed into the city with great rapidity, and left behind them great quantities of fiſh.

At Tangier, the earthquake began at ten in the morning, and laſted 10 or 12 minutes. The ſea came up to the walls, which was not known to have ever happened before; and went down immediately with the ſame rapidity with which it aroſe, leaving a great quantity of fiſh behind it. Theſe commotions were repeated 18 times, and laſted till ſix in the evening.

At Tetuan, the earthquake began at the ſame time it did at Tangier, but laſted only ſeven or eight minutes. There were three ſhocks, ſo extremely violent, that it was feared the whole city would be deſtroyed.

In the city of Funchal, in the iſland of Madeira, a ſhock of the earthquake was firſt perceived at 38 minutes paſt nine in the morning. It was preceded by a rumbling noiſe in the air, like that of empty carriages paſſing haſtily over a ſtone pavement. The obſerver felt the floor immediately to move with a tremulous motion, vibrating very quickly. The ſhock continued more than a minute; during which time the vibrations, though continual, were weakened and increaſed in force twice very ſenſibly. The increaſe, after the firſt remiſſion of the ſhock, was the moſt intenſe. The noiſe in the air accompanied the ſhock during the whole of its continuance, and laſted ſome ſeconds after the motion of the earth had ceaſed; dying away like a peal of diſtant thunder rolling through the air. At three quarters paſt eleven, the ſea, which was quite calm, (it being a fine day, and no wind ſtirring,) retired ſuddenly ſome paces; then riſing with a great ſwell without the leaſt noiſe, and as ſuddenly advancing, overflowed the ſhore, and entered the city. It roſe 15 feet perpendicular above the high-water mark, although the tide, which flows there ſeven feet, was then at half ebb.

The water immediately receded, and after having fluctuated four or five times between high and low water mark, it ſubſided, and the ſea remained calm as before. In the northern part of the iſland the inundation was more violent, the ſea there retiring above 100 paces at firſt, and, ſuddenly returning, overflowed the ſhore, forcing open doors, breaking down the walls of ſeveral magazines and ſtore-houſes, leaving great quantities of fiſh aſhore, and in the ſtreets of the village of Machico. All this was the effect of one riſing of the ſea, for it never afterwards flowed high enough to reach the high-water mark. It continued, however, to fluctuate here much longer before it ſubſided than at Funchal; and in ſome places farther to the weſtward, it was hardly, if at all, perceptible.

The ſhocks of this earthquake were alſo felt in a great many other places, much more diſtant from Portugal, but in general very ſlightly. They were felt in ſeveral provinces of Sweden, in Italy, and eſpecially at Milan; in England at Earſy Court, Berks; at Eyam-bridge, Derbyſhire, where the ſhocks were pretty ſmart; in France, as at Bayonne, Bourdeaux, and Lyons, &c. But the effects of this earthquake in diſtant places, were obſerved to affect the waters of ſeas, lakes, rivers, ſprings, wells, &c. in a moſt extraordinary manner; and ſuch phenomena took place principally in Norway, Sweden, Germany, Holland, Corſica, Switzerland, Antigua, Barbadoes, Great Britain, Ireland, &c.

In ſome of thoſe places the waters turned muddy, and were ſtrangely agitated, in others they overflowed the banks with violence and then retired; unuſual tides came on at different places, a bubbling hiſſing or roaring was perceived in ſome lakes, and ſo forth; but we muſt be more particular in deſcribing ſome of thoſe effects, which were obſerved in England, Scotland, and Ireland.

At Barlborough in Derbyſhire, between 11 and 12 in the morning, a ſurpriſing and frightful noiſe was heard near a large body of water called "Pibley Dam," a large ſwell of water came in a current from the ſouth, and roſe two feet on the north ſide of the lake. It then ſubſided, returned again, and ſo on, gradually decreaſing in its motion until it ceaſed entirely. A ſimilar noiſe, with agitation, and overflowing of the water of a canal, was obſerved at about half an hour after ten in the morning, at Buſbridge in Surrey; a ſimilar agitation was obſerved in a pond at Cobham in Surrey. At Dunſtall in Suffolk, the water of a pond roſe gradually for ſeveral minutes in the form of a pyramid, and fell down like a water-ſpout. Other ponds in the neighbourhood had a ſmooth flux and reflux from one end to the other. Near Durham, about half an hour after ten, a ruſhing noiſe was heard to iſſue from a pond, and its water was ſeen to riſe and to deſcend alternately, without any fluctuating motion, and continued this riſing and falling during ſix or ſeven minutes, making four or five ſuch vibrations in a minute. At Earſy Court, Berks, about 11 o'clock, after a violent trembling of the earth, a motion of the water of a fiſh-pond was obſerved from the ſouth to the north end of the pond, leaving the bottom at the ſouth end altogether dry for about ſix feet. It then returned, and flowed at the ſouth end, riſing three feet up the ſlope bank; and immediately after returned to the north bank, riſing there alſo about three feet. In the time between the flux and reflux, the water ſwelled up in the middle of the pond, collected in a ridge about 20 inches higher than the level on each ſide, and boiled like a pot. This agitation from ſouth to north laſted about four minutes. At Eaton bridge, Kent, the water of a pond was ſeen to open in the middle, ſo that a poſt could be ſeen a good way down, almoſt to the bottom. The water in the mean time daſhed over a bank two feet high, and perpendicular to the pond. This was repeated ſeveral times with a great noiſe. At Shireburn caſtle, Oxfordſhire, at a little after ten in the morning, a ſtrange motion was obſerved in the water of a moat which ſurrounds the houſe. Though there was not the leaſt wind, the water was obſerved to flow at one corner, and to retire again ſucceſſively and regularly. Every flood began gently; its velocity increaſed by degrees, and at laſt it ruſhed in with great impetuoſity, till it had attained its full height. After a little time it ebbed in a ſimilar manner, &c. At every flux, the whole body of water ſeemed to be violently thrown againſt the bank, but neither during the time of the flux nor that of the reflux, did there appear the leaſt wringle of a wave on the other parts of the moat.

The like movement was obſerved at the oppoſite corner of the moat; but it was remarked with ſurpriſe, that the water flowed at both corners, which ſtood diagonally oppoſite to each other, at the ſame time, and alſo ebbed at the ſame time in both places.

At White Rock, Glamorganſhire, at about two hours ebb of the tide, and near three quarters after ſix in the evening, a vaſt quantity of water ruſhed up with a prodigious noiſe; floated two large veſſels, broke their moorings, drove them acroſs the river, and had like to have overſet them.

The whole riſe and fall of this extraordinary body of water did not laſt above 10 minutes, nor was it felt in any other part of the river, ſo that it ſeemed to have guſhed out of the earth at that place.

At Loch Lomond in Scotland, at about half an hour after nine in the morning, the water, without the leaſt apparent cauſe, roſe againſt its banks with great rapidity, then ſubſided far below the uſual level. It roſe again, and ſo forth.

The greateſt perpendicular height of this ſwell was two feet, and four inches. A remarkable phenomenon attended the earthquake in this lake, which was, that a large ſtone, lying at ſome diſtance from ſhore, but in ſuch ſhallow water that it could eaſily be ſeen, was forced out of its place in the lake upon dry land, leaving a deep furrow in the ground, all along the way in which it had moved. At Loch Neſs, at about half an hour after nine, a great agitation was obſerved in the water of the river Oich.

At Kinſale, in Ireland, between two and three in the afternoon, the weather being calm, and the tide near full, a large body of water ſuddenly ruſhed into the harbour with ſuch rapidity, that it broke the cables of two ſloops, and it whirled round ſeveral veſſels. At one place it overflowed, and poured into the market place. It then ſubſided, and again roſe, continuing this motion for about 10 minutes. But between ſix and ſeven in the evening, the water roſe again, though not with ſo great violence as before, and it continued to ebb and flow alternately till three in the morning.

At ſea, the ſhocks of this earthquake were felt moſt violently. Off St. Lucar, the captain of the Nancy frigate felt his ſhip ſo violently ſhaken, that he thought he had ſtruck the ground; but on heaving the lead, found he was in a great depth of water. Captain Clark from Denia, in N. lat. 36° 24′, between nine and ten in the morning, had his ſhip ſhaken and ſtrained as if ſhe had ſtruck upon a rock, ſo that the ſeams of the deck opened, and the compaſs was overturned in the binacle. The maſter of a veſſel, bound to the American iſlands, being in N. lat. 25°. W. long. 40°, and writing in his cabin, heard a violent noiſe, as he imagined, in the ſteerage, and while he was aſking the cauſe of it, the ſhip was put into a ſtrange agitation, and ſeemed as if ſhe had been ſuddenly jerked up and ſuſpended by a rope faſtened to the maſt-head. He immediately ſtarted up with great terror and aſtoniſhment; and looking out at the cabin-window, ſaw land, as he took it to be, at the diſtance of about a mile. But coming upon the deck the land was no more to be ſeen, but he perceived a violent current croſs the ſhip's way to the leeward. In about a minute, this current returned with great impetuoſity, and at a league's diſtance he ſaw three craggy pointed rocks throwing up water of various colours reſembling fire. This phenomenon, in about two minutes, ended in a black cloud, which aſcended very heavily. After it had riſen above the horizon, no rocks were to be ſeen; though the cloud, ſtill aſcending, was long viſible, the weather being extremely clear. Between nine and ten in the morning, another ſhip, 40 leagues weſt of St. Vincent, was ſo ſtrongly agitated, that the anchors, which were laſhed, bounced up, and the men were thrown a foot and a half perpendicularly up from the deck. Immediately after this, the ſhip ſunk in the water as low as the main chains. The lead ſhewed a great depth of water, and the line was tinged of a yellow colour, and ſmelled of ſulphur. The ſhock laſted about ten minutes, but ſmaller ones were felt during about 24 hours after the firſt.

Thus we have ſtated the moſt material particulars which were obſerved on the firſt of November 1755, during an earthquake remarkable for its deſtructive effects, for its extent, and for the ſingularity of the phenomena with which it was accompanied. Many other particulars might have been added which were obſerved in ſome of the above-mentioned places as well as in others; but we have thought proper to omit them, conſidering that they are neither of much conſequence, nor eſſentially different from ſome of thoſe which have been already mentioned. See Phil. Tranſ. vol. xlvi. and xlix.

The earthquakes of Calabria are of a more recent date, but of a duration vaſtly greater than the preceding. In fact, it was a repetition of ſhocks more or leſs violent and deſtructive, which continued to afflict that country from the beginning of the year 1783 to the end of the year 1786. The moſt violent ſhocks, however, and the greateſt deſtruction, took place during February and March of the firſt of thoſe years. The moſt authentic account of theſe earthquakes was written by the chevalier Vivenzio, phyſician to their Sicilian majeſties. This intelligent gentleman publiſhed his firſt account in the year 1783, immediately after the moſt deſtructive ſhocks; and his documents were derived from the accounts which were regularly tranſmitted to the court of Naples, from the various parts of Calabria and Sicily, which places were the actual ſufferers of the misfortunes. But in the year 1788, when the ſhocks had entirely ceaſed, and when the former accounts had received due corrections and enlargements, the ſame gentleman publiſhed a ſecond edition, much amended and improved, with the addition of elegant plates. The title of the book is "Iſtoria de Tremuoti Avvenuti nella provincia della Calabria Ulteriore, e nella Città di Meſſina, nell' anno 1783, &c. Di Giovanni Vivenzio, Cavaliere," &c. Amongſt other improvements,

provements, this ſecond edition contains a moſt ſingular and accurate journal of the earthquakes, kept by a learned phyſician of Monteleone, in Calabria, named Dr. Domenico Pignataro, who reſided upon that devoted ſpot all the time. This journal expreſſes the time, the ſtrength, the direction, and the effects of each ſhock, and is accompanied with an accurate ſtatement of the concomitant phenomena of the atmoſphere, ſuch as the ſtrength and direction of the wind, rain, temperature, &c.

Beſides the above, ſeveral other partial accounts were alſo publiſhed about that time; and ſir William Hamilton, then Engliſh miniſter at the court of Naples, alſo tranſmitted his accounts, which contain ſeveral curious obſervations. From all theſe documents we have extracted the following account, which, conſidering the variety and the importance of the facts, we have endeavoured to render as conciſe as it was in our power.

The ſouthern part of the kingdom of Naples conſiſts of two provinces of the ſame name, *viz.* the Hither Calabria, and the Further Calabria, or Calabria Citra, and Calabria Ultra, the latter of which is ſeparated from the iſland of Sicily by the channel or faro of Meſſina. This province extends from latitude 37° 45′ to 39° 12′ N., it is ſeparated from the other Calabria principally by the mountans called Sile, and by the mountains of Nicaſtro; and is itſelf divided nearly from north to ſouth by a ridge of mountains called the Appennines, among which there are Monte Dijo, Monte Sacro, and Monte Caulone, extending weſtward to the Tyrrhene ſea. It was in the vicinity of theſe mountains that the earthquake in general exerted its greateſt force. Catanzaro is the principal city or capital of the province.

With reſpect to weather, temperature, &c. of the year 1782, preceding that of the earthquake, it was obſerved in that province, that the ſummer proved remarkably hot and dry, the autumn was peculiarly rainy and cold; but the beginning of the winter was rather mild. The winds moſtly predominant were, the S.E., the S., and the S.W. On the 28th of October a violent hurricane aroſe, and blew along the coaſt of Catanzaro, the heights of Tiriolo, and as far as the plains of Criſalco, rooting up trees, cutting and deſtroying whatever happened to be in its way. The violent rains of October and November filled the ciſterns, wells, ponds, and rivers, to an unuſual degree, which occaſioned a great deal of damage throughout the province, and on the 10th of December upwards of a hundred perſons loſt their lives in conſequence of the violent overflow of a torrent.

In the courſe of the night of the 1ſt of January, 1783, a ſlight ſhock of an earthquake was felt; and it was ſaid by ſome, that two other ſlight ſhocks were alſo felt during two other nights of the ſame month. This, however, is uncertain. During the firſt two days of February, the weather was either clear, though not perfectly ſo, or covered with broken clouds: the wind blew either from the ſouth-eaſt, or from the weſt. The ſun appeared ſomewhat inflamed. The morning of the 5th commenced with nearly the ſame appearances, but a hazineſs came on gradually. On the ſhores of Bovino and Pizzo the fiſhermen were obliged to relinquiſh their occupations, and to land, for though there was no wind, yet the ſea at ſome diſtance appeared to be in an extraordinary ſtate of ferment and ebullition. On the eaſtern coaſt, near cape Rizzuto, the ſea being unuſually agitated, overflowed the ſhores, and at that time ſome aſſert that they felt a ſlight tremor of the earth. From about ten until very near twelve o'clock at noon, ſome rain fell in different parts of the province; but at Monteleone it rained abundantly. The wind was S.S E. In this ſtate of the atmoſphere, at about a quarter before one in the afternoon, a rumbling ſubterranean noiſe, like a ſucceſſion of thunders was in about two ſeconds ſucceeded by a dreadful earthquake. At firſt the ſoil began to ſhake gently, but the vibrations ſoon became violent in the direction of S.S.W. and N.N.E. ſome of them, however, were extremely ſtrong and irregular, then they decreaſed nearly in the ſame manner as they had commenced, and the whole laſted about two minutes. The water of the ſea was inſtantly put in agitation; at firſt it retired from the ſhore, and it flowed ſoon after, and this was repeated three times ſucceſſively. This earthquake ſhook, fractured, or entirely demoliſhed, ſeveral buildings on the northern part of the iſland of Sicily, as well as all over the province of Calabria. The ground was thrown up or ſunk in ſeveral places, changing the face of the country, and interrupting the courſe of rivers, the overflowing of which occaſioned incredible damage. At the ſame time the fires, which were naturally kindled among the houſes and villages that were deſtroyed, contributed to the diſtreſs of the natives. Some of theſe fires continued to burn two or three days, and even longer. The inhabitants of Monteleone ſaw a denſe fog riſe from the ſea, and thoſe who happened to be involved in it, perceived a diſagreeable ſtrong ſmell, as if it came from the rubbiſh of the buildings that were deſtroyed. Water was ſeen to ſpring out of the ground in a great many places, and theſe, as well as the waters of rivers, &c. became muddy, and moſtly emitted a ſulphureous or phoſphoric ſmell. Large fiſſures were found open in the ground, and in other places the ground was elevated much above its uſual level; and thus the moſt delicious plantations, gardens, paſture lands, &c. inſtantly became a frightful deſert.

The greateſt force of the earthquake ſeems to have been exerted in the very centre of the province, *viz.* in the vicinity, or on the weſtern ſide of Aſpromonte, Monte Sacro, and Monte Caulone. And from that place the greateſt force ſeems to have proceeded in the direction of W.S.W.

The ſpace which came within the action of this earthquake was reckoned to meaſure 40 miles by 30; for whatever was comprehended within it, was altered and deſtroyed in a dreadful manner. At Meſſina, in Sicily, the houſes on or near the level of the ſea ſuffered moſt. The Lipari iſlands likewiſe ſuffered their ſhare of the diſaſters. The utmoſt boundaries at which the ſhock was felt, ſeemed to be Otranto in the kingdom of Naples, and Palermo in Sicily. A vaſt number of people periſhed under the ruins of their habitations, many were left lame and helpleſs, and thoſe who ſurvived were ſo terrified as hardly to know what to do. Beſides the above great convulſion, four more ſuch dreadful commotions took place, of which we ſhall ſpeak preſently; but in the courſe of the ſame day, the memorable 5th of February 1783, and within four hours of the great commotion, not leſs than 14 other ſhocks were felt, but their force and duration was not to be compared to the great one. Indeed, during the whole year 1783, from February forward, very few days paſſed without one or two or more of thoſe ſhocks of various ſtrength and duration, taking place. They became gradually leſs frequent in the following years, 1784, 1785, and 1786, with which the journal terminates.

We muſt now reſume the account of the four other extraordinary commotions which followed that of the 5th of February. The next, or ſecond great earthquake, took place at about midnight, between the 6th and 7th of the ſame February. It was accompanied by a dreadful rumbling noiſe, it laſted about one minute and an half, but it commenced and ended with the ſame uniform violence. About the ſame time the ſea in many places roſe ſeveral feet above its uſual level, and produced great damage by its inundation. This ſecond great earthquake, as may be eaſily imagined, added conſiderably to the ſcene of deſtruction and diſtreſs; but without repeating the ſame diſagreeable expreſſions of horror, we ſhall proceed to ſtate the periods of the other great commotions, and ſhall then add a ſummary of the principal facts which may demand our more particular attention.

The third great earthquake took place in the afternoon of the 7th of the ſame February. It laſted about two minutes and a half. The rumbling noiſe and the commotion commenced at the ſame moment. The ſhocks were of various ſorts, ſuch as horizontal or vertical pulſations, whirling, waving, &c.

The fourth tremendous earthquake happened very early in the morning of the 1ſt of March following. This alſo was accompanied with great ſubterranean noiſe; it laſted about a minute and 35 ſeconds; it was tremendouſly violent throughout its whole duration. The ſhocks were at firſt undulating, but after a very ſhort intermiſſion they changed into a ſort of whirling motion.

The fifth and laſt great earthquake took place on the evening of the 28th of the ſame month of March, at about an hour and a quarter after ſun ſetting. It laſted about two minutes. Its ſhocks were of various ſorts, the laſt of which proved the moſt violent.

In the journal, the ſhocks, much inferior to the abovementioned five extraordinary convulſions, are diſtinguiſhed into four degrees of force; the firſt being the weakeſt, and the fourth the ſtrongeſt. And from the ſtatement of the whole journal, it appears that during the year 1783, the unfortunate inhabitants of Calabria felt 501 ſhocks of the firſt degree, 236 of the ſecond degree, 175 of the third, and 32 of the fourth degree, beſides the five great commotions; in all 949 earthquakes.

During the year 1784, there happened 98 ſhocks of the firſt degree, 34 of the ſecond, 16 of the third, and three of the fourth degree. In all 151 ſhocks. Their number gradually diminiſhed in the following years, ſo that it needs not be particularly ſtated.

Thoſe dreadful and repeated commotions, ſhook, altered, and deſtroyed the whole face of the country. Sir William Hamilton obſerves, that if the city of Oppido, where the earthquake exerted its greateſt force, be taken as a centre, and round that centre a circle be deſcribed with a radius of 22 miles, this will comprehend all the towns, villages, farms, &c. that were utterly deſtroyed, where the greateſt mortality happened, and where the ſurface of the country ſuffered the greateſt alteration. But if you deſcribe the circle with a radius of 72 miles, this, then, will comprehend the whole country that had any mark of having been affected by the earthquake. The greateſt alteration of the country took place on the weſtern ſide of the mountains which have been mentioned above, *viz.* Monte Sacro, Monte Caulone, &c. Many openings and cracks were made in thoſe places; ſome hills were lowered, others were entirely levelled with the adjoining ground; ſome were ſplit aſunder; deep vallies were filled up; pieces of ground, with trees ſtanding, were tranſported from one place to another, even with men upon them, who often remained unhurt. But the interruption of the rivers, in conſequence of the fall of hills, and the alterations of the ground, cauſed an unappreciable damage. As it appeared from the ſurvey made by profeſſional perſons, ſent on purpoſe by the government of Naples, not leſs than 215 lakes, and ſome of them very extenſive, were formed by the above-mentioned interruptions.

From the authentic ſtatements which were tranſmitted to the government, it appears that 182 towns and villages were entirely deſtroyed, 92 were partly deſtroyed, but rendered entirely uninhabitable, and many others ſuffered in a leſs degree.

From the ſtatement of the population previous to, and ſubſequent to the earthquakes, it appears, that in the whole country that ſuffered, the whole population before the earthquakes, comprehending men, women, and children, amounted to 439·776 human beings; out of which number 29,451 died under the ruins, and 5709 died of diſeaſes contracted in conſequence of the earthquakes. It is now neceſſary to add ſome of thoſe remarkable occurrences which took place at different times during the above-mentioned earthquakes. It was obſerved, previous to moſt of the ſhocks, that the clouds, when any exiſted, diſperſed in the atmoſphere, generally collected together, and remained ſtationary, ſuſpended, as it were, upon ſome particular ſpot. It is ſaid that horſes and other animals, by their moanings, dejection, or uneaſineſs, frequently indicated the approach of an earthquake; and it was particularly obſerved, that geeſe were ſooneſt and moſt alarmed at the approach of a ſhock. Vivenzio relates that a phyſician of Coſenza, named Dr. Niccola Zupo, being impreſſed with the idea that electricity is the cauſe of earthquakes, ſtuck into the ground an iron rod of about 12 feet in length, and that at the time of many a ſhock, he obſerved electric fire proceed from the pointed extremity of the rod which projected above the ground.

Mount Ætna, in Sicily, and the volcano of Stromboli, had ſmoked leſs than uſual before the earthquakes; but they both exhibited appearances of an eruption during the earthquakes.

Sir William Hamilton, long before the termination of the earthquakes, had the curioſity to go and examine the place with his own eyes. As he was going towards Roſano, and before he arrived at that place, he paſſed over a ſwampy plain, in many parts of which he was ſhewn ſmall hollows in the earth, of the ſhape of an inverted cone. They were covered with ſand, as was the ſoil near them. He was informed that during the earthquake of the 5th of February, a fountain of water, mixed with ſand, had been driven up from each of thoſe ſpots to a conſiderable height. This phenomenon, he thought, might be eaſily explained by ſuppoſing the firſt impulſe of the earthquake to have come from the bottom upwards, which all the inhabitants of the plain atteſted to be the fact; the ſurface of the plain ſuddenly riſing, the rivers, which are not deep, would naturally diſappear, and the plain returning with violence to its former level, the rivers muſt naturally have returned and overflowed, as the ſudden depreſſion of the boggy ground would as naturally force out the water that lay hid under their ſurface. It was obſerved in the other parts, where the ſame phenomenon had been exhibited, that the ground was always low and ruſhy.

The ſurprizing caſe of the two tenements which had exchanged ſituation was fully aſcertained by ſir William Hamilton, who relates that they were ſituated in a valley ſurrounded by high grounds; and the ſurface of the earth, which was removed, had probably been undermined by little rivulets which come from the mountains, and were then plainly diſcernible on the bare ſpot which the tenements had quitted. Their courſe down the valley was ſufficiently rapid to prove that it had not been a perfect level. The earthquake, he ſuppoſes, had opened ſome depoſitories of rain water in the clay-hills, which ſurrounded the valley; which water, mixed with the looſe ſoil, taking its courſe ſuddenly through the undermined ſurface, lifting it with the large olive, mulberry trees, and a thatched cottage, ſloated the whole piece of ground, with all its vegetation about a mile down the valley, where it then ſtood with moſt of the trees erect. Theſe two tenements were about a mile long and half a mile broad.

The deſtruction in ſome places, and the miſery that enſued, exceed deſcription. The force of the earthquake of the 5th of February was ſo great at the town of Poliſtene, that all the inhabitants were buried, alive or dead, under the ruins of their houſes, in an inſtant, and out of 6000, 2100 are ſaid to have loſt their lives on that day. At Caſal Nuovo, the princeſs Gerace Grimaldi, with 4000 of her ſubjects, periſhed on the ſame day by the exploſion; for ſuch it appears to have been. Some, who had been dug alive out of the ruins, ſaid, that they had felt their houſes fairly lifted up, without the leaſt previous notice. An inhabitant of Caſal Nuovo was at that moment on a hill overlooking the plain, when, feeling the ſhock, and turning round, inſtead of the town he ſaw only a thick cloud of white duſt, like ſmoke, the natural effect of the cruſhing of the buildings and the mortar flying off. That town was ſo effectually demoliſhed, that no veſtige of houſe or ſtreet remained, but all lay in one confuſed heap of ruins. Of the ſeveral perſons that were dug out alive, ſome were quite unhurt; and it is ſingular, that ſome perſons were buried by one ſhock, and liberated by another ſhock. Theſe facts, however extraordinary they may appear, were well authenticated; and a prieſt eſpecially, who related his own adventure to ſir William Hamilton, having been buried in the ruins of his own houſe by the firſt ſhock, was blown out of it by the ſecond, which immediately followed the firſt.

Another well-atteſted fact took place in the vicinity of Oppido. A man, who was ploughing his field with a pair of oxen, was tranſported with his field and team clear from one ſide of a ravine to the other, and neither he nor his oxen were hurt.

We ſhall cloſe this account of the Calabrian earthquake, with the narration of the misfortune which overwhelmed the inhabitants of Scilla; and which may be conſidered as one of the greateſt diſaſters occaſioned by thoſe convulſions. The city of Scilla was ſituated on the declivity of a mountain, the foot of which was waſhed by the Tyrrhene ſea. The prince of Scilla having remarked, that during the firſt great ſhock of the 5th of February, part of the rock near Scilla had been detached into the ſea, and fearing that the rock of Scilla, on which his town and caſtle were ſituated, might alſo be precipitated down, prepared ſome boats, together with ſeveral of his dependents and adherents, accommodated, as well as they could, in thoſe boats, and retired to a little beach, ſituated at the foot of the hill. The ſecond great earthquake, which happened about midnight, having detached the greateſt part of a mountain much higher than that of Scilla, called Monaſina; that enormous maſs of ſolid matter fell into the ſea, and occaſioned a great wave. But Vivenzio's account ſays, that it was part of another hill, called Campallà, that fell ſome time after the above, and which might meaſure about a ſquare mile and a half, and that about half a minute after this fall, two mountainous waves, accompanied by a horrid roaring, proceeded towards the ſhore to the altitude of about 30 feet, and ſwept away whatever happened to be in their way. The water retired, and came again; repeating this motion three times within about two minutes; and during this ſhort period an immenſe deſtruction was occaſioned by the impetuoſity of the water. Barges, tends, men, and all were daſhed againſt the houſes, and waſhed away into the ſea. The prince, or count of Sinopoli, with his adherents, and a vaſt number of other perſons, loſt their lives. A few, however, had the good fortune of being ſaved, and among thoſe, the ſingular adventure of a girl is related, who was driven by the water into the branches of a mulberry tree, ſituated about 30 ſteps from the ſhore, where her hair and clothes being entangled amongſt the branches of the tree, detained her, at the height of about 30 feet from the ground. The formidable effects of the above-mentioned waves were alſo felt on the coaſt of Sicily, where ſeveral perſons were killed.

A careful examination of the accounts of earthquakes, that have been recorded by ancient as well as modern authors, has enabled philoſophers to form certain general rules or deductions, which we ſhall now ſtate, but concerning which, we muſt obſerve, that none of them muſt be conſidered as being exactly certain. They are only approximations to the truth, and may be conſidered as rules becauſe they agree with, or are indicated by the majority of facts, and of courſe they are ſubject to various exceptions.

1. Thoſe countries which are within the tropics, or not very far from them, are more ſubject to earthquakes than thoſe which are nearer to the poles, or have a high latitude; excepting, however, thoſe countries in which volcanoes exiſt, as Iceland and other places; for in the vicinity of volcanoes, earthquakes have generally been more frequent.

2. When a volcano has continued an unuſual length of time without making an eruption, then an earthquake is more likely to happen in the neighbourhood of it, than after a copious eruption.

3. Earthquakes are moſtly preceded by the fall of copious rains after a long drought; and ſuch was evidently the caſe with the earthquake of Liſbon, as well as with thoſe of Calabria.

4. Several other unuſual phenomena have often preceded earthquakes, and ſuch are ſtrong northern lights, abundance of what are commonly called ſhooting ſtars, fire-balls, which are more commonly known under the name of meteors; a peculiar thickneſs, or rather a want of perfect tranſparency in the atmoſphere, and a ſimilar dullneſs or a fiery redneſs in the aſpect of the ſun.

5. The ſea alſo is generally affected in an unuſual manner previous to an earthquake happening upon the adjoining land. It either ſwells up to an unuſual height, or bubbles up, and emits a peculiar roaring noiſe. The waters likewiſe of ſprings, wells, ponds, and rivers, frequently grow muddy previouſly to an earthquake, or give other indications of it, ſuch as to become ſuddenly more abundant, or more ſcanty, to yield unpleaſant ſmells, &c. It has been often obſerved, that the waters of ponds, rivers, ſeas, &c. have given indications of an earthquake having taken place at an immenſe diſtance, when no ſhock or tremor of the earth, or other unuſual phenomenon, could be perceived in the neighbourhood of thoſe waters.

6. At the time of an earthquake the air is generally calm and ſerene, though ſeldom very pellucid; but afterwards becomes generally obſcure and cloudy.

7. A noiſe of various kind, *viz.* either a continued rumbling, or ſomething like the rattling of carriages, or like the exploſions of heavy cannon, is the general forerunner of an earthquake; but ſometimes the ſhock and noiſe commence at the ſame time.

8. The nature and direction of the ſhocks vary much, and moſtly they ſucceed each other in a very ſhort time. The earth ſometimes trembles, at other times it moves ſomewhat like the waves of the ſea. The ſhock frequently begins with a perpendicular heave; then changes into a vi-

bratory motion backwards and forwards, or in a whirling ſort of movement.

9. A ſingle ſhock is of ſhort duration, ſcarcely ever exceeding a minute ; but they frequently ſucceed each other, at ſhort intervals, for a conſiderable length of time.

10. At the time of an earthquake, fiſſures, cracks, or chaſms, are frequently opened in the earth, which are of various ſhapes and ſizes ; and are either ſhut up immediately, or they are left open. In great earthquakes, thoſe openings of the earth frequently ſwallow up human beings, and other animals. And there are various inſtances on record of their having ſwallowed up even whole towns. Sometimes a ſulphureous, or phoſphoric ſmell, ſmoke, and flames, but more commonly waters, iſſue out of thoſe openings.

11. Flame and ſmoke have alſo been emitted from the earth, when no openings were viſible in it ; and it is ſaid, that flame and ſmoke have iſſued, likewiſe, from the water of the ſea at the time of an earthquake.

12. The effects of an earthquake are felt by ſhips at ſea, and often in a very great degree. An unuſual motion of the water is moſtly obſerved, which is either like a prodigious ſwell, or like a current ſetting in a certain direction, or ſomewhat like a whirling movement. The ſhips are affected with a ſudden ſtroke, as if they had run a-ground, or ſtruck upon a rock ; and ſometimes they are affected in a more hurtful manner, as we have mentioned above, during the earthquake of Liſbon.

13. Earthquakes are not confined to any particular diſtrict, or within any preſcribable limits. Some of their effects have frequently been obſerved at an immenſe diſtance from the actual ſcene of action. And if attentive obſervations were made, and proper machines were uſed, there is no doubt but that their effects would manifeſt themſelves at a much more ſurpriſing diſtance.

The idea of meaſuring the vibrations of an earthquake, or of conſtructing a machine capable of indicating the motion of the earth, when affected by a moderate ſhock, has occurred to ſeveral perſons. A Mr. Wark propoſed to uſe a veſſel partly filled with water, and having its inſide ſurface above the level of the water, covered with powder of any light ſort ; for, if a veſſel, ſo prepared, be kept on the ground, or upon any thing that is firmly fixed to the ground, the powder will remain unwaſhed from the inſide of it as long as the earth remains unſhaken ; but if the earth, and of courſe the veſſel, happens to be moved out of its uſual ſituation by any ſhock of an earthquake, then the water, by waſhing off ſome of the powder, from one ſide or the other of the veſſel, would give an indication of that motion. (Roz. I. 376.) That the above-mentioned effect would take place, there can be no doubt ; but the ſhortneſs of the radius of vibration (for a very large veſſel could not be conveniently uſed for ſuch a purpoſe,) will not render ſenſible any very ſmall movements of the earth.

A watch-maker of the city of Naples, during the earthquakes of Calabria, in the year 1783, made a much better contrivance for the ſame purpoſe, which is as follows : By connecting three oblong pieces of wood, he formed a ſtrong triangular frame, which he fixed ſtraight up, in a very ſteady room, and ſcrewed one ſide of it faſt to the floor. From the upper angle of this triangular frame, a pendulum proceeded, which was about eight feet in length, and conſiſted of a rod, nicely ſuſpended, and having a bob, or leaden ball, of a conſiderable weight, faſtened to its lower extremity. Juſt under the ball there was a black lead pencil, which, by means of a delicate ſpring, was made to reſt gently upon a ſheet of paper, which was fixed horizontally under the pencil. It will be eaſily comprehended that, if the floor of the room, wherein this machine was fixed, happened to be moved out of its uſual level, the pendulum muſt neceſſarily move relatively to the frame, and, of courſe, the pencil muſt mark a black ſtroke upon the ſheet of paper. The length and direction of this ſtroke would obviouſly indicate which way, and how much the floor was moved from its uſual ſituation. This machine was uſed at Naples during the latter part of the earthquakes of Calabria, and its inventor had the ſatisfaction to obſerve ſeveral marks made by the pencil upon the paper, at the time that the ſhocks of the earthquake took place in Calabria (as it was proved by comparing the times with the information which was afterwards received from Calabria,) at the ſame time that no perſon in Naples was at all ſenſible of any ſhock. It is evident, that ſuch a machine cannot indicate any perpendicular riſing, or ſinking of the ground.

The reader will eaſily believe, that a natural phenomenon of ſuch magnitude, and of ſuch conſequence as an earthquake, has at all times excited the ſpeculation of philoſophers, reſpecting its nature and its origin. Though few experiments have been inſtituted with that view, yet a vaſt number of hypotheſes have been offered, which run through all the intermediate ſteps, from the moſt evident abſurdity to a degree of high probability. Almoſt all the ancient writers who ſpeak of earthquakes offer ſome theory, or conjecture. But, as at that time, when the branches of natural philoſophy were in their very infancy, in proportion to what they are at preſent, thoſe theories, or conjectures, were hardly any thing more than random gueſſes; yet, it is to be remarked, that ſome of them coincide, in a great degree, with the two beſt modern theories, which reſt upon the innumerable facts and diſcoveries that have been produced by the two or three laſt prolific centuries.

It was imagined by Anaxagoras, that vaſt caverns, or vaults, exiſted within the body of the earth, and that earthquakes were produced by ſubterraneous clouds, confined within thoſe cavities, which, burſting into lightning, ſhook thoſe vaults, and occaſioned the ſhocks. Another hypotheſis was, that the above-mentioned vaults, being undermined, or weakened by ſubterranean fires, at laſt fell in, with whatever lay upon them. Epicurus, and other Peripatetics, aſcribed the earthquakes to the ignition of inflammable exhalations.

One of the moſt prevailing opinions, not only among the ancients, but alſo amongſt the more modern, and even amongſt ſome of the preſent philoſophers, is, that the rarefaction of water is the cauſe of volcanoes ; but it is curious to obſerve how this hypotheſis has been differently modified at different times, and by different philoſophers.

The very early philoſophical writers were contented to ſay that water, reduced into ſteam by the heat of ſubterraneous fires, was the cauſe of earthquakes. Gaſſendus, Kircher, Schottus, Varenius, Des Cartes, &c. ſuppoſed that there are numerous large cavities within the body of the earth, which communicate with one another. Some of theſe cavities contain water ; whilſt others contain vapour, or exhalations, ariſing from inflammable matter, ſuch as bitumen, ſulphur, &c. They then imagined that theſe exhalations were ſubject to inflammation, either from the effects of fermentation, or otherwiſe, and by their flow, or by their violent combuſtion, occaſioned the different kinds of earthquakes. Fabri ſimply and judiciouſly ſuppoſed, that water, when prodigiouſly rarefied by heat, might ſometimes be the cauſe of earthquakes. Dr. Woodward ſuppoſes, that the ſubterranean heat, or fire, which is continually elevating water out of the abyſs, which, according to him, occupies the centre of the earth, to furniſh rain, dew, ſprings, and rivers; may be ſtopped in ſome particular part. When this obſtruction happens, the heat cauſes a great ſwelling and commotion in the waters of the abyſs; and, at the ſame time, making the like effort againſt the ſuperincumbent earth, that agitation and concuſſion of it are occaſioned, which we call an earthquake. Mr. Amontons, of the French Academy of Sciences, offered the following hypotheſis. According to the received philoſophical principles, which ſuppoſe the atmoſphere to be about 45 miles high, and that the denſity of the air increaſes in proportion to the abſolute height of the ſuperincumbent column of aerial fluid, it is ſhewn, that, at the depth of 43.528 fathoms below the ſurface of the earth, air is but one-fourth lighter than mercury. Now, this depth of 43,528 fathoms is only a 74th part of the ſemi-diameter of the earth; and the vaſt ſphere beyond this depth, in diameter 6,451,538 fathoms, may probably be only filled with air; which will be here greatly condenſed, and much heavier than the heavieſt bodies we know of in nature. But it is found, by experiment, that the more air is compreſſed, the more does the ſame degree of heat increaſe its ſpring, and the more capable does it render it of a violent effect; and that, for inſtance, the degree of heat of boiling water increaſes the ſpring of the air above what it has in its natural ſtate, in our climate, by a quantity equal to a third of the weight wherewith it is preſſed. Whence, we may conclude, that a degree of heat which, on the ſurface of the earth, will only have a moderate effect, may be capable of a very violent one below. And, as we are aſſured, that there are in nature degrees of heat much more conſiderable than that of boiling water, it is very poſſible there may be ſome, whoſe violence, further aſſiſted by the exceedingly great weight of the air, may be more than ſufficient to break and overturn this ſolid orb of 43,528 fathoms; whoſe weight, compared to that of the included air, would be but a trifle.

This reaſoning, though very ſpecious, will not bear a careful and particular examination.

Dr. Stukeley ſeems to have been the firſt perſon who advanced that earthquakes were probably cauſed by electricity. The two earthquakes which were felt in London during the months of February and March 1749, together with that which happened in Northamptonſhire on the 30th of September 1750, ſuggeſted this inquiry, upon which the doctor beſtowed a good deal of attention, and he communicated his reaſoning and his obſervations to the Royal Society in two papers, which are contained in the Phil. Tranſ. vol. xlvi. A ſummary of theſe papers is as follows.

That earthquakes are not owing to ſubterraneous winds, fires, vapours, or any thing that occaſions an exploſion, and heaves up the ground, Dr. Stukeley thought might eaſily be concluded from a variety of circumſtances. In the firſt place, he thought there was no evidence of any remarkable cavernous ſtructure of the earth; but that, on the contrary, there is rather reaſon to preſume, that it is, in a great meaſure, ſolid, ſo as to leave little room for internal changes and fermentations within its ſubſtance; nor do coal-pits, he ſays, when on fire, ever produce any thing reſembling an earthquake.

In the ſecond earthquake at London, there was no ſuch thing as fire, vapour, ſmoke, ſmell, or any eruption of any kind obſerved, though the ſhock affected a circuit of 30 miles in diameter. This conſideration alone, of the extent of ſurface ſhaken by an earthquake, he thought, was ſufficient to overthrow the ſuppoſition of its being owing to the expanſion of any ſubterraneous vapour.

For it could not poſſibly be imagined, that ſo immenſe a force, as could act upon that compaſs of ground inſtantaneouſly, ſhould never break the ſurface of it, ſo as to be diſcoverable to the ſight or ſmell; when ſmall fire balls, burſting in the air, have inſtantly propagated a ſulphureous ſmell all around them, to the diſtance of ſeveral miles.

Beſides, the operation of this great fermentation, and production of elaſtic vapours, &c. ought to be many days in continuance, and not inſtantaneous; and the evaporation of ſuch a quantity of inflammable matter would require a long time.

He thought that if vapours and ſubterraneous fermentations, exploſions, and eruptions, were the cauſe of earthquakes, they would abſolutely ruin the whole ſyſtem of ſprings and fountains wherever they had once been, which is quite contrary to fact, even where they have been frequently repeated. Mentioning the great earthquake which happened A. D. 17; when no leſs than 13 great cities of Aſia Minor were deſtroyed in one night, and which may be reckoned to have ſhaken a maſs of earth 300 miles in diameter, he aſks, how can we poſſibly conceive the action of any ſubterraneous vapours to produce ſuch an effect ſo inſtantaneouſly? How came it to paſs that the whole country of Aſia Minor was not at the ſame time deſtroyed, its mountains reverſed, &c.? Whereas, nothing ſuffered but the cities.

To make the hypotheſis of ſubterraneous vapours being the cauſe of earthquakes the more improbable, he obſerves, that any ſubterraneous power, ſufficient to move a ſurface of earth thirty miles in diameter, muſt be lodged at leaſt 15 or 20 miles below the ſurface of the earth, and, therefore, muſt move an inverted cone of ſolid earth, whoſe baſis is 30 miles in diameter, and axis 15 or 20 miles; an effect which, he ſays, no natural power could produce.

Upon the ſame principle, the ſubterraneous cauſe of the earthquake in Aſia Minor muſt have moved a cone of earth of 300 miles baſe. and 200 in the axis; which, he ſays, all the gun-powder which has ever been made ſince the invention of it, would not have been able to ſtir, much leſs any vapours, which could be ſuppoſed to be generated ſo far below the ſurface.

It is not upon the principles of any ſubterraneous exploſion that we can in the leaſt account for the manner in which ſhips, far from any land, are affected during an earthquake; which ſeems as if they ſtruck upon a rock, or as if ſomething thumped againſt their bottoms. Even the fiſhes are affected by an earthquake. The ſtroke, therefore, muſt be occaſioned by ſomething that could communicate motion with unſpeakably greater velocity than any heaving of the earth under the ſea, by the elaſticity of generated vapours. This could only produce a gradual ſwell, and could never give ſuch an impulſe to the water, as would make it feel like a ſtone.

Comparing all thoſe circumſtances, Dr. Stukeley ſays, he had always thought, that an earthquake was an electrical ſhock, of the ſame nature with thoſe which are now become familiar in electrical experiments. And this hypotheſis, he thought, was confirmed by the phenomena preceding and attending earthquakes, particularly thoſe which happened in London and other parts of England. The weather, for five or ſix months before the firſt of theſe earthquakes, had been dry and warm to an extraordinary degree, the wind generally ſouth and ſouth-weſt, and that without rain, ſo that the earth muſt have been in a ſtate of electricity ready for that particular vibration in which electrification conſiſts. On this account, he obſerves, that the northern regions of the world are but little ſubject to earthquakes in compariſon with the ſouthern, where the warmth and dryneſs of the air, ſo neceſſary to electricity, are common.

All the flat country of Lincolnſhire, before the earthquake in September, though underneath it is a watery bog; yet, through the whole preceding ſummer and autumn (as they can have no natural ſprings in ſuch a level) had the drought ſo great on the ſurface of the earth, that the inhabitants were obliged to drive their cattle ſeveral miles to water. This, he ſays, ſhews how fit the dry ſurface was for an electrical vibration; and alſo, which is of great importance, that earthquakes reach but very little below the ſurface of the earth.

Before the earthquake at London, all vegetables had been uncommonly forward, and electricity is well known to quicken vegetation. As the weather had been uncommonly mild previous to the earthquake, it is more likely that the forward ſtate of vegetation was owing to that circumſtance, rather than to the interference of electricity, which Dr. Ingenhouſz found, by a variety of experiments, not to forward vegetation, as it had been believed.

Dr. Stukeley continues to remark, that the aurora borealis had been very frequent about the ſame time, and had been twice repeated juſt before the earthquake, of ſuch colours as had never been ſeen before. It had alſo removed to the ſouth, contrary to what is common in England; ſo that ſome Italians, and people from other places where earthquakes are frequent, obſerving theſe lights, and the peculiar temperature of the air, did actually foretell the earthquake. For a fortnight before the earthquake in September, the weather was ſerene, mild, and calm; and one evening, there was a deep red aurora borealis, covering the cope of heaven, very terrible to behold. The whole year had been remarkable for fire-balls, thunder, lightning, and coruſcations, almoſt throughout England. And all theſe meteors are ſuppoſed to be cauſed by the electrical ſtate of the atmoſphere.

In theſe previous circumſtances of the ſtate of the earth and air, nothing, he ſays, is wanting to produce the wonderful effect of an earthquake, but the touch of ſome non-electric body, which muſt neceſſarily be had *ab extra*, from the region of the air, or atmoſphere. Hence, he infers, that if a non-electic cloud diſcharges its contents upon any part of the earth in that highly electrical ſtate, an earthquake muſt neceſſarily enſue. It has been obſerved, that the noiſe which commonly attends earthquakes, generally precedes the ſhock: whereas it muſt have been quite the contrary if the concuſſion had depended upon a ſubterraneous eruption. This noiſe attending earthquakes, the doctor thought, could not be accounted for, but upon the principles of electricity. He alſo thought that the flames and ſulphureous ſmells which are frequently obſerved during earthquakes, are more eaſily accounted for, upon the ſuppoſition of their being electrical phenomena. The impreſſion made by an earthquake upon land and water, to the greateſt diſtances, is inſtantaneous, which could only be effected by electricity.

The little damage, the Dr. ſays, generally done by earthquakes, is an argument of their being occaſioned by a ſingle vibration, or tremulous motion of the ſurface of the earth by an electrical ſnap. This vibration impreſſed on the water, meeting with the ſolid bottoms of ſhips and lighters, occaſions that thump which is ſaid to be felt by them. That earthquakes are electrical phenomena, he thinks, is made further evident, from their chiefly affecting the ſea-coaſt, places along rivers, and eminences. Laſtly, the doctor adds, as a farther argument in favour of his hypotheſis, that pains in the back, rheumatic, hyſteric, and nervous caſes; head-aches, colics, &c. were felt by many people of weak conſtitutions for a day or two after the earthquake; juſt as they would after electrification, and, to ſome, theſe diſorders proved fatal.

In what manner the earth and atmoſphere are put into that electrical and vibratory ſtate, which prepares them to give or receive that ſnap and ſhock which we call an earthquake, and whence it is that this electric matter comes, the doctor does not pretend to ſay, but thinks it as difficult to account for as magnetiſm, gravitation, muſcular motion, and many other ſecrets in nature.

Willing to throw as much light as poſſible upon the important and obſcure ſubject of earthquakes, we have endeavoured to extract the moſt important part of Dr. Stukeley's ingenious papers, which, ſince their publication in the Phil. Tranſ. have acquired many adherents; yet it is eaſy to perceive, that he writes like a man who has long employed his ſerious thoughts upon a favourite ſubject; which naturally caſts a veil over the merits of other ſubjects that may ſtand in oppoſition to the former. The doctor moſtly derived his concluſions from the phenomena which attended the ſlight earthquakes of 1749 at London. Had he lived to examine the ſubſequent earthquakes of Liſbon and of Calabria, it is moſt likely that he would at leaſt have altered ſome of his arguments. He is miſtaken when he ſays, that the force of ſteam cannot poſſibly equal that of gun-powder. He alſo lays too much ſtreſs upon various effects which might be attributed to other cauſes as well as to the agency of electricity; and at laſt, his not being able to account for the accumulation of an enormous quantity of electricity in the earth or in the atmoſphere, forms the greateſt defect of his theory.

The ſimilarity between the effects of electricity and ſome of the phenomena that attend earthquakes, has ſtruck a great many perſons, but when one examines the particulars a little beyond the bare ſimilarity of certain phenomena, there appears to be very little reaſon for concluding that electricity is the cauſe of earthquakes. The chevalier Vivenzio, in his account of the earthquakes of Calabria in 1783, expreſſes his perfect conviction of their being electrical phenomena; but his hypotheſis of the accumulation of electric fluid under certain ſtrata of non-conducting matter, and of the force which it muſt exert againſt thoſe ſtrata, is too vague to demand any particular examination. This author is not only perſuaded that electricity is the cauſe of earthquakes, but he alſo propoſes a remedy againſt their effects. In ſhort, he propoſes to fix metallic rods into the ground, as deep as it may be practicable, through which the electric fluid may paſs from the earth into the atmoſphere, and *vice verſâ*. Theſe rods, he ſays, ſhould project ſome feet above the ſurface of the earth, and both extremities of each metallic rod, *viz.* that which is within, and that which is above the ground, ſhould terminate into a number of points, or pointed branches, ſomewhat like a bruſh. And if another ſet of ſuch pointed branches was placed about the middle of each rod, it would be ſtill better.

Whoever is acquainted with the practical part of electricity, muſt know how difficult it is to confine the electric fluid, eſpecially when it is much condenſed, or in large quantities. The beſt poſſible inſulation, formed by the interpoſition of dry glaſs and reſins, will hardly prevent the diſſipation of that ſubtile fluid, which will endeavour to fly off into the air, or to any other body which may happen to be within its reach. How difficult it is then to conceive, that an immenſe quantity of that fluid (for ſurely immenſe muſt that quantity be which can produce an earthquake) can be accumulated in any part of the earth, without its immediately ruſhing to the other parts of it; or, in ſhort, that it may be accumulated at all in any part of it more than in another. It is undoubtedly true, that the earth contains various non-conducting bodies; but the manner in which they are found to exiſt is ſuch as to prevent the poſſibility of forming a perfect non-conducting ſtratum of any conſiderable extent: for they either exiſt in ſeparate pieces, or they are intermixed with water and a variety of other bodies, ſo that the whole compound is far from being a non-conductor of electricity. And we may venture to add, that as far as human art has been able to deſcend below the ſurface of the earth, it is not poſſible to cut off from any part of it a cubic lump of 15 or 20 feet, which might be conſidered as a perfect non-conductor of electricity. In the atmoſphere, or in the clouds, as far as we know, no very extraordinary quantity of electricity can be accumulated, beyond what may conſtitute a thunder-ſtorm; for though the *aurora borealis*, ſhooting ſtars, as they are commonly called, and other meteors, have been ſuppoſed to be electrical phenomena, yet there is no certain evidence of their being actually ſo.

Such, in brief, are the obſervations which may be advanced reſpecting the ſuppoſed accumulation of electric fluid, either within the earth or in the atmoſphere. If, then, we proceed to examine the effects, we ſhall undoubtedly find, that ſome of thoſe which are produced by earthquakes may be conveniently explained upon the ſuppoſition of their being electrical phenomena; and the principal of theſe is the effect produced upon veſſels at ſea. But ſeveral others cannot be ſatisfactorily reconciled to it: for inſtance, in the earthquakes of Calabria, in 1783, ſmall ſhocks, ſtrong ſhocks, and extraordinary commotions, followed one another at ſhort intervals of time, without any order or regularity. Now it is difficult to comprehend how the electric fluid, which produced thoſe ſhocks, could be let out of its confinement in a manner ſo irregular: for if a ſmall quantity of it, which produced a ſlight ſhock, could find an exit, why a larger quantity of it (which can much more eaſily cut its way through any obſtacle) could not come out at the ſame time? and yet, not long after, this large quantity comes out of its confinement, and produces a great earthquake.

Slight flames, ſuppoſed to have been electric fire, have been frequently ſeen at the time of earthquakes: but, in the firſt place, theſe flames may have been nothing more than the combuſtion of hydrogen gas, diſlodged from under the earth, and inflamed at the time of an earthquake; and, ſecondly, they may be allowed to be electric fire, without the leaſt neceſſity of admitting that earthquakes are produced by electricity: for, at the time of an earthquake, the converſion of a certain quantity of water into vapour, or of vapour into water, generally and evidently takes place; and whenever this is the caſe, electricity muſt be generated, becauſe vapour contains much more electric fluid than water, or the ſame quantity of water contains leſs of the electric fluid in that ſtate, than in a ſtate of vapour: therefore, when water is converted into vapour, a quantity of electric fluid is abſorbed, and, of courſe, negative electricity is manifeſted;—when vapour is converted into water, a quantity of electric fluid is depoſited, and, of courſe, poſitive electricity is manifeſted.

The communication of the ſhock of an earthquake to places far diſtant from each other, at the ſame or nearly at the ſame inſtant of time, has alſo been alleged as a proof of their being produced by electricity. But ſurely when a ſtroke of any kind, and of ſufficient ſtrength, is given to any part of an extended ſolid, the commotion is communicated to the moſt diſtant parts of it, if not inſtantaneouſly, at leaſt in an exceedingly ſmall portion of time. The leaſt ſcratch of a pin, at one end of the longeſt beam that can be produced, is inſtantly heard at the other end, by a perſon who puts his ear in contact with the beam.

The laſt hypotheſis which remains to be mentioned is, that earthquakes are produced by the ſudden expanſion of water into vapour; and this indeed coincides with the opinions of various ancient authors: but it is rendered much more probable by the facts which, of late years, have been aſcertained reſpecting the expanſibility of ſteam. The principal facts are as follow. Water, raiſed to the temperature of 212° of Fahrenheit's thermometer, in an ordinary ſtate of the atmoſphere, is converted into ſteam, *viz.* an elaſtic fluid, the bulk of which is not much leſs than 1800 times the bulk of the water from which it originated; and in that ſtate, its elaſticity enables it to ſupport the preſſure of the atmoſphere. If its temperature be increaſed by about 30° more, ſo as to amount in all to about 242°, then its elaſtic force will be doubled; by the addition of 30° more of heat, its elaſticity will be quadrupled; and ſo on: nor is it known how far this increaſe of elaſticity may be extended, by increaſing the temperature. Therefore, if water happens to fall upon any thing, which can inſtantly communicate a very high degree of heat to it, the elaſticity of the vapour, which is thereby produced, may be equal to any force we may have any idea of. The only thing requiſite is the ignited ſubſtance, which is to furniſh a ſufficient quantity of heat; and for this purpoſe, large quantities of melted metals are the fitteſt, eſpecially thoſe which require a very high temperature for their fuſion; metallic ſubſtances being very good conductors of heat, ſo that when water falls upon any part of the melted matter, the caloric ruſhes to that ſpot from every part of the maſs, and inſtantly converts the water into ſteam, poſſeſſed of a prodigious elaſtic force. Now the application of theſe facts to the production of earthquakes is extremely eaſy, as will appear from the following obſervations of Dr. Thomas Young. We muſt not, however, omit to acknowledge that there are certain circumſtances, which indicate a connection between the ſtate of the atmoſphere and the approach of an earthquake, and which do not ſeem to admit of an explanation upon this hypotheſis.

"The ſhocks of earthquakes," Dr. Young ſays, "and the eruptions of volcanoes, are, in all probability, modifications of the effects of one common cauſe: the ſame countries are liable to both of them; and where the agitation produced by an earthquake extends farther than there is any reaſon to ſuſpect a ſubterraneous commotion, it is probably propagated through the earth nearly in the ſame manner as a noiſe is conveyed through the air. Volcanoes are found in almoſt all parts of the world, but moſt commonly in the neighbourhood of the ſea, and eſpecially in ſmall iſlands; for inſtance, in Italy, Sicily, Iceland, Japan, the Caribbees, the Cape Verd iſlands, the Canaries, and the Azores. There are alſo numerous volcanoes in Mexico and Peru, eſpecially Pichincha and Cotopaxi. The ſubterraneous fires, which are continually kept up in an open volcano, depend perhaps in general on ſulphureous combinations and decompoſitions, like the heating of a heap of wet pyrites, or the union of ſulphur and iron-filings; but, in other caſes, they may perhaps approach more nearly to the nature of common fires. A mountain of coal has been burning in Siberia for almoſt a century, and muſt probably have undermined, in ſome degree, the neighbouring country. The immediate cauſe of an eruption appears to be very frequently an admiſſion of water from the ſea, or from ſubterraneous reſervoirs. It has often happened that boiling water has been diſcharged, in great quantities from a volcano; and the force of ſteam is perhaps more adequate to the production of violent exploſions, than any other power in nature. The conſequence of ſuch an admiſſion of water into an immenſe collection of ignited materials, may in ſome meaſure be underſtood, from the accidents which occaſionally happen in founderies: thus, a whole furnace of melted iron was lately diſſipated into the air, in Colebrook Dale, by the effect of a flood, which ſuddenly overflowed it."

We ſhall now conclude this article with the account of an idea of a preſervative againſt the effects of earthquakes, which has been not only believed, but actually put in practice by various perſons at different times. The idea is, that deep wells, by giving vent to the effluvia, whatever they be, that produce earthquakes, will guard cities, buildings, &c. againſt their effects; or rather that they will prevent the ſhocks of earthquake. And this effect, provided it be true, ſeems to be much in favour of the laſt-mentioned hypotheſis, namely, that earthquakes are occaſioned by the great expanſion or elaſticity of aqueous vapour. We do not mean to vouch for the truth of it, but we ſhall briefly mention our authorities. Pliny ſays, "In terræ motibus eſt remedium, quale, et crebri ſpecus præbent: conceptum enim ſpiritum exhalant: quod in certis notatur oppidis, quæ minus quatiuntur, crebris ad eluviem cuniculis cavata. Multoque ſunt tutiora in iiſdem illis, quæ pendent; ſicut Neapoli in Italia intelligitur———Deſinunt autem tremores, cum ventus emerſit." Hiſt. Nat. l. ii. cap. 82. In the city of Naples, there is a pyramid erected before a church, dedicated to St. Januarius, under which (Celano, in his firſt volume of the deſcription of that city, ſays that) there is a deep well, which has ſeveral openings about the baſe of that pyramid, and which was made expreſsly for the purpoſe of ſaving it from the effects of earthquakes. Toaldo, the diſtinguiſhed aſtronomer, is much inclined to believe that idea, and he adduces ſeveral inſtances in corroboration of it. (See his Saggio Meteorologico, printed at Podova, in 1770.) This author, among other inſtances, ſays, that the city of Udine, capital of the Friuli, has four very deep wells, and other excavations, made at a very remote period; for they are even mentioned by Palladio: and ancient tradition ſays, that they were made at a time when that province ſuffered frequent earthquakes; and that the expedient ſeems to have been attended with the deſired effect. The ancient city of Nola, in the kingdom of Naples, was never known to have been damaged by earthquakes; and this city contains both within and without its boundaries a great number of wells. It is much to be wiſhed, that ſuch caſes may be inquired into, and properly examined, wherever they may be thought likely to occur.

Earthquake, *Artificial*. There are two experiments, frequently deſcribed by chemical and philoſophical writers, to which they have given the name of artificial earthquakes: one of them is furniſhed by the ſcience of chemiſtry, the other by that of electricity. The former, which, by the bye, may with more propriety be called an *artificial volcano*, is prepared in the following manner: Take about twenty pounds weight of iron-filings, and an equal quantity of pounded ſulphur, or of flowers of ſulphur; mix theſe two articles with as much water as will enable you to work them into a maſs like a pretty ſtiff paſte; and in that ſtate bury it into the ground, about a foot or two below the ſurface. This paſte, being a ſort of artificial pyrites in a moiſt ſtate, will ferment and will generate heat ſufficient to ſet it actually on fire; ſo that, ſome hours after the laying down of the above-mentioned paſte, the earth over it will be ſeen to crack, and fire will come out of it.

By means of electricity, the artificial earthquake may be performed various ways; but the following is perhaps the beſt. Place the extremities of two wires upon the ſurface of a thick and flat piece of glaſs; ſo that they may ſtand in one direction, and about one inch diſtant from each other. Lay a little cylinder of ivory (about three-fourths of an inch in diameter, and an inch or two high) upon that part of the ſurface of the glaſs which lies between the extremities of the two wires. Upon the upper part of the ivory cylinder, place a little board about five or ſix inches ſquare; and upon this, which may repreſent the ground of a town, diſpoſe, in any manner you pleaſe, little repreſentations of houſes, made either of paper, or cork, or wood, &c. Things being thus prepared, connect one of the above-mentioned wires with the outſide of a pretty large Leyden phial, fully charged with electricity, and connect the other wire with the knob of the ſame phial: in doing which, the charge or ſhock will paſs over the flat piece of glaſs, and under the ivory cylinder, from the extremity of one wire to the other. This ſhock hardly ever fails to break the glaſs, and to ſhake the ivory cylinder, with the board that ſtands over it, ſo as to throw down the little repreſentations of houſes, &c.; and thus it will give a faint repreſentation of an earthquake. This experiment may be performed very commodiouſly, by uſing an electrical inſtrument, called the *univerſal diſcharger*; for a deſcription of which, ſee the article Electrical *Apparatus*.

EARTHWORM, in *Zoology*. See Lumbricus.

Earthworms are by ſome eſteemed of great virtue in medicine, and are ſaid to be diuretic, diaphoretic, and anodyne; as alſo diſcutient, emollient, and openers of obſtructions; and have been preſcribed in apoplexies, ſpaſms, and all nervous affections, and in the jaundice, dropſies, and colics. See Worm *Tincture*.

EASE, in the *Sea Language*, ſignifies as much as ſlacken, or let go ſlacker.

Thus they ſay, eaſe the bowline, eaſe the ſheet; that is, let them go ſlacker.

Ease *the Ship*, is the command given by the pilot to the ſteerſman, to put the helm cloſe to the lee ſide; or hard-a-lee, when the ſhip is expected to pitch or plunge her fore-part deep in the water while cloſe hauled.

Ease, *Chapel of*. See Chapel.

EASEL, the frame uſed by painters to ſupport the tablet, or frame of canvas, upon which they are painting.

The eaſel in common uſe is too well known, and too ſimple, to need a figure: it is only a triangular frame, which ſtands on its baſe, and is ſupported in an inclined poſition by a leg behind; the ſides of the triangle are perforated with holes to receive pegs, which ſupport the tablet; and by placing the pegs in other holes, the canvas can be placed higher or lower on the frame. Mr. Middleton of St. Martin's Lane, London, has contrived an eaſel, repreſented in *fig.* 1. *Plate* XII. *Miſcellany*, of which A A is a rectangular frame of mahogany, having grooves for a frame, *a a*, to ſlide up and down in; and a ſmall ſpring-latch at the underſide of the frame, *a a*, fixes the frame at any height the painter chuſes, by locking into any of the holes made in the middle rail of the frame A A. The canvas is reſted upon a ſmall box, *b*, at the lower part of the frame *a a*; and the box alſo ſerves as a ſhelf to contain ſpare pencils, &c. B is a leg to ſupport the frame A A, which is ſhut up cloſe to the frame, when the eaſel is not in uſe.

Easel-*Pieces*, among *Painters*, ſuch ſmaller pieces, either portraits or landſcapes, which are painted on the eaſel.

They are thus called to diſtinguiſh them from larger pictures drawn on walls, cielings, &c.

EASEMENT, in *Law*, a ſervice or convenience which one neighbour has of another by charter or preſcription, without profit; as a way through his ground, a ſink, or the like. (Kitch. 105.) A perſon may preſcribe to an eaſement in the freehold of another, as belonging to ſome ancient houſe, or land, &c. And a way over the land of another

other, a gate-way, water-courſe, or waſhing-place on another's ground, may be claimed by preſcription as eaſements. But a multitude of perſons cannot preſcribe; though for an eaſement they may plead cuſtom. Cro. Jac. 170. 3 Leon. 254. 3 Mod. 294.

In the civil law, eaſements are called *ſervitus prædii.*

EASINGWOLD, in *Geography*, a market-town in the wapentake of Bulmer, in the North Riding of Yorkſhire, England, is about 11 miles from York, and 206 from London. According to the late official report to parliament, in 1801, this town contained 269 houſes, and 1467 inhabitants. Here are a weekly market on Fridays, and two annual fairs.

EASK, a lake of Ireland, in the county of Donegal; 4 miles N.E. of Donegal.

EAST, in *Coſmography*, one of the cardinal points of the horizon; being the point wherein the prime vertical interſects that quarter of the horizon in which the ſun riſes when in the equinoctial.

The word eaſt is Saxon. In Italy, and throughout the Mediterranean, the eaſt-wind is called the *levante:*—in Greek, ανατολη and απηλιωτης, becauſe it comes from the ſide of the ſun, απ’ ἡλιȣ:—in Latin, *eurus*.

To find the eaſt and weſt line, points, &c. ſee MERIDIAN-*Line*, and DEGREE.

EAST-*Wind*, is that which blows from the eaſt point. See WIND.

EAST-*Dials*. See DIAL.

EAST-*India Companies*. See COMPANY.

EAST-*India Silk*. See SILK.

EAST, *Mooring for*. See MOORING.

EASTANALLEE, in *Geography*, the N.E. head branch of Alahama river, in Georgia, North America, on which ſtands the town of Eaſtanallee.

EAST ANDOVER, a town of America, in York county, and ſtate of Maine, 90 miles N.W. of Portland, containing 175 inhabitants.

EAST BAY, an arm of lake Champlain, projecting eaſtward from its ſouth point.

EAST BETHLEHEM, a townſhip of America, in the county of Waſhington and ſtate of Pennſylvania, having 1461 inhabitants.

EASTBOURNE, a pariſh in the hundred of Eaſtbourne, and rape of Pevenſey, in the county of Suſſex, England, is one of thoſe places that has obtained ſome degree of celebrity, in conſequence of being frequented in the ſummer months, for bathing. It is ſituated in a valley, nearly ſurrounded by hills, which are moſtly appropriated to ſheep-walks. The country is very ſimilar to parts of Saliſbury-plain; and, like that, conſiſts of a ſubſtratum of chalk and flint, with a thin ſtratum of mould, which produces a fine ſweet herbage for ſheep. The village is about one mile from the ſea, near which is the hamlet of Southbourne, where are ſeveral modern houſes built and fitted up for viſitors. In the pariſh is a free-ſchool for 15 boys, a ſmall theatre, and barracks for horſe and foot ſoldiers. In the church, which has ſome claim to antiquity, are ſeveral fine monuments. Lord George Cavendiſh has a handſome ſeat here. At a place called Holywell is a ſpring of chalybeate water, which is ſaid to poſſeſs ſimilar qualities to the Briſtol waters. On this coaſt the cliffs are very lofty in places, particularly that promontory called *Beachy-head,* which is noted by mariners as a place of danger. Here are many caverns in the cliffs, which are much frequented by ſmugglers. See a Guide to Eaſtbourne.

EAST CAMP, a village of New York, in the county of Columbia, on the eaſt bank of the Hudſon, 7 miles above Red Hook; 13 miles N. of New York.

EAST CAPE, the eaſternmoſt point of the continent of Aſia, and the dominions of Ruſſia. N. lat. 66° 15′. W. long. 169° 32′.

EAST CAPE, the eaſternmoſt land of the coaſt of New Zealand. S. lat. 37° 42′ 30″. W. long. 181°. The cape is high, and has white cliffs.

EAST CHESTER, a townſhip of America, in the ſtate of New York and county of Weſt Cheſter, on Long iſland Sound, about 8 miles S.W. of Rye, and 17 N.E. of New York, containing 738 inhabitants.

EASTER, in *Chronology* and *Eccleſiaſtical Hiſtory*, a feaſt of the church, held in memory of our Saviour's reſurrection.

The Greeks and Latins call it Πασχα, *paſcha*, originally a Hebrew word, ſignifying *paſſage*, applied to the feaſt of the Paſſover, which is held among the Jews much about the ſame time. In Engliſh it is called Eaſter, from *Eaſtre*, a goddeſs worſhipped with peculiar ceremony in the month of April.

The obſervation of this feſtival is as ancient as the time of the Apoſtles; for it is certain that the Chriſtians of the ſecond century celebrated anniverſary feſtivals in commemoration of the death and reſurrection of Chriſt, and of the effuſion of the Holy Ghoſt upon the apoſtles. The day which was obſerved as the anniverſary of Chriſt's death was called the paſchal day, becauſe it was conſidered as the ſame with that on which the Jews celebrated their Paſſover. But towards the cloſe of this century, a diſpute commenced about the particular time in which this feaſt was to be kept. The Aſiatic churches kept it on the 14th day of the firſt Jewiſh month, and three days after commemorated the reſurrection of the Redeemer, pleading on behalf of this practice the authority of the apoſtles, Philip and John, and the example of Chriſt, who held his paſchal feaſt on the ſame day that the Jews celebrated their paſſover. The weſtern churches celebrated their paſchal feaſt on the night that preceded the anniverſary of Chriſt's reſurrection, and thus connected the commemoration of his death with that of his reſurrection; and they pleaded the authority of the apoſtles Peter and Paul. One principal inconvenience attending the Aſiatic method was, that this great feſtival was commonly held on other days of the week than the *firſt*, or Sunday, which was the day of Chriſt's reſurrection. Hence very vehement contentions aroſe between the Aſiatic and Weſtern Chriſtians. About the middle of the ſecond century, during the reign of Antoninus Pius, the venerable Polycarp came to Rome, to confer with Anicet, biſhop of that ſee, upon this matter; but the conference, though conducted with great decency and moderation, was ineffectual for terminating the diſputes. Polycarp and Anicet, however, agreed in opinion, that the controverſy ought not to diſſolve the bonds of charity. Towards the cloſe of this century, Victor, biſhop of Rome, attempted to force the Aſiatic churches, by the pretended authority of his laws and decrees, to follow the rule which was obſerved by the weſtern churches: they refuſed to ſubmit, and were excommunicated by Victor. However, in conſequence of the mild interpoſition of Irenæus, biſhop of Lyons, the diſputants retained their own cuſtoms till the fourth century, when the council of Nice aboliſhed that of the Aſiatics, and rendered the time of the celebration of Eaſter the ſame through all the Chriſtian churches.

Eaſter is one of the moſt conſiderable feſtivals in the Chriſtian calendar; being that which regulates and determines the time of all the other moveable feaſts.

The rule for the celebration of Eaſter, fixed by the council of Nice, in the year 325, is that it be held on the Sunday which falls next after the full moon following the 21ſt of March; *i. e.* the Sunday which falls next after the firſt full moon after the vernal equinox.

The reaſon of which decree was, that the Chriſtians might avoid celebrating their Eaſter at the ſame time with the Jewiſh paſſover, which, according to the inſtitution of Moſes, was held the very day of the full moon.

To find Eaſter agreeably to this rule, the method that obtained throughout the church, from the time of Dionyſius Exiguus to that of the reformation of the calendar under pope Gregory, and which ſtill obtains in countries where the Gregorian correction is not admitted, is, by means of the golden numbers duly diſtributed throughout the Julian calendar. See *Metonic* Cycle.

To find Eaſter by the golden number, ſee Number *of Direction*, and *Metonic* Cycle.

In the new or Gregorian computation, in lieu of golden numbers, the time of Eaſter is found by means of epacts contrived for that purpoſe. See Epact, and *Metonic* Cycle.

Having the dominical letter and the epact, Eaſter-day may be found by the two following rules: 1. For finding Eaſter limit, or the day of the paſchal full moon from March the firſt incluſive; add 6 to the epact; and if this ſum exceeds 30, 30 muſt be taken from it; the remainder ſubtracted from 50 will give the limit, which is never to exceed 49, nor fall ſhort of 21. 2. From the limit and dominical letter, Eaſter-day may be found, by adding 4 to the number of the dominical letter, ſubtracting the ſum from the limit, and the remainder from the next higher number, which is exactly diviſible by 7; add the laſt remainder to the limit, and the ſum will give the number of days from the 1ſt of March to Eaſter-day, both incluſive. Thus for the year 1809, the epact is 14, and the dominical letter A: $6 + 14 = 20$: $50 - 20 = 30$ paſchal limit; $30 - 5$ the ſum of 4 and the dominical letter, $= 25$; and $28 - 25 = 3$, which added to 30, the limit, gives 33, or the number of days from March the 1ſt incluſive to Eaſter-day, or 2d of April.

The following table renders the finding of Eaſter in the Gregorian year from the year 1700 to the year 1900 very eaſy.

Epacts.	Paſchal full Moons.		Epacts.	Paſchal full Moons.	
X.	13 April,	E.	IX.	4 April,	C.
XI.	2 April,	A.	XX.	24 March,	F.
XXII.	22 March,	D.	I.	12 April,	D.
III.	10 April,	B.	XII.	1 April,	G.
XIV.	30 March,	E.	XXIII.	21 March,	C.
XXV.	18 April,	C.	IV.	9 April,	A
VI.	7 April,	F.	XV.	29 March,	D
XVII.	27 March,	B.	XXVI.	17 April,	B
XVIII.	15 April,	G.	VII.	6 April,	E.
			XVIII.	26 March,	A.

Now, to find Eaſter for any given Gregorian year, ſeek the dominical letter and the Gregorian epact, as ſhewn under Epact and *Metonic* Cycle. Find the epact in the table, and note the paſchal full moon, with the weekly letter correſponding to the ſame.

E. gr. the dominical letter of 1809 is A, and the epact XIV. conſequently the paſchal full moon falls on the 30th of March E, which is therefore Thurſday, and Eaſter-day is the 2d of April, as before.

Though the Gregorian calendar be doubtleſs preferable to the Julian, yet it alſo has its defects. It cannot, for inſtance, keep the equinox fixed on the 21ſt of March, but it will ſometimes fall on the 19th, and ſometimes on the 23d.

Add, that the full moon happening on the 20th of March, might ſometimes be paſchal; yet it is not allowed as ſuch in the Gregorian computation; as on the contrary, the full moon of the 22d of March may be allowed for paſchal, which it is not. Scaliger and Calviſius have alſo proved other inaccuracies in this calendar. See Calendar. See an excellent paper on this ſubject by the earl of Macclesfield, in the Phil. Tranſ. vol xl. p. 417. See *Metonic* Cycle, and Epact.

Easter, in *Geography*, an iſland in the South Pacific ocean, commonly ſuppoſed to be *Davis's land*, from its having being viſited by Capt. Davis in 1686, but touched at by Roggewin in April 1722, is ſituated in S. lat. 27° 5′ 30″, and W. long 109° 46′ 20″. The French editor of La Perouſe's voyage is of opinion that Davis's land does not exiſt: but that there are iſlands in the 27th degree of S. latitutde, about 200 leagues from Copiapo, which are the iſlands of St. Felix and St. Ambroſe, laid down erroneouſly in all the maps; and that theſe iſlands are the pretended land of Davis. Eaſter is about ten or twelve leagues in circuit, having a hilly and ſtony ſurface, and an iron bound ſhore. The hills are ſo high that they may be ſeen at the diſtance of 15 or 16 leagues. Off the S. end are two rocky iſlets lying near the ſhore: the north and eaſt points of the iſland riſe directly from the ſea to a conſiderable height; between them, on the S.E. ſide, the ſhore forms an open bay, in which Capt. Cook, who viſited this iſland in March 1774, ſuppoſes that the Dutch anchored. He anchored on the weſt ſide of the iſland, three miles to the north of the ſouth point, in a road which is very good with eaſterly winds, but dangerous with thoſe that are weſterly, as the other on the S.E. ſide muſt be with eaſterly winds. This bay, called "Cook's bay," is eaſily known, ſays La Perouſe; for after doubling the two rocks off the S. point of the iſland, and running along ſhore at the diſtance of a mile, a ſmall creek may be perceived, which is the moſt certain landmark. When this creek bears E. by S. and the two rocks juſt mentioned are ſhut in with the point, there is anchorage in twenty fathoms water over a bottom of ſand, at three quarters of a mile from the ſhore. Nothing, however, but neceſſity, ſays Cook, will induce any one to touch at this iſle, unleſs it can be done without going much out of the way, in which caſe it may be done with advantage, as the people readily part with ſuch refreſhments as they have, and at an eaſy rate. Generally ſpeaking, this iſland affords no ſafe anchorage, no wood for fuel, nor any freſh water worth taking on board. Nature has been very ſparing of her favours to this ſpot. As every thing muſt be raiſed by dint of labour, it cannot be ſuppoſed that the inhabitants plant much more than is ſufficient for themſelves, and as they are but few in number, they cannot have much to ſpare to ſupply the wants of ſtrangers who may chance to viſit them. La Perouſe ſays, that ſcarcely a tenth part of the iſland is cultivated; and ſuch is its fertility, that three days' labour is ſufficient to produce the Indian ſubſiſtence for a year. The lands already cleared are in an oblong form, and very regular, without any incloſure: the reſt of the iſland is covered with a very coarſe graſs, which extends to the ſummit of the mountains. The people ſeemed to have no implements of agriculture; and therefore it is probable, that when they have cleared the land, they make holes with ſtakes, and then plant their yams and potatoes. However, in the cultivation of the ſoil they manifeſt great intelligence, as they pull up the weeds, burn them in heaps, and thus fertilize the ſoil. The banana trees are planted in a ſtrict line by a cord. The produce of the iſland is ſweet potatoes, yams, taraoreddy root, plantain, and ſugar canes, all of which are tolerably good, and the potatoes peculiarly excellent in their kind. They have ſome few gourds. Their tame fowls, ſuch as cocks and hens, were few and ſmall, but well taſted. They have alſo rats, which they eat: of land birds there are ſcarcely any, and their ſea birds are few; theſe were men of war, tropic and egg birds, noddies, tern, &c. The coaſt did not ſeem to abound with fiſh. The ſoil is kept cool and moiſt by large ſtones, that lie looſe upon the earth, and ſupply the place of the ſalutary ſhade, of which the inhabitants have deprived themſelves by felling their trees. This practice, which has expoſed their ſoil to be burnt up by the ſun, and precluded the exiſtence of floods, rivulets, or ſprings, muſt have taken place in very remote periods. The inhabitants did not ſeem to exceed 6 or 700 in number, and of theſe above two-thirds were males, according to Cook's account; but La Perouſe, in 1785, eſtimates them at 2000: and the diſproportion between the males and females not ſo conſiderable. Their population did not ſeem to be on the decline. In colour, features, and language, they bear ſuch affinity to the people of the more weſtern iſles, that they are without doubt of the ſame origin. Their language, phyſiognomy, and manufactures, are the ſame with thoſe of the other iſlanders of the South ſea. They are generally of a ſlender race; ſo far from being giants, as one of the authors of Roggewin's voyage aſſerts, not one of them was ſeen who meaſured ſix feet. They are briſk and active, have good features, and not diſagreeable countenances; are friendly and hoſpitable to ſtrangers, but as much addicted to pilfering as any of their neighbours, nor do they ſeem to attach any diſgrace to it. But they are well apprized of the injuſtice they commit, for they inſtantly fly to eſcape the puniſhment, which they evidently expect. The practice of tattooing or puncturing the ſkin is much uſed in this iſland, both by the men and women; but leſs by the latter than by the former. Their cloathing is a piece or two of quilted cloth, about ſix feet by four, or a mat. One piece wrapped round their loins, and another over their ſhoulders, made a complete dreſs. But the men are generally naked, or wear nothing but a ſlip of cloth between their legs, faſtened by each end to a cord or belt paſſing round their waiſt. Their cloth, like that of Otaheite, is made of the bark of the cloth-plant. Their hair is commonly black, worn long by the women, and ſometimes tied up on the crown of the head; but the men wear their hair and beards cropped ſhort. Their head-dreſs is a round fillet adorned with feathers; and both men and women have very large holes, or rather ſlits in their ears, extended to the length of nearly three inches. Their ear ornaments are the white down of feathers, and rings made of ſome elaſtic ſubſtance and rolled round like a watch ſpring. The women offer their favours to thoſe who are diſpoſed to purchaſe them by preſents; and the men urge the acceptance of them, and while the women laviſh their careſſes, they take away the hats and the handkerchiefs of thoſe who comply. All ſeemed to be accomplices in theſe thefts, and as ſoon as they were committed, ran away like a covey of birds. Some of them dragged girls thirteen or fourteen years of age, ſolely with the hope of receiving the reward of panders; but their repugnance evinced, that in them the laws of the country were violated. Although theſe iſlanders ſeem to be harmleſs and friendly, they are not deſtitute of offenſive weapons, ſuch as ſhort wooden clubs and ſpears; the latter of which are crooked ſticks about ſix feet long, armed at one end with pieces of flint. Their houſes are low miſerable huts, conſtructed by ſetting ſticks upright in the ground, at ſix or eight feet diſtance, then bending them towards each other, and tying them together at the top. The building is ſo contrived as to be higheſt and broadeſt in the middle, and lower and narrower towards each end. To theſe ſticks are affixed others in a horizontal direction, and the whole is thatched over with leaves of ſugar-cane. The door way is in the middle of one ſide, formed like a porch, and ſo low and narrow as juſt to admit the entrance of a man crawling upon all fours. The largeſt of theſe huts ſeen by Capt. Cook was about 60 feet long, eight or nine feet high in the middle, and three or four at each end; its breadth being nearly equal to its height. But La Perouſe meaſured a houſe, conſtructed ſince Cook's viſit, which was 300 feet in length, 10 in breadth, and in the middle 10 in height. Its form was that of a canoe inverted; and it had no entrance except by creeping on the hands through two doors, both leſs than two feet high. This houſe was capable of containing 200 perſons; and, together with two or three others not far diſtant, formed a village. Some dwellings are ſubterraneous, and are a kind of caverns or vaulted houſes, conſtructed with ſtone. In theſe under-ground habitations, which are numerous in the interior part of the iſland, Capt. Cook and ſome of his officers imagine that the inhabitants conceal their women and children. They dreſs their victuals in the ſame manner as at Otaheite, with hot ſtones, in an oven or hole in the ground. The ſtraw, or tops of ſugar-canes, plantain-heads, &c. ſerve as fuel to heat the ſtones. In every diſtrict there is probably a chief, who ſuperintends the plantations, of which Capt. Cook imagined he was the proprietor. The moſt probable conjectures concerning the government of theſe iſlanders are, that they compoſe but a ſingle nation divided into as many diſtricts as there are "morais;" for it was obſerved that their villages are built near theſe cœmeteries. The productions of the earth appear to be common to all the inhabitants of the ſame diſtrict; and as men offer their wives to ſtrangers without the leaſt delicacy or reſerve, it muſt be ſuppoſed that they do not belong to any man in particular, and that as ſoon as children are weaned, they are delivered to other women, who in each diſtrict are charged with the management of them. The iſland abounds with ſeveral monuments and ſtatues, of a gigantic ſize, which appear to be very ancient; and they are placed in a kind of morai, or burying-ground, which might be inferred from the number of bones that were near them. Inſtead of the coloſſal mauſolea of pride and vanity, theſe iſlanders have ſubſtituted ſmall heaps of ſtone in the ſhape of a pyramid, the upper ſtone of which is whitened with lime-water. Theſe little monuments are erected near the ſea-ſhore; and an Indian clearly expreſſed to La Perouſe and his companions the object to which theſe heaps of ſtones were appropriated, by laying himſelf down and afterwards lifting up his head towards heaven, which evidently expreſſed his belief in a future exiſtence. However, they obſerved no trace of religious worſhip among them, and the gigantic ſtatues are not regarded as idols by the preſent inhabitants, though they expreſs a kind of veneration for them. They are placed on platforms of maſonry, ſome of which are 30 or 40 feet long, 12 or 16 broad, and from 3 to 12 feet in height. They are faced with hewn ſtones of a very large ſize; and the workmanſhip is not inferior to the beſt plain piece of maſonry we have in England. They uſe no ſort of cement, and yet the joints are exceedingly cloſe, and the ſtones mortiſed and tenanted into one another in a very artful manner. The ſide-walls are not perpendicular, but inclining a little inwards, like the breaſt-works, &c. that are built in Europe; and yet notwithſtanding all the ſkill manifeſted in their conſtruction, theſe curious ſtructures are mouldering by the ravages of all-devouring time. The coloſſal ſtatues, the largeſt of which is only fourteen feet ſix inches high, ſeven feet ſix inches broad acroſs the ſhoulders, three feet thick in the belly, and ſix feet broad, and five feet thick at the baſe, reſt upon platforms as their foundations. They are formed by a rude kind of ſculpture out of a volcanic production, known among naturaliſts by the name of "lapillo," ſays La Perouſe, a ſtone ſo light and friable, that ſome of Capt. Cook's officers thought it might be a factitious ſubſtance, compoſed of mortar indurated by the air. Although the workmanſhip is coarſe, the features of the face are not ill formed, particularly the noſe and chin; but the ears are long beyond proportion; and, as to the bodies, there is nothing like a human figure about them. In order to elevate them upon the platforms, and to place large cylindric ſtones upon their heads, Capt. Cook ſuppoſes that they raiſed the upper end by little and little, ſupporting it by ſtones as it was elevated, and building about it till it became erect; and thus a ſort of mount or ſcaffolding would be formed, upon which they might roll the cylinder, and place it upon the head of the ſtatue; and then the ſtones might be removed from about it. We may hence infer the ingenuity and perſeverance of the iſlanders at the period in which they were conſtructed. Beſides theſe monuments of antiquity, which were numerous, on or near the ſea-coaſt, there were many ſmaller piles of ſtones along the coaſt, as we have already mentioned. Theſe ſtones were lavas of different denſities. The canoes of theſe people are of the ſame form with thoſe of the Society iſlands; but they were mean in their ſtructure, being built of many pieces of wood ſewed together with ſmall line. There were only about three or four of them obſerved on the iſland; about 18 or 20 feet long, head and ſtern carved or raiſed a little, very narrow, and fitted with out-riggers. They ſeemed capable of carrying no more than about four perſons, and unfit for any diſtant navigation. As they have no trees on the iſland, they muſt have obtained the wood large enough for their purpoſe, either from that left here by the Spaniards, or from that drifted on the ſhore from ſome diſtant land. At the ſouthernmoſt extremity of the iſland, M. de Langle and other companions of La Perouſe found the crater of a volcano, whoſe ſize, depth, and regularity, excited their admiration. It reſembled the fruſtum of a cone, whoſe upper and lower baſis appeared more than two miles in circumference; the depth was at leaſt 800 feet. At the bottom was a marſh, containing ſeveral conſiderable pools of freſh water, whoſe ſurface appeared to be above the level of the ſea. This marſh was ſurrounded by the fineſt plantations of banana and mulberry trees. The graſs on the ſides of the cone, the marſh at the baſe, and the fertility of the adjacent lands, prove that the ſubterranean fires have been long extinguiſhed. The inhabitants of this iſland, as we have reaſon to believe, were more numerous when the iſland was better wooded. If they had ſufficient induſtry to build ciſterns for preſerving water, they would remedy one of the principal inconveniences of their ſituation, and might even prolong their lives; for M. de Langle informs us, that they did not ſee one man who appeared to be more than 65 years of age, as far as they were capable of judging. The ingenuity of theſe people may well ſurpriſe us, when we conſider the meanneſs of their working-tools, which, like thoſe of all the other iſlanders in this ocean, are made of ſtone, bone, ſhells, &c. They little value iron, or iron tools; and as preſents, they preferred pieces of painted cloth, half an ell long, to nails, knives, and beads. But the chief object of their wiſhes was hats, which they greedily accepted or ſtole whenever they had an opportunity. Cook's 2d Voyage, vol. i. La Perouſe's Voyage, vol. i.

Easter *Term*. See Term.

EASTERLING. See Sterling.

EASTERN. See Oriental.

Eastern *Amplitude, Church, Horizon, Ocean.* See the ſubſtantives.

Eastern *Diſtrict*, in *Geography*, a diſtrict of Upper Canada, conſtituted as ſuch by the name of the diſtrict of Lunenburgh, in the province of Quebec, by lord Dorcheſter's proclamation, July 24, 1788, and taken principally from the weſt end of Montreal. It derives its preſent name from an act of the provincial legiſlature. It is bounded by the province of Lower Canada on the eaſt; to the ſouth by the river St. Lawrence; northerly by the Ottawa river; and weſterly by a meridian line paſſing through the mouth of the Gananoque river in the townſhip of Leeds.

Eastern *Iſland*, an iſland on the E. ſide of Cheſapeak bay, at the mouth of Cheſter river.

Eastern *Precinct*, a precinct of America, in the ſtate of New Jerſey, and county of Somerſet, which contained, in 1790, 2068 inhabitants, including 468 ſlaves.

Eastern *River*, a ſettlement of America, in the ſtate of Maine, and county of Hancock, containing, in 1790, 240 inhabitants.

EASTERTON, a village of America, in Dauphin county, Pennſylvania, on the E. ſide of Suſquehannah river, 4 miles N. by W. of Harriſburg, and 111 N. by W. of Philadelphia.

EAST Florida. See Florida.

East Greenwich. See Greenwich.

East Grinstead. See Grinstead.

East Haddam. See Haddam.

EASTHAM, a poſt town of America, in the ſtate of Maſſachuſetts, and county of Barnſtaple, 6 miles long and 2½ wide, ſeated on the peninſula of Cape Cod, between Orleans and Wellfleet; diſtant 94 miles from Boſton. Since the foreſts have been cut down, a part of this townſhip is become a deſert of ſand; and though it has thus ſuſtained conſiderable damage as an arable diſtrict, the fertile lands are likely to be preſerved by incloſures. The number of families is 122, including 659 inhabitants in 99 dwelling-houſes, of which only ſeven are two ſtories high. At the diſtance of a mile, a light-houſe was erected on the high lands of Cape Cod in the year 1798. The town contains a meeting-houſe and two ſchool-houſes. The Nauſet Indians formerly occupied this town and Orleans. N. lat. 41° 51′. W. long. 69° 56′.

EAST Hampton. See Hampton.

East Hartford. See Hartford.

East Haven. See Haven.

East Island, an iſland ſo called by Cook, in 1769, that lies off East Cape, on the coaſt of New Zealand. It is of a ſmall circuit, high and round, and appears white and barren.

East Kingston. See Kingston.

East Main. See Main.

East Meath. See Meath.

East Ness, or Eastonness, a cape in the German ocean, on the eaſt coaſt of England, between Southwold and Loweſtoff.

EASTON, a poſt town of America, in the ſtate of Pennſylvania, and capital of Northampton county, pleaſantly ſituated at the mouth of the Lehigh, and on the W. ſide of Delaware river; containing about 150 dwelling houſes, a church, court-houſe, regiſter's office, and an academy, and

1045 inhabitants; 12 miles N.E. of Bethlehem, and 70 N. of Philadelphia.—Alſo, the chief and poſt-town of Talbot county, Maryland, formerly called Talbot court houſe, is ſeated on the E. ſide of Cheſapeak bay, near the forks of Treadhaven river; 12 miles from its junction with Choptank river. It has a handſome court-houſe and market-houſe, about 150 dwelling-houſes, and ſeveral ſtores for the ſupply of the adjacent country; 5 miles S. weſterly of Williamſburg, 37 S. of Cheſter town, and 118 S.W. of Philadelphia.—Alſo, a townſhip in Waſhington county, New York; containing 3069 inhabitants.

EASTON, or *Eaſtown*, a poſt-town, important for its iron manufactures, ſituated in the county of Briſtol, and ſtate of Maſſachuſetts, near the head of Raynham river, ſix miles N.W. of Raynham, and 12 W. of Bridgewater, and containing 1550 inhabitants. The art of making ſteel was introduced here by captain Eliph. Leonard in 1786; which ſerves by its excellent quality for plough-ſhares, horſe-ſhoes, &c. that require hard ſteel: but for edge-tools, in general, it is inferior to that which is imported. The beſt mill-ſaws in the ſtate are manufactured here. The manufacture of linſeed oil began here in 1792; and from an annual ſtock of 3000 buſhels of ſeed, there have been annually produced near 5000 gallons of oil.

EASTON'S *Beach* and *Bay*, a beach and bay of America, which lie at the ſouthern end of Rhode iſland.

EASTOWN, a town of America, in the county of Waſhington, and ſtate of New York, ſeated on the eaſt bank of Hudſon river, and containing 3072 inhabitants.

EAST POINT, the extreme eaſt point of the iſland of St. John, in the gulf of St. Lawrence.—Alſo, the N.E. extremity of New Holland. S. lat. 10° 42′.

EAST PORT, a poſt-town of Waſhington county, in the ſtate of Maine. This townſhip forms the weſtern cape of Paſſamaquoddy bay, and the mouth of Kobbeſkook river; ſituated 888 miles N. E. from Waſhington.

EAST RIVER, a river of America, in the ſtate of New York, forming a communication between North river and Long iſland, along the eaſtern ſide of New York iſland.

EAST RIVER. See QUINEPAUGE.

EAST TOWN, a town of America, in Cheſter county, and ſtate of Pennſylvania, containing 444 inhabitants.

EAST WHITELAND, a townſhip of America, in Cheſter county, Pennſylvania, containing 642 inhabitants.

EAST WINDSOR. See WINDSOR.

EATON. See ETON.

EATON, a townſhip of Lower Canada, E. of Aſcot, having 400 inhabitants. A ſouthern branch of St. Francis river runs through this town.—Alſo, a town of America, in the northern part of Strafford county, New Hampſhire, three miles N. of the Great Oſſipee lake, and about 56 N. by W. of Portſmouth; incorporated in 1766, and containing 381 inhabitants.

EATOOAS, in *Modern Hiſtory*, a name given at Otaheite to a claſs of enthuſiaſtic perſons, ſo called from a perſuaſion, that they are poſſeſſed with the ſpirit of the divinity. They appear as if they were bereaved of their ſenſes, and pretend to extraordinary gifts. During the paroxyſms of their fits they do not ſeem to know their moſt intimate acquaintance; and if any one of them happen to poſſeſs property, he will give away every moveable unleſs his friends put it out of his reach; and when he recovers, he will inquire for thoſe very things, which he had, juſt before, diſtributed, not ſeeming to have the leaſt remembrance of what he had done, while the fit was upon him. Cook's Third Voyage, vol. ii. p. 19.

EATUAS, in *Modern Mythology*, a name which the inhabitants of Otaheite in the South ſea give to an imaginary inferior race of deities; two of whom, they ſay, at ſome remote period of time, inhabited the earth, and were the parents of the firſt man. The term is derived from *cothe*, which ſignifies *finiſhed*. Theſe ſubordinate deities are very numerous, and are of both ſexes; the male are worſhipped by the men, and the female by the women, in ſeparate morais, and under the direction of diſtinct prieſts. There are alſo morais common to both. Hawkſw. Voyages, vol. ii. p. 239.

EAU ARQUEBUSADE. See AQUA *Vulneraria*.

EAU *de Luce*, is a kind of volatile liquid ſoap, of a ſtrong, penetrating ſmell. The following inſtructions will ſerve for making it: take four ounces of rectified ſpirit of wine, and in it diſſolve ten or twelve grains of white ſoap; filtrate this ſolution, then diſſolve in it a dram of rectified oil of amber, and filtrate again: mix as much of this ſolution with the ſtrongeſt volatile ſpirit of ſal ammoniac, in a cryſtal-glaſs bottle, as when ſufficiently ſhook, ſhall produce a beautiful milky-liquor. If upon its ſurface be formed a cream, ſome more of the oily ſpirit of wine ought to be added.

EAU *Rabel*. See RABEL.

EAVES, the margin or edge of the roof of a houſe, being the loweſt tiles, ſlate, or the like, which hang over the walls to throw off the waters to a diſtance from the wall.

EAVES-LATH, a thick feather-edged board, generally nailed round the eaves of a houſe for the lowermoſt tiles, ſlate, or ſhingles to reſt upon.

EAVES-*Droppers*, in *Law*, are perſons who liſten under walls or windows or the eaves of a houſe, to hearken after diſcourſe, and thereupon to frame ſlanderous and miſchievous tales. Theſe are a common nuiſance, and preſentable at the court-leet, or indictable at the quarter ſeſſions, and puniſhable by fine, and finding ſureties for good behaviour. 1 Hawk. P. C. 132.

EAUZE, in Latin *Eluſa*, in *Geography*, a very ancient town of France, in the department of the Gers, chief place of a canton, in the diſtrict of Condom, ſituated on the river Geliſe, near the ruins of the ancient Eluſa, which was the chief city of Novempopulania; 21 miles S.W. of Condom, and 30 miles N.W. of Auch. It has a population of 3300 individuals. The canton contains 14 communes, and 9224 inhabitants, upon a territorial extent of 287½ kiliometres.

EBBING *and Flowing of the Sea*. See TIDES.

EBDOMARY, EBDOMADARIUS, an officer anciently appointed weekly in cathedral churches, to ſuperviſe the regular performance of divine ſervice, and preſcribe the particular duties of each perſon attending in the choir, as to reading, ſinging, and praying. To this purpoſe, the ebdomary, at the beginning of his week, drew up in form, a bill, or writing, of the reſpective perſons, and their ſeveral offices, called *tabula*, and the perſons there entered were ſtyled *intabulati*.

EBDOME, Ἑβδόμη, in *Antiquity*, a feſtival kept on the ſeventh of every lunar month, in honour of Apollo, to whom all ſeventh days were ſacred, becauſe one of them was his birth-day; whence he was ſometimes called *Ebdomagenes*. For the ceremonies of this ſolemnity, ſee Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 385.

EBEDJESU, in *Biography*, a learned Syrian writer, of the ſect of the Neſtorians, was biſhop of Niſibis, called by the Syrians Soba, in the latter part of the 13th century, and died in the year 1318. Dr. Aſſeman firſt publiſhed an accurate edition of his catalogue of eccleſiaſtical writings at Rome, in 1725. Ebedjeſu having, in his catalogue, mentioned the writers of the Old Teſtament, proceeds to enumerate thoſe of the New, arranging the goſpels, the Acts of the Apoſtles, three Catholic epiſtles, and St. Paul's 14 epiſtles.

epiſtles in the order which now obtains among us, and ſpecifying the places and languages in which the ſeveral goſpels of Matthew, Mark, Luke, and John, were written, agreeably to the common opinion of the Syrians in general. Accordingly, he ſays, that Matthew wrote his goſpel in Hebrew, and publiſhed it in Paleſtine; that Mark preached in Latin at Rome; Luke taught and wrote at Alexandria, in the Greek tongue; and John wrote his goſpel at Epheſus, in the ſame language. He mentions only three Catholic epiſtles, omitting the 2d of Peter, and 2d and 3d of John, and the epiſtle of Jude; conforming, in this reſpect, to the common ſentiments of the Syrians. He likewiſe omits the book of Revelation; which book, and alſo the three Catholic epiſtles, are omitted in the ancient Syriac verſion. Dr. Lardner very juſtly remarks, that Ebedjeſu ſhould not have paſſed over in ſilence the four Catholic epiſtles, and the book of Revelation, whatever might have been the general opinion of the Syrians concerning them; becauſe he could not be unacquainted with them. And if they were not equally reſpected with the other books of the New Teſtament, he might have ſo ſaid. Lardner's Works, vol. iv. p. 442.

EBELEBEN, in *Geography*, a ſmall town of the kingdom of Saxony, belonging to the prince of Schwarzburg Sonderſhauſen, with a caſtle and a grammar ſchool, remarkable for ſeveral learned profeſſors, among others Paul Gölzen, known among hiſtorians by the name of Paulus Jovius.

EBELING, C. D. in *Biography*, of Hambro', well merits notice among German dilettanti, for his excellent taſte, ſound judgment, and extenſive knowledge of the hiſtory of the muſical art and its votaries; many excellent tracts and critiques have flowed from his pen, to which he never ſet his name. He was many years in ſtrict friendſhip with the incomparable Emanuel Bach, whoſe ſuperior genius and abilities he very early felt; and on the death of Telemann, he, perhaps, firſt taught the Hamburghers to appreciate his merit. His collection of muſic and muſical curioſities, 30 years ago, ſurpaſſed that of any other private gentleman of that city. M. Ebeling was then in partnerſhip with M. profeſſor Buſch, in the celebrated Academy of Commerce. He is author, among other works, of the "Hiſtory of the American War," which has been much approved; but the preſent article extends no further than his ſkill, performance, and knowledge in muſic, faculties which he has, unhappily, long ceaſed to enjoy, except by memory, and reflection, from an almoſt total deafneſs.

EBELSTADT, or EBELTOFT, in *Geography*, a ſmall town of Denmark, in the province of North Jutland, with a good harbour, on the gulf of the ſame name, on the eaſt ſide of Jutland. In Latin, it is called *Ebeltoftia*, or *Pomagrium*. Ebeltoft is in the dioceſe, or general government, of Aarhuus, in the circle of Stiernholm.

EBENEZER, a town of America, being the capital of Effingham county, in the ſtate of Georgia, ſeated on the S.W. bank of Savannah river; 25 miles N.N.W. of Savannah, and 860 S.W. of Philadelphia. It was ſettled in 1735, by Proteſtants, driven by perſecution from Saltſburg, in the electorate of Bavaria; but is now declining, and reduced to leſs than 12 decaying houſes.

EBENFELD, a town of Germany, in the duchy of Carniola; 3 miles S. of Stein.

EBENFURTH, a town of Germany, in the archduchy of Auſtria, ſeated on the Leyta, built by the knights Templars; 18 miles S. of Vienna.

EBENHAUSEN, a ſmall town of Germany, in the former biſhopric of Wurtzburg, which was ſeculariſed at the peace of Luneville, and given as an indemnity to the grand duke of Tuſcany.

EBENOXYLUM, in *Botany*, from εβενος, *ebony*, the name of a valuable wood in Theophraſtus, Pliny, &c. and ξυλον, *wood*, Loureir. Cochinch. 613. Claſs and order, *Diœcia Triandria*?

Gen. Ch. Male, *Cal.* none. *Cor.* Petals three, longiſh, acute, a little ſpreading, incurved. *Stam.* . . . Female. *Cal.* and *Cor.* as in the male. *Nectary* ſtellated. *Style* one, ſhort. *Berry* ſmall, ovate, ſmooth, of one cell. *Seeds* three, oblong, angular.

Eſſ. Ch. Male, Cal. none. Petals three. Female, Cal. none. Petals three. Nectary ſtellated. Style one. Berry with three ſeeds.

Sp. *Ebenoxylum verum*, Lour. A tall tree, with aſcending branches. *Bark* rough, greeniſh-brown. *Wood* with a thick, heavy, white, uniform *alburnum*, and a very black, very heavy, and peculiarly uniform heart. *Leaves* ſcattered, ſtalked, lanceolate, broadiſh, entire, ſmall, ſmooth, firm, ſhining, flat, of a browniſh-green. *Flowers* white, on many-flowered terminal ſtalks. *Berry* reddiſh-yellow. Native of the vaſt woods of Cochinchina, about the 11th degree of north latitude, where Loureiro ſays he had often ſeen it, but not being then attentive to botany, he neglected to collect the flowers. The generic characters above given are, therefore, taken from Rumphius, who in his Herb. Amboin. part 4. t. 1, figures what he terms *Ebenus vulgaris*, and appears to be the plant of Loureiro. Whether it may be the ſame with any of the trees we have already mentioned under DIOSPYROS, (which ſee,) and how far the above characters are faithful, we have not materials to determine.

EBENSFELD, in *Geography*, a town of Germany, in the duchy of Stiria; 6 miles W. of Pettau.

EBENTHEL, a town of Germany, in the duchy of Carinthia; 2 miles S.S.E. of Clagenfurt.

EBENUS, in *Botany*, Linn. Gen. 386. Schreb. 491. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Leguminoſæ*, Juſſ. *Papilionaceæ*, Linn. E. *cretica*, Linn. Sp. Pl. 1076. Alpin. Exot. t. 278, the only ſpecies upon which this genus was founded by Linnæus, is reduced to *Anthyllis* by Juſſieu, who is followed by La Marck, and by Willdenow, Sp. Pl. v. 3. 1019. The latter defines it "ſhrubby; leaves pinnate, or ternate, equal, villoſe; flowers ſpiked." It is a native of Crete; a ſlender elegant ſhrub, with ſilky leaves, and roſe-coloured flowers. Proſper Alpinus conceived this to be one of the plants comprehended by Theophraſtus under his εβενος, or *ebony*, as the wood is hard and black, and the ſhrub has an affinity to *Cytiſus*. Hence, the above name was retained by Linnæus (See DIOSPYROS and EBENOXYLUM.) *Ebenus pinnata*, Ait. Hort. Kew. v. 3. 27. Desfont. in Act. de la Soc. d'Hiſt. Nat. de Paris, v. 1. t. 3, apparently of the ſame genus as the above, is *Anthyllis ſericea*, Willd. 1014 This grows in Barbary and the Levant. Vahl makes it an *Hedyſarum*. The ſtem is not ſhrubby, but herbaceous, and the root biennial.

EBERACH, in *Geography*, a ſmall town of the kingdom of Bavaria, with a rich abbey, which was ſecularized at the peace of Luneville, and the revenues of which were made over to Bavaria.

EBERARDI, LA TERESA, in *Biography*, one of the moſt elegantly ſimple and pleaſing Italian ſingers of the ſecond claſs, that we remember on our opera ſtage. She was here from the year 1760 to 1765, and performed the ſecond woman's part in ſerious operas under the Mattei, and in the comic, under the Paganini, while Eliſi was here.

Whoever heard her ſing Galuppi's Sicilian ſtrain, "La paſtoralla al Prato," in Il Filoſofo di Campagnæ, and "Sono Amante," in La Peſcatrice, will never forget her modeſt, unadorned, and unpretending manner of ſinging, which pleaſed, by mere purity of tone and natural ſweetneſs of expreſſion. And though her ſtyle and appointment were ſo inferior to the two great ſingers, with whom ſhe alternately appeared, ſhe was ſcarcely ever ſuffered to quit the ſtage, till ſhe had repeated her ſongs.

EBERBACH, in *Geography*, a ſmall town of the kingdom of Bavaria, ſituated on the Neckar; 2 miles W. of Moſsbach, and remarkable for its good wine.—Alſo, a ſmall town of France, in the department of the Lower Rhine; 9 miles of Haguenau, in the diſtrict of Straſbourg.

EBEREMORTH, or EBEREMORS, in our *Old Law*, the ſame as eberemurdrum, or eberemurder. See ABEREMURDER.

EBEREMURDRUM, or ABEREMURDRUM, in our *Old Writers*. See ABEREMURDER.

EBERMANSTADT, in *Geography*, a town of Germany, in the circle of Franconia, and biſhopric of Bamberg, ſeated on the Wiſent; 13 miles E.S.E. of Bamberg.

EBERN, a ſmall town of Germany, in the former biſhopric, now grand duchy of Würtzburg, ſituated on the river Baunach, and chief place of a diſtrict of the ſame name.

EBERSBURG, a ſmall town of the kingdom of Saxony, belonging to the counts of Stollberg, and remarkable for a very ancient tower, and the ruins of an old caſtle, and for a rich coal-mine, at a very little diſtance, near the village of Herrmanſacker.

EBERSTEIN, a ſmall town of Germany, in the grand duchy of Baden, near the Black foreſt, the diſtrict of which was formerly an earldom. It is five miles S.E. of Baden.

EBHER, a town of Perſia, in the province of Irak, ſeated on a river of the ſame name, in a fertile country, containing about 2500 houſes, and many moſques, caravanſeras, bazars, and other handſome buildings. The Turkiſh language is ſpoken in one part of the town, and the Perſian in the other. It is diſtant 40 miles W. from Caſbin.

EBIN, or YBIN, one of the ſmaller Philippine iſlands, in the Eaſt-Indian ſea.

EBINGEN, or EKINGEN, a town of Germany, in the circle of Swabia, and duchy of Wurtemburg; 36 miles S. of Stutgardt, and 22 S. of Tubingen.

EBIONITES, in *Eccleſiaſtical Hiſtory*, the denomination of perſons who roſe in the church in the very firſt age of it, and formed themſelves into a ſect in the ſecond century, denying the divinity of Jeſus Chriſt.

Origen takes them to have been ſo called from the Hebrew word *ebion*, which, in that language, ſignifies *poor;* becauſe, ſays he, they were poor in ſenſe, and wanted underſtanding. Euſebius, with a view to the ſame etymology, is of opinion, they were thus called, as having poor thoughts of Jeſus Chriſt, taking him for no more than a mere man, born of Joſeph and Mary; and eſteeming the ritual ordinances of the law neceſſary to be obſerved by them. Others, he ſays, do not deny, that Jeſus was born of a virgin by the Holy Ghoſt. Nevertheleſs, they do not acknowledge his pre-exiſtence, as God the Word; and, like the others, they are fond of the external obſervances of the law of Moſes. They alſo reject Paul's epiſtles, and call him an apoſtate from the law.

It is more probable the Jews gave this appellation to the Chriſtians in general, out of contempt; becauſe, in the firſt times, there were few but poor people that embraced the Chriſtian religion. This opinion, Origen himſelf ſeems to give into, in his book againſt Celſus, where he ſays, that they called Ebionites, ſuch among the Jews as believed that Jeſus was truly the expected Meſſiah.

It might even be urged, with ſome probability, that the primitive Chriſtians aſſumed the name themſelves, in conformity to their profeſſion. It is certain, Epiphanius obſerves, they valued themſelves on being poor, in imitation of the apoſtles. The ſame Epiphanius, however, is of opinion, that there had been a man of the name *Ebion*, the chief and founder of the ſect of Ebionites, contemporary with the Nazarenes and Cerinthians. He gives a long and exact account of the origin of the Ebionites, making them to have riſen after the deſtruction of Jeruſalem, when the firſt Chriſtians, called *Nazarenes*, went out of the ſame to live at Pella.

As to the origin of their name, many learned men are now of opinion, that there never was any man named Ebion, the leader of a ſect; but that the Ebionites were ſo called from their low opinion concerning the perſon of Chriſt, and their attachment to the external rites of the law of Moſes. To this opinion the judicious Dr. Lardner ſeems to incline. We cannot deny, ſays this candid writer, (vol. vii. p. 21.) that there were ſome believers, who ſuppoſed Jeſus to have been born as other men; but he apprehends, that the number of them was very ſmall, nor does he recollect any Chriſtian writing, now extant, where that opinion is maintained. Although we allow that there were ſome, who rejected the apoſtle Paul, whilſt they received the other apoſtles, theſe he ſuppoſes to have been few in number. He adds, that he does not know any work of an ancient author, now remaining, who ſpeaks diſreſpectfully of him, excepting only the "Recognitions," or "Clementine Homilies."

The Ebionites are little elſe than a branch of Nazarenes; only that they are ſaid to have altered and corrupted, in many things, the purity of the faith held among thoſe firſt adherents to Chriſtianity. For this reaſon, Origen, as well as Euſebius, diſtinguiſhes two kinds of Ebionites, in his anſwer to Celſus: the one believed that Jeſus Chriſt was born of a virgin; and the others, that he was born after the manner of other men. The firſt were orthodox in every thing, except that to the Chriſtian doctrine they joined the ceremonies of the Jewiſh law, with the Jews, Samaritans, and Nazarenes, together with the traditions of the Phariſees. They differed from the Nazarenes, however, in ſeveral things, chiefly as to what regards the authority of the ſacred writings; for the Nazarenes received all for ſcripture contained in the Jewiſh canon; whereas the Ebionites are ſaid to have rejected all the prophets, and held the very names of David, Solomon, Iſaiah, Jeremiah, and Ezekiel, in abhorrence. They alſo rejected all St. Paul's Epiſtles, whom they treated with the utmoſt diſreſpect.

They received nothing of the Old Teſtament but the Pentateuch; which ſhould intimate them to have deſcended rather from the Samaritans than from the Jews. They agreed with the Nazarenes in uſing the Hebrew Goſpel of St. Matthew, otherwiſe called the Goſpel of the Twelve Apoſtles; but they are charged with having corrupted their copy in abundance of places; and particularly with having left out the genealogy of our Saviour, which was preſerved entire in that of the Nazarenes, and even in thoſe uſed by the Cerinthians.

Irenæus, Euſebius, and Epiphanius, concur in ſaying, that the Ebionites received the goſpel of St. Matthew only. Epiphanius informs us, that the goſpel of the Ebionites began with the third chapter of Matthew, a little altered, and he ſays expreſsly, that it is defective and corrupted.

Some, however, have made this goſpel canonical, and of greater value than our preſent Greek goſpel of St. Matthew. See *Goſpel of* ST. MATTHEW and NAZARENES.

Beſide the Hebrew goſpel of St. Matthew, the Ebionites had adopted ſeveral other books, under the names of St. James, John, and the other apoſtles; they alſo made uſe of the travels of St. Peter, which are ſuppoſed to have been written by St. Clement, but had altered them ſo, that there was ſcarce any thing of truth left in them. They even made that ſaint tell a number of falſehoods, the better to authorize their own practices. See St. Epiphanius, who is very diffuſive on the ancient hereſy of the Ebionites, Hær. 30.

But his account deſerves little credit, as, by his own confeſſion, he has confounded the other ſects with the Ebionites, and has charged them with errors, to which the firſt adherents to this ſect were utter ſtrangers.

Dr. Prieſtley, in his "Hiſtory of Early Opinions concerning Jeſus Chriſt, &c." (vol. iii.) zealouſly maintains the identity of the Ebionites and Nazarenes; and in oppoſition to thoſe who aſſert, that they were ſubſequent to the deſtruction of Jeruſalem by Titus, and to others who have fixed their origin ſo late as the deſolation of Judea by Adrian, he endeavours to ſhew, that perſons diſtinguiſhed by theſe appellations were ſuppoſed to have exiſted in the time of the apoſtles. Irenæus, ſays this writer, who gives no other name to any Jewiſh Chriſtians beſides that of Ebionites, whom he always ſpeaks of as denying the pre-exiſtence and divinity of Chriſt, and likewiſe the miraculous conception, objects to the Gnoſtics, that they were of late date, but he ſays nothing of the Ebionites in that reſpect. Euſebius alſo ſays, that "the firſt heralds of our Saviour" (meaning the apoſtles) "called thoſe Ebionites, which in the Hebrew language ſignifies poor; who, not denying the body of Chriſt, ſhewed their folly in denying his divinity."

Epiphanius makes the Ebionites contemporary with the Nazarenes; and he mentions the Ebionites as well as the Nazarenes among thoſe who gave great alarm to the apoſtle John. Dr. Prieſtley further maintains, that there was no difference between theſe two ſects; and that both of them were equally believers in the ſimple humanity of Chriſt. To this purpoſe he alleges the teſtimonies of Origen, Euſebius, and Jerom; but ſome have thought that the paſſages he produces do not decidedly warrant the inference which he deduces from them. (See the preceding part of this article, and the title NAZARENES.) In favour of the identity of the Ebionites and Nazarenes, this author obſerves, that the latter are not mentioned by name by any writer, who likewiſe ſpeaks of the Ebionites, before Epiphanius, who was fond of multiplying hereſies, though the people ſo called were certainly known before his time. The term Ebionites occurs, he ſays, only in Irenæus, Tertullian, Origen, and Euſebius. None of them make any mention of Nazarenes, though they muſt have been more conſiderable in the time of theſe writers than they were afterwards. It was not till the time of Epiphanius, that the term Nazarenes, by which the unbelieving Jews ſtill continued to call the Chriſtians among them, was applied to a ſect different from that of the Ebionites. M. Le Clerc, and many other eminent critics of the laſt age, maintained the opinion, that the Ebionites and Nazarenes were the ſame people. Mr. Jones "On the Canon" (vol. i.) obſerves, that there was a very great agreement between theſe two ancient ſects, but at the ſame time he intimates, that the Ebionites had made ſome addition to the old Nazarene ſyſtem. Our author, after having remarked that the peculiar opinions of the Ebionites and Nazarenes are repreſented by the moſt reſpectable authorities as the very ſame, adds, that ſome have thought that the Nazarenes believed the miraculous conception, which the Ebionites denied; but that this opinion has no authority whatever among the ancients. Againſt this aſſertion, however, many objections might be urged. (See NAZARENES.)

Tertullian, it is obſerved, is the firſt Chriſtian writer who expreſsly calls the Ebionites *heretics*. Although Irenæus profeſſes his diſlike of their doctrine, he never confounds them with the heretics. Juſtin Martyn makes no mention of them, but is ſuppoſed to include them under the general denomination of "Jewiſh Chriſtians;" and it is aſſerted, on the authority of Jerom, that the Ebionites were anathematized *ſolely* on account of their adherence to the Jewiſh law, the yoke of which many of them were deſirous of impoſing on the Gentile Chriſtians. Epiphanius, with great injuſtice, as it ſeems, charges the Ebionites with the peculiar doctrines of the Gnoſtics; whereas by the teſtimony of ancient writers, the hereſy of the former was the very reverſe of that of the latter.

The Ebionites, as we have already ſaid, made uſe of no other goſpel than that written in Hebrew, which was their own language, and this goſpel is commonly ſaid to be that of St. Matthew, originally compoſed in their language, and for their uſe. Their copies of this goſpel, however, began with the third chapter.

Epiphanius ſays, as we have already obſerved, that they alſo made uſe of the travels of Clement, with which they might be pleaſed, as it was an Unitarian work. But they made no uſe of the epiſtles of St. Paul, becauſe they diſapproved the ſlight, which he put upon the law of Moſes, which they held in the greateſt veneration. Epiphanius further ſays concerning the Ebionites, that they deteſt the prophets. However, from other accounts it appears, that they acknowledged the authority of all thoſe books which we admit into the canon of the Old Teſtament. Symmachus was an Ebionite, and Theodotion, according to Jerom, was of the ſame ſect, and as they both tranſlated the other books of the Old Teſtament, as well as the Pentateuch, and without making any diſtinction between them, it is probable that they conſidered them as entitled to equal credit. To this purpoſe Irenæus expreſsly ſays, that the Ebionites expounded the prophecies too curiouſly.

EBISMA, in *Ancient Geography*, a town of Arabia Felix, in the country of the Adramites, according to Ptolemy.

EBLANA, a town of Hibernia, now *Dublin*.

EBODA, a town of Arabia Petræa, according to Ptolemy; but placed by Pliny in Arabia Felix.

EBOES, a name given in the Weſt Indies to thoſe negroes who are imported from thoſe parts of Africa that are bounded weſtward by an extent of coaſt of about 300 leagues, called the bight of Benin. (See BENIN.) Theſe negroes are, with regard to their complexion, much yellower than thoſe of the Gold Coaſt and Whidah. They appear of a ſickly hue, and their eyes ſeem to be ſuffuſed with bile, even when they are in perfect health. The conformation of their face, in general, reſembles that of the baboon. The great objection to theſe Eboes, as ſlaves, is their conſtitutional timidity and deſpondency of mind, which prevail to ſuch a degree, that they often ſeek, in a voluntary death, a refuge from their own melancholy reflections. They therefore require mild and gentle treatment to reconcile them to their ſituation; and with this treatment their confidence may be gained, and they then manifeſt as great fidelity, affection, and gratitude, as can be expected from men in a ſtate of ſlavery. The females are better labourers than the men, probably from their having been more hardly treated in Africa. It is ſaid, however, that theſe Eboes are more ſavage than any nation of the Gold Coaſt; inaſmuch as many of them, eſpecially thoſe of the Moco tribe, have been accuſtomed to the ſhocking practice of feeding on human fleſh. As to their religious opinions and modes of worſhip, it is ſaid, that, like the inhabitants of Whidah, they pay adoration to certain reptiles, of which the guana, a ſpecies of lizard, is in the higheſt eſtimation. They univerſally practiſe circumciſion; and it is, moreover, affirmed, that they frequently offer up human ſacrifices in their worſhip of the guana. Edwards's Hiſt. W. Indies. vol. ii.

EBOLICS, Ebolica. See Ecbolics.

EBONY *of Crete*, in *Botany*. See Ebenus.

Ebony *of the Alps*. See Cytisus.

Ebony, *Falſe*. See Poinciana.

Ebony, *Mountain*. See Bauhinia.

Ebony-*Wood* is brought from the Indies, exceedingly hard and heavy, ſuſceptible of a very fine poliſh, and on that account uſed in Moſaic and inlaid works, toys, &c.

There are divers kinds of ebony; the moſt uſual among us are black, red, and green, all of them the product of the iſland of Madagaſcar, where the natives call them, indifferently, *hazon mainthi*, *q. d.* black wood. The iſland of St. Maurice, belonging to the Dutch, likewiſe furniſhes part of the ebonies uſed in Europe.

Authors and travellers give very different accounts of the tree that yields the black ebony. By ſome of their deſcriptions, it ſhould be a ſort of palm-tree; by others, a cytiſus, &c. M. Flacourt, who reſided many years at Madagaſcar, as governor thereof, aſſures us, that it grows very high and big, its bark being black, and its leaves reſembling thoſe of our myrtle, of a deep, duſky, green colour.

Tavernier ſays, that the iſlanders always take care to bury their trees, when cut down, to make them the blacker, and to prevent their ſplitting, when wrought. F. Plumier mentions another black ebony tree, diſcovered by him at St. Domingo, which he calls "ſpartium portulacæ foliis aculeatum ebeni materiæ." Candia alſo bears a little ſhrub, known to the botaniſts under the name of *ebenus Cretica*, above deſcribed.

Pliny and Dioſcorides ſay, the beſt ebony comes from Ethiopia, and the worſt from India; but Theophraſtus prefers that of India. Black ebony is much preferred to that of other colours. The beſt is a jet black, free of veins and rind, very maſſive, aſtringent, and of an acrid pungent taſte. This is the dioſpyros ebenum, according to Dr. Roxburg's account, and is found in the woods of Ceylon. See Diospyros. Loureiro makes a diſtinct genus of it under the name of *Ebenoxylum*, which ſee. Its rind, infuſed in water, is ſaid to purge pituita and cure venereal diſorders; whence Matthiolus took guaiacum for a ſort of ebony. It yields an agreeable perfume when laid on burning coals: when green, it readily takes fire, from the abundance of its fat. If rubbed againſt a ſtone it becomes brown. The Indians make ſtatues of their gods, and ſceptres for their princes, of this wood. It was firſt brought to Rome by Pompey, after he ſubdued Mithridates. It is now much leſs uſed among us than anciently; ſince the diſcovery of ſo many ways of giving other hard woods a black colour.

As to the green ebony, beſides Madagaſcar and St. Maurice, it likewiſe grows in the Antilles, and eſpecially in the iſle of Tobago. The tree that yields it is very buſhy; its leaves are ſmooth, and of a fine green colour. Beneath its bark is a white blea, about two inches thick; all beneath which, to the very heart, is a deep green, approaching towards a black, though ſometimes ſtreaked with yellow veins. Its uſe is not confined to Moſaic work; it is likewiſe good in dyeing, as yielding a fine green tincture.

As to red ebony, called alſo *grenadilla*, we know little of it more than the name.

The cabinet makers, inlayers, &c. make pear-tree, and other woods, paſs for ebony, by giving them the black colour thereof. This ſome do by a few waſhes of a hot decoction of galls; and when dry, adding writing ink thereon, and poliſhing it with a ſtiff bruſh, and a little hot wax; and others heat or burn their wood black.

EBORA, in *Ancient Geography*, now *Evora*, a town of Spain, in the S. W. part of Luſitania. According to Bochart, its name, in the Eaſtern language, ſignifies abundance; which correſponds to *Cerealis*, derived from Ceres, an appellation given to it by Pliny.

EBRBUHARITES, a ſect or order of religious, among the Mahometans; thus called from their founder Ebrbuhard, a diſciple of Nacſchibendi.

The Ebrbuharites, notwithſtanding the extraordinary ſanctity they make profeſſion of, with an abſolute dereliction of all worldly things, are regarded, by the Muſſulmans, as no better than heretics, becauſe they do not eſteem themſelves obliged to go in pilgrimage to Mecca. To excuſe themſelves from this labour, they urge, that the pureneſs of their ſouls, their ſublime contemplations, ecſtacies, &c. ſhew them Mecca and Mahomet's tomb, without ſtirring out of their cells.

EBREUIL, in *Geography*, a ſmall town of France, in the department of the Allier, chief place of a canton, in the diſtrict of Gannat, with a population of 2200 individuals. The canton has an extent of 207 kiliometres and a half, and contains 13,043 inhabitants, diſperſed in 17 communes.

EBRICCATUM, a term uſed by Paracelſus to expreſs the partial loſs, or deprivation of reaſon, as it happens during drunkenneſs; but with the addition of the epithet *cæleſte*, it ſignifies, with the ſame author, a much more exalted ſtate, a ſort of divine enthuſiaſm, or inſpiration, ſuch as the Sybils of old boaſted of; and, among the moderns, the French prophets, and ſome other religious ſects, have pretended to. Paracelſus himſelf pretended, at times, to be under ſome ſuch influence; but his mad fits ſeemed to have very little of inſpiration in them.

EBRIETAS. See Drunkenness.

EBRILLADE, in the *Manege*, a check of the bridle, which the horſeman gives to the horſe by a jerk of one rein, when he refuſes to return. An ebrillade differs from a *ſaccade*, the latter being made with both reins at once, and the former only with one. Moſt people confound theſe two words under the general name of a check or jerk of the bridle, called in French *coup de bride*. It is a chaſtiſement, and no aid, and is diſuſed in academies.

EBRIZIUS Color, a term uſed by ſome of the old writers, to expreſs a very fine yellow. The word ſeems originally to have been obrizium, and was certainly derived from the aurum obryzum, or fine gold, of which this ebrizius expreſſed the colour.

EBRO, in *Geography*, the ancient *Iberus*, from which Spain took the name of Iberia, is a conſiderable river of Spain, which has its ſource on the boundaries of the Aſturias and Old Caſtile, in the mountains near Santillana, runs through Biſcay and Arragon, begins to be navigable at Tudella, paſſes by Saragoſſa, where commences a canal, into which the Ebro falls at Bocal, and then flows through Catalonia into the Mediterranean ſea, about 25 miles below Tortoſa. Its water is remarkable for its ſalubrity. Its courſe is from north-weſt to ſouth-eaſt, through the greateſt part of northern Spain.

The Ebro ſerved as a limit to the conqueſts of Charles the Great, in the South, and the French did not penetrate further into Spain in 1795. But at the end of the year 1808, and in the beginning of 1809, their conqueſts extended to a conſiderable diſtance beyond this river, which is to form the boundary between France and Spain, in caſe Joſeph Buonaparte maintains himſelf on the throne of the united kingdom of Spain and Portugal.

EBRODUNUM, in *Ancient Geography*, *Embrun*, a town of Gaul, belonging to the Caturiges. It is alſo called *Eberudoro*, *Hebriduno*, and *Eburono*. It lies at the foot of the Alps, and is therefore referred to Italy by Ptolemy.

EBROIN, in *Biography*, mayor of the palace under the French kings Clotaire III. and Thierri I., is ſuppoſed to have been a German by birth. At the ſucceſſion of Clotaire, in 656, he was raiſed to the dignity of mayor, and in this capacity he governed the kingdom in conjunction with the queen-mother Batilde. During ten years the adminiſtration of public affairs was conducted with impartiality and peace, but at the end of this period diſputes ran high between Ebroin and two biſhops, which ſo diſguſted the queen, that ſhe withdrew to a convent. Ebroin now held the reins of government with a high hand, and made the principal people in the ſtate his enemies, who, at the death of Clotaire, roſe in arms, plundered the miniſter, and dethroned Thierri, whom he had proclaimed as king. For a ſhort time Childeric, king of Auſtraſia, reigned in the room of Thierri, but, in 670, the death of Childeric made room for the depoſed monarch, who was replaced on the throne, and on this event Ebroin left the monaſtery, to which he had retired, and ſcrupled the uſe of no means to regain his former poſt, which he at length obtained, when he became as deſpotic as he was powerful, and inflicted on his enemies the moſt cruel torments. He was himſelf aſſaſſinated in the year 681, by one whom he had fined for mal-practices in the offices which he held. Moreri.

EBROMAGUS, or EBROMANUS PAGUS, in *Ancient Geography*, a place of Aquitanic Gaul. Anton. Itin.

EBRUS, a river of Illyria, according to Diodorus Siculus.—Alſo, a river of Greece, in Theſſaly, which paſſed by the town of Lariſſa.

EBSTORF, in *Geography*, a town of Germany, in the circle of Lower Saxony, and principality of Luneburg: celebrated for its honey, which the inhabitants ſell annually to the amount of ſeveral thouſand crowns; 7 miles W.N.W. of Uitzen.

EBU-HANIFA. See SONNITES.

EBULLITION, in *Phyſics*, the act of emitting bubbles, by a vehement agitation of the parts of a fluid, produced by fire, or otherwiſe. See BOILING.

EBULLITION, or *Efferveſcence*, in the language of Sydenham, and ſome other humoral pathologiſts, ſignified the exacerbation, or hot ſtage of an intermitting fever, before the ſweating ſtage had commenced. This expreſſion was deduced from the compariſon of a paroxyſm of fever, with the chemical proceſs of fermentation; whence the ſubſequent ſweating ſtage was denominated the *deſpumation* of the febrile humours: the hot ſtage, in which the circulation appears to be in a ſtate of tumultuous action, being ſuppoſed to reſemble the inteſtine motion of a vat of fermenting liquor; and the ſweating ſtage, to repreſent the throwing off of the ſcum and froth from the ſurface. See Sydenham, ſect. i. c. 5. Van Swieten ad Aph. 750.

EBULUS, in *Botany*, Dane-wort, or Dwarf Elder, ſee SAMBUCUS. A fœtid and rather dangerous plant, which was vulgarly ſuppoſed to have ſprung up from the blood of ſome of the Danes who were killed in invading England.

The roots and leaves of dwarf-elder are ſaid to be briſk cathartics. The juice of this plant has been recommended in the dropſy, gout, and ſcorbutic diſorders. The flowers are eſteemed ſudorific; and the leaves boiled, till perfectly ſoft, make a good cataplaſm for the ſciatica. See ELDER.

EBUR, FOSSILE, in *Natural Hiſtory*. See *Foſſile* IVORY.

EBUR *foſſile variegatum*, in the *Natural Hiſtory* of the ancients, a name given to the ſubſtance which we now call the rough or native turquoiſe.

Foſſile ivory, and the bones of other animals, are frequently found buried at great depths in the earth, and are found to have preſerved their ſubſtance, texture, and colour in different degrees, according to the nature of the matter among which they happen to have lain. Sometimes they are firm and ſolid, and ſcarce altered in colour; and ſometimes more or leſs hardened, and tinged to different colours by the different matters in which they have been depoſited.

Of this kind was the ſpotted foſſile ivory of the ancients, which was in all reſpects the ſame with our rough turquoiſes of many places, which are no other than the teeth and bones of animals accidentally lodged in the way of particles of copper. See TURCOIS.

EBURA, or EBORA, in *Ancient Geography*, a town of Spain, now *Alcala-real*, between Granada and Cordova.

EBUROBRICA, or EBUROBRIGA, a place of Gaul, between Auxerre and Troie, now St. Florentin.

EBUROBRITIUM, a place of Spain, in Luſitania, now Ebora-de-Alcobaça.

EBURONES, an ancient people of Belgica, whoſe country coreſponded to the duchies of Cleves, Juliers, and Gueldre. Their chief town was *Atuatuca*. A legion of Cæſar, which wintered there, was defeated by Ambiotrix; and by way of retaliation, he threatened to exterminate them. His treatment of them was very ſevere. They were ſucceeded by the Tongri.

EBURUM, an ancient town of Germany, in the country of the Quadi, according to Ptolemy; ſuppoſed to be Olmutz, a town of Bohemia.

EBUSUS, now IVICA, an iſland of the Mediterranean, near the coaſt of Spain. This iſland was fertile in the production of vines, olives, and large figs, which were exported to Rome, and other places.

EBUTIANA, a town of Italy, in Samnium, N.W. of Aliſæ.

ECACOATE, in *Zoology*, a name by which the natives of ſome parts of America call the rattle-ſnake.

ECALESIA, Εκαλησια, in *Antiquity*, a feſtival kept in honour of Jupiter, ſurnamed Hecalus, or Hecaleſius, from Hecale, one of the borough-towns in Attica.

ECARTELE, in *Heraldry*. See QUARTERLY.

ECASTAPHYLLUM, in *Botany*, Browne's Jamaica 299, t. 32. f. 1. See HEDYSARUM and DALBERGIA.

ECASTOR, in *Antiquity*, an oath wherein Caſtor was invoked. It was a cuſtom for the men never to ſwear by Caſtor, nor the women by Pollux.

ECATESIA, Εκατησια, an anniverſary ſolemnity, obſerved by the Stratonicenſians, in honour of Hecate.

The Athenians likewiſe had a public entertainment, or ſupper, every new moon, in honour of the ſame goddeſs. The ſupper was provided at the charge of the richer ſort; and was no ſooner brought to the accuſtomed place, but the poor people carried off all, giving out, that Hecate had devoured it. For the reſt of the ceremonies obſerved on this occaſion, ſee Pott. Arch. Græc. lib. ii. cap. 20.

ECATÆA, Εκαταια, ſtatues erected to the goddeſs Hecate, for whom the Athenians had a great veneration, believing that ſhe was the overſeer of their families, and that ſhe protected their children. Pott. Arch. Græc. lib. ii. cap. 20. tom. i. p. 386.

ECATOMBÆON, Εκατομβαιων, in *Chronology*, the firſt month of the Athenian year. It conſiſted of thirty days, and began on the firſt new moon after the ſummer ſolſtice, and conſequently anſwered to the latter part of our June and beginning of July. The Bœotians called it Hippodromus, and the Macedonians Lous. (See Month.) The word is a derivative from the Greek, ἑκατομβη, *a hecatomb*, becauſe of the great number of hecatombs ſacrificed in it.

ECAVESSADE, in the *Manege*, is uſed for a jerk of the caveſſon.

ECBASIS, Εκβασις, in *Rhetoric*, is uſed for a *digreſſion*, which ſee.

ECBATANA, in *Ancient Geography*, a celebrated city of Aſia, the capital of Media, and the reſidence of the Median and Perſian kings, was built by Dejoces the firſt, who reigned in Media, after the inhabitants had ſhaken off the Aſſyrian yoke. In the book of Judith it is ſaid to have been built by Arphaxad, ſuppoſed by ſome to be Dejoces, and by others Phraortes his ſucceſſor, who might have repaired the city or made ſome additions to it. It was ſituated on a plain, about 12 ſtadia from mount Orontes, according to Diodorus, who ſays that it was 250 ſtadia in circuit. The walls of this city are much celebrated by the ancients, and particularly deſcribed by Herodotus. (l. i. 98.) They were ſeven in number, all of a circular form, and gradually riſing above each other by the height of the battlements of each wall. The ſituation of the grounds, which gently aſcend, might ſuggeſt the deſign of thus building them. The royal palace and treaſury were within the innermoſt of theſe ſeven circles. In the book of Judith we read, that the walls of this ſtately metropolis were 70 cubits high, and 50 cubits broad; that the towers on the gates were 100 cubits in height, the breadth in the foundation 60 cubits, and the walls built of hewn and poliſhed ſtone, each ſtone being ſix cubits in length, and three in breadth. The timber of the palace was, according to Diodorus, (l xi. 13.) cedar or cypreſs: and various parts of it were caſed with gold or ſilver. The whole was pillaged about the time of the arrival of Alexander. We read in the 2d book of Maccabees, that Antiochus Epiphanes was at Ecbatana, when he received intelligence of the defeat of his armies in Paleſtine. There are now no monuments remaining of the ſuperb palace, where the monarchs of Aſia generally paſſed their ſummer; nay, there is a diſagreement among our modern travellers about the place where that ſtately metropolis ſtood. Sir John Chardin thinks it moſt probable, that Tauris is the ancient and famous Ecbatana. Others ſuppoſe it to be Hamadan.

Ecbatana, a city of Syria, at the foot of mount Carmel, on the ſide of Ptolemais. In this city the unfortunate Cambyſes died, in his return from Egypt towards Suſa.

Ecbatana, an ancient city of Aſia, called "the City of the Magi," to diſtinguiſh it from thoſe of Media and Syria. It belonged to the Magi. Darius removed it towards the mountains. This place is mentioned by Pliny.

ECBOLAS, in *Botany*, from εκβαλλω, *to caſt out*, is, according to ſome authors, the name of a fig ſuppoſed to cauſe abortion. See Ecbolium.

ECBOLE, or Elevation, in the moſt ancient Greek *muſic*, was the alteration of the enharmonic genus, when a ſtring was accidentally raiſed five dieſes above its uſual tuning.

Ecbole, Εκβολη, in *Rhetoric*, is alſo uſed for a digreſſion.

ECBOLICS, Ecbolica, from εκβαλλω, *I eject*, in the writings of the ancient phyſicians, a term uſed to expreſs ſuch medicines as were given to promote delivery in child-birth; and alſo ſuch as cauſed abortion. See Delivery.

ECBOLIUM, in *Botany*, from εκβαλλω, *to caſt out*, (whence alſo εκβολιον is an appellation for any drug that promotes delivery or abortion), has been applied by Rivinus and others to the genus now called *Juſticia*, in alluſion to the elaſtic force with which its capſules project the ſeeds. The original *Ecbolium* of Rivinus is the Malabar nut, *Juſticia Adhatoda* of Linnæus. *Juſticia Ecbolium* of Linnæus is a diſtinct ſpecies, though nearly related to the former.

ECBRASMATA, from εκβραζω, *I cauſe heats*, in the writings of ſome of the earlier phyſicians, a word uſed to expreſs eruptions, or puſtules, of a fiery and inflamed nature appearing on different parts of the body. Virgil calls theſe *ardentes papulæ*, and ſeems to attribute them to the wearing cloaths made of the wool of ſheep which had died of a murrain, which he deſcribes.

ECBRYSOMATA, from εκβρυω, *I cauſe to ſpread*, a word uſed by Galen, and the old phyſicians, for thoſe eminences or protuberances of the bones at the joints, which appear through the ſkin.

ECCANTHIS, or Encanthis, in *Medicine*. See Encanthis.

ECCARD, or Eckhard, John George, in *Biography*, a learned antiquarian, was born at an obſcure village in Germany. Having received a good education, he removed to Leipſic, where he became acquainted with Leibnitz. By the recommendation of this celebrated man, he obtained the profeſſorſhip of hiſtory at Helmſtadt, in 1706, and in 1713 he was appointed a counſellor of the electorate of Hanover, and hiſtoriographer. He now aſſiſted Leibnitz in his "Origines Guelphicæ," and, in 1717, ſucceeded him as librarian at Hanover. Shortly after this he travelled at the expence of George I. through a conſiderable part of Germany in ſearch of MSS. and other materials to enable him to proſecute the compilation of the work which he had undertaken. Some other literary occupations procured him the favour of prince Eugene, and count Von Zindendorf, and through the means of the latter, he was raiſed by the emperor Charles VI. to the rank of nobility. The friendſhip of the great produced him honour, but he was extremely poor, and preſented a poem to his ſovereign, in which he gave a picture of his diſtreſſed ſituation, and begged for relief; before, however, the neceſſary forms could be complied with, he was obliged to abſcond: he proceeded to Cologne, where, in Feb. 1724, at the college of the Jeſuits, he formally abjured the Lutheran religion. After this he entered the ſervice of the biſhopric of Wurzburgh; where he was entruſted with the care of the library belonging to the court and the univerſity. The dean and chapter committed to his charge the MSS. contained in the diplomatic archives of the cathedral, which he arranged and claſſed with great ability. He next projected improvements in academical lectures, and other works of public benefit. He printed, in two magnificent folios, his "Commentarii de rebus Franciæ orientalis," and undertook a hiſtory of Wurzburgh, which he did not live to finiſh; in this he comprehended the principal German events from the emigrations of the Franks to king Conrad I. While defining, in his preface, the boundaries of the biſhopric under St. Burckhard, he was ſuddenly ſeized with a mortal diſeaſe, which put a period to his life in February, 1730. Eckhard was a very voluminous writer. His moſt intereſting work is entitled "Corpus hiſtoriarum medii aevi," which is compiled from materials collected with great labour during many years. This is conſidered by Lenglet du Freſnoi as the production of one of the ableſt men in Germany: he adds that it contains a great many curious pieces well arranged, and not to be found in any other collection. Eckhard was deeply ſkilled in hiſtory, geography, and antiquities. He had alſo made etymology his ſtudy many years, with a view of publiſhing a dictionary of the German language. A liſt of his works is given in the General Biography, to which our readers may be referred.

ECCATHARTIC, in *Medicine*, a term ſynonymous with *cathartic*, but not now in uſe.

ECCE-HOMO, among *Painters*, a name given to a picture, wherein our Saviour is repreſented in a purple robe, with a crown on his head, and a reed in his hand, ſuch as he was preſented before Pilate by the Jews.

The phraſe is Latin, borrowed from the words of the Jews themſelves: *q. d.* this is the man.

ECCENTRIC. See Excentric.

ECCENTRICITY. See Excentricity.

ECCHELLENSIS, Abraham, in *Biography*, who flouriſhed in the 17th century, is famous for the aſſiſtance which he rendered M. le Jai, in preparing for the preſs the magnificent Polyglot Bible. He alſo furniſhed the Arabic and Syriac texts of the book of Ruth, with the Latin verſion. He was unfortunately engaged in ſome diſputes, which were little creditable to the contending parties. One of his opponents charged him with incapacity for the undertaking in which he had embarked; but he repelled the accuſation, and conducted himſelf in ſuch a manner as to obtain the appointment of profeſſor of the Syriac and Arabic languages, in the College Royal at Paris. He was next engaged by the college "De propaganda Fide," to aſſiſt in tranſlating the ſcriptures into Arabic, which employed him from the year 1636 to the year 1652. He was likewiſe made profeſſor of the Oriental languages at Rome; and was choſen by the archduke Ferdinand II. to tranſlate out of the Arabic into Latin the 5th, 6th, and 7th books of "Apollonius's Conics," in which he was aſſiſted by Borelli. The whole work was printed at Florence, with Archimedes's book, "De Aſſumptis," in 1661, in folio. He publiſhed many other works, and died at Rome in the year 1664. Moreri.

ECCHYMOSIS, in *Surgery*. This term ſignifies a livid or blue diſcolouration of the ſkin, in conſequence of the rupture of veſſels, and extravaſation of blood.

The word is derived from the Greek ἐκχύω, *to pour out;* an ecchymoſis being in fact only a kind of ſwelling, formed by an effuſion of blood from the veſſels.

An ecchymoſis is uſually produced by falls, blows, and ſprains, which rupture many of the ſmall veſſels on the ſurface of the body, and occaſion an extravaſation of fluid, unattended with any external breach of continuity. Contuſions are always attended with a degree of ecchymoſis. (See Contusion.) A very conſiderable ecchymoſis may be produced by bruiſes and blows, when any of the ruptured veſſels are ſufficiently large to pour out a copious quantity of blood into the cavities of the cellular ſubſtance.

In general, an ecchymoſis does not exhibit the diſcolouration which characteriſes it, until ſome time has elapſed after the receipt of the violence. We may indeed remark, that it is not till after ſeveral hours that the blue and livid diſcolouration of the ſkin becomes moſt conſpicuous. A black eye, which is one of the moſt common examples of an ecchymoſis, is always moſt disfigured ſix or eight hours after its occurrence.

In the common operation of bleeding, an ecchymoſis often ariſes at the time when the blood is flowing out. This happens in conſequence of the fluid not having a ready vent, ſo that ſome of it gets into the cellular ſubſtance, near the opening in the vein. When the patient changes the poſture of his arm, after the puncture is made, the orifice in the ſkin ſometimes ſlips a little away from the wound made in the veſſel; and as the blood ſtill continues to flow from the latter, it neceſſarily produces an ecchymoſis, by inſinuating itſelf into the cellular ſubſtance.

Common caſes of ecchymoſis are in general eaſily cured, by applying diſcutient lotions, and adminiſtering one or two doſes of any mild purgative ſalt. The beſt topical applications are vinegar, the lotio ſalis ammoniaci, ſpiritus vini camphoratus, and aqua ammoniæ acetatæ. The grand indications are to prevent inflammation, and to promote the abſorption of the effuſed blood.

Every man of experience muſt be ſo well aware of the ſucceſs which attends the practice of diſperſing collections of extravaſated blood, by exciting the action of the abſorbents, that he can hardly picture to himſelf a caſe of ecchymoſis, in which it would be proper and advantageous to make an inciſion for the diſcharge of the effuſed fluid. We have frequently ſeen tumours on the head, formed by extravaſations of blood, and containing four or five ounces of this fluid, ſubſide with wonderful rapidity, while the treatment merely conſiſted in employing general antiphlogiſtic remedies, and applying a diſcutient lotion.

On the contrary, when an opening is made into theſe ſwellings, the whole of the blood can very ſeldom be entirely preſſed out, owing to its coagulated ſtate; and the portion, which remains behind, becoming expoſed to the air, ſoon putrefies, and acquires an irritating quality; and the too frequent conſequences are a great deal of inflammation and ſuppuration, which need not be induced.

ECCLES, John, in *Biography*, was the ſon of Solomon Eccles, a performer on the violin, and author of ſeveral grounds, broken into common diviſions, of common chords, without improving the tune. Bellamira, one of his grounds, has words ſet to it in the Beggar's Opera. From the inſtructions of his father, John became an eminent and popular compoſer for the theatre, furniſhing it with act tunes, dance tunes, and incidental ſongs, in moſt of the new comedies, after the death of Purcell. The air which he ſet to "A Soldier and a Sailor," ſung by Ben, in Congreve's comedy of "Love for Love," is ſo truly original and characteriſtic, that it can never be ſuperſeded for any other air. He ſet an ode, written by Congreve for St. Cecilia's day in 1701. He likewiſe ſet Congreve's "Judgment of Paris," when there was a contention for prizes, and gained the ſecond, of 50 guineas. Several of his ſingle ſongs were the beſt of the time, and have ſtill the merit of originality. Indeed we never remember to have ſeen the ſlighteſt compoſition by Eccles, whether catch, ballad, or rope-dancing tune, that was not ſtamped with ſome mark of genius. Upon the death of Dr. Staggins, about the year 1698, Eccles, at a very early period of his profeſſional life, was appointed maſter of queen Anne's band; and after the deceaſe of Dr. Crofts, in 1727, he ſeems only to have ſet the odes, and to have retired from all other profeſſional employments to Kingſton, for the convenience of angling, in which amuſement he appears to have been as much delighted as Walton. He died in 1735, and was ſucceeded as maſter of the king's band and compoſer to his majeſty by Dr. Green.

Eccles had two brothers: *Henry*, a performer on the violin, ſaid to have been in the king of France's band, and author of 12 excellent ſolos for his own inſtrument, printed at Paris, 1720. Theſe we have never heard or ſeen, even in a catalogue. *Thomas*, who had been taught the violin by Henry, and had the character of a very fine player, but preferred the life of a ſtrolling fidler at taverns to that of a regular profeſſor, and was more fond of drinking than either of good company or clean linen.

He ſeems to have been one of the laſt vagrant bards, who uſed to inquire at taverns if there were any gentlemen in the houſe who wiſhed to hear muſic? Since ſmoking has been diſcontinued, few evenings are ſpent in taverns, which has diminiſhed the number of modern minſtrels, particularly ſuch as are as well qualified to amuſe good company and lovers of muſic as Tom Eccles, who uſed to regale his hearers with Corelli's ſolos and Handel's beſt opera ſongs, which he executed with preciſion and ſweetneſs of tone, equal to the moſt eminent performers of the time. He ſurvived his brother, John, more than 20 years; and continued to officiate as a prieſt of Bacchus to the laſt.

ECCLESBOURN, in *Geography*, a river of England, which runs into the Derwent, in Derbyſhire.

ECCLESFECHAN, a town of Scotland, in the county of Dumfries; 15 miles E. from Dumfries.

ECCLESFIELD, a large pariſh in the wapentake of Strafforth and Tickill, in the Weſt Riding of the county of York, England, is a very populous diſtrict, compriſing 984 houſes, and 5114 inhabitants. The principal part of theſe are employed in the various branches of cutlery and hardware goods. The place is only 5 miles from Sheffield, which has long been noted for its large manufactories of knives, and forks, ſciſſars, razors, &c. In the vicinity of Eccleſfield are ſome remains of a Roman encampment, which is known by the name of the Devil's-ditch.

ECCLESHALL, a market-town and pariſh in the hundred of Pirehill, Staffordſhire, England, was, at a former period, the ſeat of the biſhops of Lichfield. In the time of the civil wars, it was garriſoned for the king, but being taken by the parliamentary forces, was nearly deſtroyed; after which it was rebuilt by biſhop Lloyd. The town is pleaſantly ſituated on the banks of the river Sow, about 7 miles from Stafford, and 148 from London. It contains 590 houſes, and 3487 inhabitants. Here are a weekly market on Friday, and three annual fairs. The living is a vicarage, in the patronage of the biſhop of Lichfield.

ECCLESIA, a Latin, or rather Greek term, ſignifying church.

In our ancient law-books, Fitzherbert obſerves, that eccleſia, εκκλησια, properly ſignifies a parſonage. Whence, if a preſentation were made to a chapel, as to a church, by the name of eccleſia, it changed the name thereof, and it preſently commenced a church.

When the queſtion was, Whether it were eccleſia, aut capella pertinens ad eccleſiam? the iſſue was, whether it had baptiſterium & ſepulturam? For if it had the adminiſtration of the ſacraments and ſepulture, it was in law judged a church. See CHAPEL.

ECCLESIA, *Reſtitutione extracti ab.* See RESTITUTIONE.

ECCLESIÆ, *Recto de advocatione.* See RECTO.

ECCLESIÆ, *Warda.* See WARDA.

ECCLESIÆ *Sculptura*, the image or ſculpture of a church in ancient times was often cut out in plate or other metal, and preſerved as a religious treaſure or relique; and to perpetuate the memory of ſome famous churches.

ECCLESIANS, ECCLESIANI, in *Church Hiſtory*. Upon any falling out, or miſunderſtanding, between the emperors and the churchmen, the adherents to the emperor called ſuch as adhered to the intereſts of the church and churchmen, eccleſiani, a term of reproach, anſwering to our high-church men.

ECCLESIASTES, one of the books of the Old Teſtament thus called, from a Greek word, ſignifying preacher; becauſe the author in it declaims or preaches againſt the vices and vanities of the world; or becauſe of the peculiar gravity and dignity of the ſubjects, of which he treats.

This is Mariana's judgment: Grotius thinks otherwiſe; taking the book to derive its appellation from its being a collection of fine ſentences and reflections on the vanity of the things of our earth, &c. from the word קהל, which ſignifies to *amaſs* or *collect*, συναθροιζειν. Some Hebrew doctors, ſuppoſing the ſame etymon, will have it to have been thus called on account of its amaſſing a great deal of wiſdom: others, becauſe the author's aim is to aſſemble and call together all ſuch as are willing to conſult their ſafety, and avoid the dangers of the world, which is the opinion of Gejerus. Laſtly, others, with Calovius, deduce it from his aſſembling them about him, as a preacher aſſembles his auditors: accordingly Ludolphus obſerves, that the word *Coheléth*, in the Ethiopic language, ſignifies a *circle*, or a company of men gathered together, in the form of a circle.

There are different ſentiments as to the author of this book: the moſt common is, that it is Solomon's, who is ſuppoſed to have written it towards the cloſe of his life, to give tokens of his penitence to poſterity.

Grotius, indeed, takes the work to be poſterior to Solomon, and to have been written after his death, by ſix authors, unknown, who, to give their book the greater authority, put Solomon's name to it, and repreſented him as a repentant. What he chiefly founds his opinion on is, that we meet with words in this book, which are no where elſe ſeen, but in Daniel, Ezra, and the Chaldee paraphraſes; whence he thinks it probable, that it was written after the captivity in Babylon: but it is certain, all Hebrews, Greeks, and Latins, have always ſpoken of it as a work of Solomon. Indeed there are authors who have attributed all the books of Solomon to Iſaiah; but theſe are only to be underſtood as if that prophet had collected them. If it be true, that there are Chaldee words in the Eccleſiaſtes, it is eaſier to ſuppoſe Solomon underſtood that language than to deny him to be the author of the book. The Talmudiſts aſcribe this book to Hezekiah; rabbi Kimchi, to Iſaiah; and Grotius, to Zorobabel.

Calovius aſſures us, that the true reaſon why Grotius would not allow Solomon to be the author of the book of Eccleſiaſtes, is, that it ſpeaks too clearly and preciſely for his time, of the univerſal judgment, eternal life, and the pains of hell; but theſe are truths eſtabliſhed before Solomon, in the Pſalms, Pentateuch, and Job.

There appears no reaſon, therefore, for denying this book to Solomon, but ſeveral for aſcribing it to him. As, 1. The title of the book, which aſſerts its author to be the ſon of David, and king of Jeruſalem. 2. Several paſſages in the book, which agree to nobody but that prince, as chap. i. ver. 12. chap. vii. ver. 25. chap. xii. ver. 9, &c. And, 3. The conſtant tradition of the ancient Jews and Chriſtians.

The deſign of the author is to diſcover what conſtitutes the chief good or complete felicity of man. Accordingly this book conſiſts of two principal parts: the firſt of which, comprehended in the 6 firſt chapters, contains a recital and confutation of men's falſe opinions about their chief good; and the other teaches in what our genuine true and ſolid felicity conſiſts, both in this life and the next. In both he ſhews, what is the end to which a man ſhould direct all his counſels, ſtudies, and endeavours; what he ought to follow, as above all things moſt deſirable; and what to avoid, as the worſt of all evils.

The Talmudiſts, and other Rabbins note, that it was ſome time before the book of Eccleſiaſtes was put in the canon. See the Gemara on the Pirke Abboth. fol. 1. col. 1. Maſſech. Schabbath, cap. ii. fol. 30. col. 2. Aben Ezra on the Eccleſiaſtes, vii. 4. Maimonides, Moreh. Nebochim, lib. iii, cap. 28. and Mercerus, Calovius, and Gejerus, on this book.

ECCLESIASTIC, or Ecclesiastical, ſomething belonging to, or ſet apart for the church, in contradiſtinction to civil or ſecular, which regard the world. See Civil, &c. There are eccleſiaſtical things and perſons; eccleſiaſtical law, juriſdiction, hiſtory, ceremonies, diſcipline, preferments, &c. Eccleſiaſtical perſons are thoſe whoſe functions conſiſt in performing the ſervice and maintaining the diſcipline of the church. See Clergy. Eccleſiaſtical perſons are either regular or ſecular. (See Regular and Secular.) In the empire there are three eccleſiaſtical electors, *viz.* the archbiſhops of Mentz, Treves, and Cologne.

Ecclesiastic *chambers*, *community*, *corporation*, *courts*, *faith*, *patronage*, *tradition*. See the different ſubſtantives.

ECCLESIASTICAL Jurisdiction. By ſtat. 37 Hen. VIII. c. 17, the doctors of the civil law, although they be laymen, &c. may exerciſe eccleſiaſtical juriſdiction.

Ecclesiastical *Laws*. See Canon *Law* and *Eccleſiaſtical* Courts.

Ecclesiastical *State*, in *Geography*, the pope's dominions in Italy, reaching from the Po to beyond Terracina, a length of more than 260 Britiſh miles, comprehending about 13,808 ſquare miles, and containing little more than two millions of inhabitants.

Theſe dominions have been differently divided by former geographers; but the moſt regular and convenient diviſion was into the following territories: 1. The duchy of Ferrara, acquired in 1598. 2. That of Bologna, gained by Julius II. in 1513, and now ſuppoſed to contain 80,000 inhabitants. 3. The province of Romagna. 4. The duchy of Urbino, acquired in 1626. 5. The marquiſate of Ancona, gained in 1532, and now containing about 20,000 inhabitants. 6. The Perugiano. 7. The Orvietano. 8. The duchy of Caſtro. 9. The Patrimony of St. Peter. 10. Campania di Roma. 11. Sabina. 12. The duchy of Spoleto al Ombria. 13. The country called Citta di Caſtello. Beſide which, the pope formerly poſſeſſed the following countries out of the papacy, *viz.* the duchy of Benevento, in the kingdom of Naples, annexed to the pope's dominions in the 11th century; the counties of Avignon and Venaſin, in the ſouthern parts of France. He had, beſides, a conſiderable number of fiefs in Italy, which hold of the papal ſee: the principal of which were the kingdom of Naples, and the ſtates of Parma and Placentia. See Naples, &c. &c.

The pope may be conſidered in two reſpects, as the ſpiritual head and monarch of the Roman church, and as a conſiderable temporal prince in Italy. In the firſt character, his ſubjects may be divided into two claſſes, *viz.* clergy and laity; the former may not unfitly be compared to a ſpiritual ſtanding army, whoſe buſineſs is to maintain his rights and conqueſts; and the reſt, the laity, as his tributary ſubjects, who are obliged to maintain thoſe forces at their own charge; and if one may judge of the greatneſs of their number, by what pope Paul IV. uſed to boaſt, that he had 228 000 pariſhes under his juriſdiction (all of which have at leaſt one or more prieſts), and 4400 monaſteries, it will appear no inconſiderable army. But their number has been much leſſened ſince the Reformation and the Revolution of France.

In the ſecond view, the pope was formerly conſidered as a potent prince in Italy, whoſe ſovereignty was chiefly ſupported by the jealouſy between Spain, France, and the Empire; though in moſt other reſpects, it was not to be compared with that of other princes of Europe. His revenues were very conſiderable, and he was able to maintain a great military force. But by the new conqueſts and arrangements of Buonaparte, the emperor of France, the dominions of the pope are ſo dilapidated and curtailed, that he retains very little of the ſecular power that formerly belonged to him, and he has been deſpoiled of the greateſt part if not the whole of his importance as a temporal prince. By the 8th article of the treaty of Campo Formio 1797, the three legations of Bologna, Ferrara, and Romagna are annexed to the *Ciſalpine republic*, which ſee. See alſo Italy.

ECCLESIASTICO *primo beneficio habendo.* See Primo.

ECCLESIASTICUS, an apocryphal book, compoſed by Jeſus the ſon of Sirach, and admitted by the Romiſh church into the canon of the Old Teſtament.

It is frequently cited by the abbreviation, *Eccli*, to diſtinguiſh it from the Eccleſiaſtes, which is cited by *Eccle*. Some of the ancients have denominated it πανάρετος, *i. e.* the book of every virtue; but the moſt uſual name among the Greeks is that of "the Wiſdom of Jeſus the ſon of Sirach."

It is called Eccleſiaſticus, as ſome ſay, becauſe the ancients divided the books of the Old Teſtament into four ſorts, *viz.* the Pentateuch, the Prophets, the Hagiographa, and the Eccleſiaſtical, or Apocryphal books, as not being in the Jewiſh canon. Among the latter, this of Jeſus the ſon of Sirach, being the moſt remarkable and uſeful, was called κατ᾽ ἐξοχὴν, or by way of eminence, Eccleſiaſticus, whilſt the reſt of the ſame claſs have loſt their name. According to others, this title was given to it by the Latins, to denote its uſe in the church, as it was read for edification in the public religious aſſemblies; or, becauſe, like Solomon's Eccleſiaſtes, which it reſembles in name, as well as matter, it teaches ſuch as attend to it by the admirable precepts which it delivers, and earneſt exhortations to wiſdom, which is another word for religion.

Iſidore, lib. vi. Etym. cap. ii. and among the moderns, Grotius and Druſius, deny the author of Eccleſiaſticus to be Jeſus the ſon of Sirach, grandſon of the high-prieſt Jeſus, who returned from Babylon with Zorobabel. Genebrard aſſerts, that Jeſus the ſon of Sirach, was of the race of Jeſus ſon of Joſedec; but this does not appear. Some of the ancients have erroneouſly aſcribed this book to Solomon. Cyprian, and Ambroſe have cited it under his name.

St. Jerom aſſures us, in his preface to the books of Solomon, that he had ſeen this book in Hebrew; and that the Hebrews intitled it *Parables*, or *Proverbs*: from which the Jeſuit Mariana concludes, that the high-prieſt Jeſus wrote this book in Hebrew, as it appears likewiſe from the prologue to the book itſelf; and that his grandſon tranſlated it into Greek, which likewiſe appears from the prologue; that he made this tranſlation in Egypt, where the author lived in his thirty-eighth year; that it was done under the reign of Ptolemy Euergetes, ſucceſſor of Ptolemy Philadelphus, who began to reign in the year of Rome 508, 246 years before Chriſt; that the grandfather had entitled it *Parables*, which the grandſon changed into Eccleſiaſticus: laſtly, that the book, however, is attributed to the tranſlator, becauſe he changed, and added many things to the original.

Fa. Calmet takes the book of Eccleſiaſticus to have been compoſed under the Pontificate of Onias III. ſon of Simon, and the reign of Antiochus Epiphanes, king of Syria, about 171 years B. C. He adds, that neither the author of the Latin tranſlation, nor the time when it was made, is known;

but being quoted regularly by all the ancient fathers, there is no doubt of its being very ancient. He takes it to have been done by the tranſlator of the Book of Wiſdom.

Munſter and Fagius mention Hebrew copies of this book, as well as St. Jerom; but Scaliger, Druſius and Huetius think that none of theſe were the original, but either Ben Sira's alphabet, or ſome late verſion made from the Greek. It is probable, that many uſeful maxims of the Hebrew Sirachides, as well as ſome of his own, were added by the laſt Jeſus, the ſon of Sirach, to his grandfather's book, or from marginal additions of other men's ſayings, of the like nature; which being too few to fill a book of themſelves, were joined to this larger work. We cannot otherwiſe account for the variations in the ſeveral Greek copies of Eccleſiaſticus, and the tranſlations of it, nor for the entire ſentences, which are found in ſome and wanting in other copies. The Hebrew Serachides wrote his book, as we may reaſonably ſuppoſe, in the language of the Jews of Jeruſalem, ſuch as was uſed after their return from the captivity, probably either in the Chaldee dialect, or Syriac, as a manual for the Jews in Egypt. The learned ſuppoſe that the original work itſelf is come down to us imperfect, either through the author's death, or the loſs of ſome part of it in Egypt (See Biſhop Chandler's Vindic. of Def. p. 81—85.); and this may account for the great incoherence, and abrupt tranſition in many places. How long the original was preſerved, we are not now able to aſcertain. The Greek is the preſent only original; and it is the moſt early and authentic tranſlation of this work, made for the uſe of the Jews in Egypt in their diſperſion, who had then almoſt forgotten their native tongue; and ſo this, as well as other books not canonical in their language, might eaſily be loſt. This ſeems to have been too literal a tranſlation, which often occaſions the ſenſe to be either obſcure or deficient. The tranſlator himſelf has the modeſty to acknowledge, that he doubts his having failed in expreſſing the full ſpirit of the then language, whether it was the ancient and pure, or more modern and corrupt Hebrew, and ingenuouſly apologizes for not attaining to the exact propriety and expreſſiveneſs of the original. Druſius is of opinion, that, beſides this inaccuracy, he has ſometimes actually miſtaken the meaning of the original in ſome of the more obſcure and intricate paſſages. There is a ſtrange tranſpoſition of chapters in the beſt Greek copies of this book from ch. xxx. to ch. xxxvi.; beſides the tranſpoſition of whole ſentences or verſes; ſo that the printed editions greatly differ from one another, which is very much owing to the careleſſneſs of tranſcribers; in conſequence of which, the preſent ſtate of this book is corrupt and mutilated. And as to the Greek tranſlation itſelf, the language is neither beautiful, nor altogether correct. This latter circumſtance is chiefly owing to the idiom of the Greek Macedonian language, and the particulars now referred to are not ſo properly faults, as modes of that adopted tongue. In this book there occur frequent alluſions to Grecian rites and cuſtoms; from which we may infer, that the Jews had learned their philoſophy, and embraced ſeveral of their opinions, ever ſince their intercourſe with that people under Alexander the Great, the Ptolemies, and Seleucidæ his ſucceſſors, who reigned in Egypt and Syria. The old verſions, particularly the Syriac and Arabic, ſo much differ from the Greek, as almoſt to lead one to ſuſpect, that they were not made from it, and yet there is no reaſon to think, that they tranſlated from any Hebrew copy. Nor do the Oriental verſions agree any better with the Latin.

As to the Vulgate, it is uncertain what copy it follows, or what was its authority. It ſometimes adds whole ſentences, which have nothing correſponding to them in the Greek; ſo that Huetius conjectures, that the tranſlator inſerted ſome parallel maxims from ſome other work. It does not appear to have been interpolated; or that any alterations have been made by the pious fraud of ſome Chriſtians in order to make it conform to, or countenance, any favourite ſentiments and opinions, as Grotius intimates. Boſſuet, Calmet, and other commentators, follow the Vulgate too implicitly, and make that verſion the foundation of their annotations; and it is no wonder that the popiſh expoſitors ſhould religiouſly adhere to a verſion, which the council of Trent has confirmed and ratified. The old Engliſh verſions, as Coverdale's and the Biſhops' Bible, generally copy the Vulgate too cloſely; but the Geneva often departs from it with advantage. Our laſt tranſlators ſeem chiefly to have regarded the Complutenſian, which, though it lies under a ſuſpicion of conforming its Greek to the Vulgate, yet exhibits a text in this book, according to Dr. Grabe (Prolegom. ch. iii. § 1.) "non nuper fictum aut interpolatum, ſed jam olim a Patribus ita lectum." However they ſcruple not occaſionally to prefer the Latin to the Greek, where they think it gives a better ſenſe, and ſometimes even to adopt conjectures, unſupported by any copy, for the ſame purpoſe. After all we may obſerve, that their rendering is in very many places inaccurate and obſcure, and in ſome, faulty and miſtaken.

This book was originally compoſed for the inſtruction and benefit of thoſe, who were diſpoſed to regulate their lives agreeably to the laws of God; and with this view the grandſon of Ben Sirach rendered it into Greek, and with the ſame deſign it has been tranſlated into many other ancient and modern languages. In the weſtern church it has met with general eſteem, and it was introduced by our firſt reformers, and the compilers of the articles of our eſtabliſhed church, into the public ſervice. It begins with an exhortation to the purſuit of wiſdom; and this is followed by numerous moral ſentences or maxims, as far as the 44th chapter, where the author begins his eulogy of the patriarchs, prophets, and famous men among the Jews, which he continues to the 51ſt chapter, containing a prayer to God. Calmet ſays, that it is a received opinion of the Catholic church, that this book was placed in the canon of ſcripture, and that it may be demonſtrated by the teſtimony of ſeveral fathers, and by the tradition of all Chriſtian churches, and by its being quoted by a great number of eccleſiaſtical writers, as a work inſpired by the Holy Ghoſt. But theſe aſſertions are unfounded. Epiſcopius, in order to ſhew the agreement of Chriſtian churches with the Jews in this point, enumerates the deciſions of nine of the Eaſtern, nine of the Weſtern, and two of the African churches, which determine for the canon as we now have it, and exclude all others, but the 22 books received by the Jewiſh church, and contained in the Hebrew Bible. The authority of the church of Rome cannot outweigh the deciſions of thoſe of Jeruſalem, Alexandria, Antioch, and Conſtantinople, to the contrary. As to the reſpect paid to it by ancient eccleſiaſtical writers, we may obſerve, that they uſed the term ſcripture in a very lax ſenſe for any book that contained excellent and pious inſtructions; and when either the Greek or Latin fathers attribute to any books the title of Holy Writings, they do not place them in any higher rank than that of ſcriptures, which are of inferior, imperfect, and doubtful authority. Dupin's Compleat Hiſtory of the Canon, b. i. chap. 3. § 16. Arnold on the Apocrypha. See Apocrypha, Bible, and Canon.

ECCLISIS, from ἐκκλίνω, *I decline*, a word uſed by Hippocrates, and from him by many other of the old phyſicians, for a receſſion of a bone from its proper ſituation, that is, a luxation.

ECCOPÆUS, from εκκοπτω, *I cut*, the name of an inſtrument, deſcribed by ſome of the ancient writers in *Medicine*, and uſed for the ſame purpoſes for which the modern ſurgeons employ a lenticular or raſpatory. The ancient inſtrument was a ſort of knife, with which they cut down morbid eminences of bones, or took out bones, in caſe of a fractured ſkull.

ECCOPE, Εκκοπη, in *Surgery*, the ſame with exciſion, or amputation.

The word is formed from the Greek, εκκοπτειν, *exſcindere, to cut off.*

Eccope is likewiſe uſed for a kind of fracture, or ſolution of continuity, of the ſkull, by a ſimple inciſion.

ECCOPROTICS, Εκκοπρωτικα, in *Medicine*, laxative, or looſening remedies, which purge gently, by ſoftening the humours and excrements, and fitting them for expulſion.

The work is compoſed of the Greek particle εκ, and κοπρος, *excrement.*

ECCRIMOCRITICA, from εκκρισις, *excretion*, and κριτικος, ſigns to judge of a diſtemper, from particular excretions.

ECCRINOLOGICA, from εκκρινω and λογος, a term uſed by ſome writers, for that part of medicine which relates to the doctrine of excretions, or the diſcharge of any of the excrements out of the body.

ECCRISIS, an excretion of any excrementitious or morbid matter from any of the natural emunctories, as it happens in a perfect criſis. The matter thus excreted is alſo ſometimes called by this name.

ECDICI, Εκδικοι, among the *Ancients*, patrons of cities, who defended their rights, and took care of the public money. Their office reſembled that of the modern ſyndics.

ECDORA, from εκδερω, *I excoriate*, a word uſed by the ancient phyſicians, to expreſs any kind of excoriation, but in a more particular manner that of the urethra.

ECDORIA, a term uſed by the ancient writers in *Medicine* for ſuch cauſtic or eſcharotic medicines, as have a power of taking off the ſkin.

ECDYSIA, Εκδυσια, in *Antiquity*, a feſtival obſerved by the Phœſtians in honour of Latona.

ECETRA, in *Ancient Geography*, a town of Italy, belonging to the Volſci.

ECHALAR, in *Geography*, a town of Spain, in Navarre; 20 miles N. of Pamplona.

ECHALLENS, a town and bailliage of Switzerland, in the canton of Bern, belonging to the cantons of Bern and Friburg, conquered by the Swiſs in 1475, and ceded to the two cantons in 1474; 6 miles from Lauſanne. On an eminence in this bailliage ſtands the caſtle of St. Barthelemi, in one of the moſt beautiful poſitions in Switzerland; about three miles from Orbe, near the high road from Lauſanne to Yverdun.

ECHANBROIGNES, Les, a ſmall town of France, in the department of the two Sevres; ſix miles N. of Chatillon ſur Sevre, and three miles E. of Maulevrier.

ECHAPE, in the *Manege*, is uſed to denote a horſe got between a ſtallion and a mare of a different breed and country.

ECHAPER, is uſed in the French academies for giving the horſe head, or putting him on full ſpeed. Hence they ſay, *laiſſer echapper de la main.*

ECHARD, Lawrence, in *Biography*, was ſon of a clergyman, and born near Beccles in Suffolk, in 1671. Having laid a foundation of claſſical learning, he went to Chriſt's college, Cambridge, where he took his degree of A.M., and was afterwards admitted into holy orders. His firſt ſettlement was in Lincolnſhire, where he publiſhed, in 1609, "The Roman Hiſtory from the Building of the City to the Settlement of the Empire by Auguſtus," which was followed by a continuation from that period to the time of Conſtantine. Theſe were afterwards printed in 3 vols. 8vo. In 1702, he publiſhed "A General Eccleſiaſtical Hiſtory from the Birth of Chriſt to the Eſtabliſhment of Chriſtianity." This work, which was printed in folio, was exceedingly popular, and was in the courſe of a few years reprinted in an octavo ſize five times. He next publiſhed "The Gazetteer, or Newſman's Interpreter," being a geographical index, or dictionary, of all the principal places on the globe. This run through many editions, and may be regarded as the forerunner of our preſent improved gazetteers, than which few books are more popular. Mr. Echard publiſhed likewiſe a hiſtory of England, from the invaſion of Julius Cæſar, to the end of James I.'s reign, which he afterwards brought down to the revolution: he tranſlated ſome of the comedies of Plautus, and took a part in the tranſlation of Terence: he compiled a volume of maxims and diſcourſes, moral and divine, from the works of archbiſhop Tillotſon. His church preferment was the appointment to the archdeaconry of Stow, in 1712: he was alſo made prebend of Lincoln, and chaplain to the biſhop of that dioceſe; and towards the latter end of an uſeful and induſtrious life he was preſented by the king to the livings of Rendleſham, Sudborne, and Alford, in Suffolk, to which county he removed; but the change was unfavourable to his health, and he died in 1730. Biog. Brit.

ECHARPE. See Battery *en echarpe.*

ECHARRI, in *Geography*, a town of Spain, in Navarre; 17 miles W. of Pamplona.

ECHAUFOUR, a ſmall town of France, in the department of the Orne, ſituated on a rivulet which flows into the Rille between Laigle and Sées; 12 miles N.E. of Sées, in the diſtrict of Alençon.

ECHAUGUETTE, in the French *Military Art*, an elevated and covered place for a centinel. Richelet explains it by the Latin *ſpecula, excubiæ.* See Guerite.

Some diſtinguiſh the exchauguette from the guerite, giving the former name to centry-boxes, made of wood, and ſquare; and the latter name to thoſe made of ſtone, and round.

ECHEBRUNE, in *Geography*, a ſmall town of France, in the department of the Lower Charente; fifteen miles off Saintes.

ECHEDAMIA, in *Ancient Geography*, a town of Greece, in the Phocide, according to Pauſanias.

ECHEDORAS, a river of Macedonia, in the Amphaxitide territory, according to Ptolemy, called Chidoros by Herodotus, who places its ſource in Creſtonia. He ſays, that it traverſes Mygdonia, and purſues its courſe along a marſh near the river Axius, into which it diſcharges itſelf.

ECHEIA, harmonic-vaſes uſed in the ancient theatres for the augmentation of ſound. Vitruvius, book v. cap. 5, tells us, that they were placed in cells or niches, between the rows of ſeats occupied by the ſpectators, to which the voice of the actor had free paſſage; that they were made of braſs, or earthen-ware, and proportioned in magnitude to the ſize of the building; and laſtly, that in the ſmall theatres, they were tuned in harmonical proportions of fourths, fifths, and eighths, with their replicates; and in theatres of great magnitude, there was a vaſe to correſpond with every ſound in the diſdiapaſon, or great muſical ſyſtem, in all the genera.

The Romans, according to the ſame author, were obliged to the Greeks for this invention, as well as for tragedy itſelf. For the echeia were brought firſt into Italy from Corinth, by Mummius. Perhaps they had ſomething of the effect of the whiſpering gallery at St. Paul's church, which, by its orbicular form, augments ſound in the ſame manner as the belly of an inſtrument, a hogſhead, or a draw-well.

Sir Francis Bacon long ſince obſerved, that ſound diffuſes and waſtes itſelf in open air, but if incloſed and confined in a canal, or narrow limits, its force is augmented; and adds, that incloſures not only increaſe and fortify ſound, but preſerve it. Reſonance is but an aggregate of echoes, or of quick repetitions and returns of the ſame ſound, which ſoon uniting into one point, are conſolidated and embodied; and by this means, the force of the tone firſt given is greatly augmented upon the delivery, and preſerved ſome time after the firſt cauſe ceaſes. This conſtitutes the ringing of muſical inſtruments, and places favourable to ſound; but with reſpect to the whiſper, which is inſtantly carried from the perſon who utters it, to the oppoſite ſide of the gallery, it runs along the ſmooth ſurface of the wall, and arrives at the place of its deſtination with nearly the ſame degree of force as it is delivered.

It is not eaſy now, however, to deſcribe, or even to conceive, the form and effects of the theatric vaſes; but their exiſtence and uſe having been recorded by ſo ſcientific a writer as Vitruvius, has excited much curioſity, and produced many conjectures, and, as yet, ineffectual experiments. Our ſmaller theatres, luckily, are in want of no ſuch helps; but this is certain, if theſe veſſels were tuned to muſical tones and intervals, nothing but noiſe and confuſion could be produced from them by common ſpeech, or ſuch as is uſed in modern declamation. For if any one cough, ſpeak loud, or ſtrike forcibly upon the caſe of a harpſichord, with the lid propped up, or on any hard body near it, the ſhock will make every ſtring in the inſtrument ſound at the ſame inſtant; but if a fixed and muſical tone be produced by the voice, or upon a violin or flute, none but the uniſon will be heard upon the harpſichord; and though the cloathing of the jacks be in cloſe contact with all the ſtrings, which renders it impoſſible to produce a clear tone from any one of them, by the common means of quills, or hammers, yet if any perſon ſing near them, every note will be exactly echoed by the inſtrument.

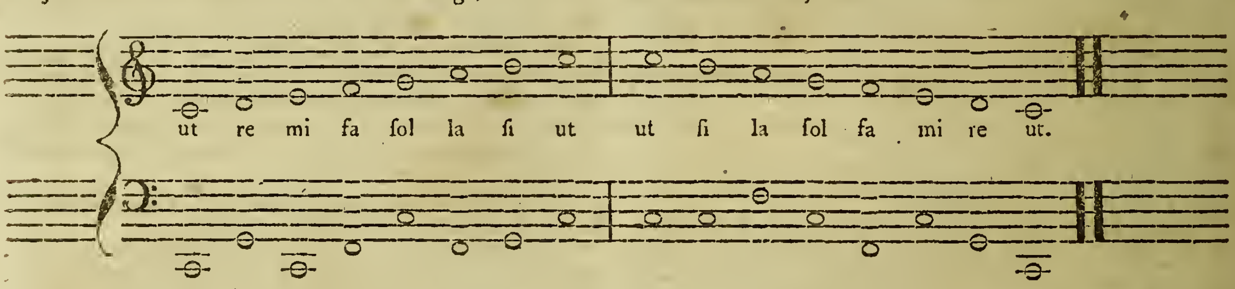
If, therefore, theſe echeia were of the uſe related by Vitruvius, it muſt have been from the voice approaching them in fixed and muſical tones, modulated in uniſon with the tones of the vaſes.

The beſt commentary upon this obſcure ſubject in Vitruvius is that of Perrault, who has given an engraving of part of an ancient theatre, on purpoſe to exhibit the ſituation of the harmonic vaſes. "Les dix Livres d'Architecture de Vitruve," Par. 1684. 2d edit. folio. Kircher, whoſe pen was never impeded by doubts or difficulties, has not only deſcribed, but given them imaginary forms reſembling bells. See Muſurgia, tom. ii. p. 285.

Every thing was upon a large ſcale in the ancient theatres. The figure, features, and voice, were all gigantic. The voice was, in a particular manner, the object of an actor's care; nothing was omitted, ſays father Brumoy, that could render it more ſonorous; even in the heat of action it was governed by the tones of inſtruments, that regulated the intervals by which it was to move, and to expreſs the paſſions.

When a new opera-houſe was built at Turin about 30 or 40 years ago upon a very large ſcale, all the architects, mathematicians, and the learned in (phonics) harmonics, or the philoſophy of ſound, were conſulted about the form and ſituation of thoſe vaſes; but the problem we believe has not yet been ſolved.

ECHELLE, Fr. a ſcale, or gammut. The names which French muſicians give to the eight notes of C major, *ut, re, mi, fa, ſol, la, ſi, ut*, are retained in all keys, whether the notes ſo denominated are flat, ſharp, or natural. This ſcale is generated by the harmonics of three baſes, C, G, and F; or the key note and its two fifths, the fifth above and the fifth below the key note.



This is termed the natural or diatonic ſcale, that is, compoſed of tones and ſemitones.

But the moderns have another ſcale, which they call ſemitonic or chromatic, from its proceeding by ſemitones, or what are called half-notes. For a baſe to this chromatic ſcale, ſee *Muſic, Plate* XXIV. and prepared baſe to ditto, *Plate* XVI. This ſcale furniſhes the means of modulation into what key we chuſe to make the fundamental, and of tranſpoſing our ideas from the natural to the fictitious or artificial keys as they are called.

ECHELLE NEUVE, or SCALA *Nuova*, in *Geography*, a ſea port town of Turkey, in Aſia, ſituated in the province of Natolia, about 50 miles off Smyrna. The Engliſh and the French had conſiderable mercantile eſtabliſhments at this place till the middle of the 17th century, when the jealouſy of the cuſtom-houſe officers of Smyrna cauſed this port to be ſhut to all European nations. Its principal trade now conſiſts in exporting annually about 2000 bales of cotton and cotton yarn, ſome wax, Morocco leather, and fine ſpunges. Dict. de Geogr. Commercante.

ECHELLES, LES, in Latin *Scalæ*, a ſmall town of France, in the department of Mont Blanc, chief place of a canton, in the diſtrict of Chambéry, with a population of 1245 individuals. The canton contains nine communes and 6494 inhabitants, on a territorial extent of 120 kiliometres.

The high road of the Echelles Bourgades, 16 kiliometres W. of Chambéry, behind the mountain of the grotto on the road to Lyons, may be conſidered as the boldeſt work that was ever undertaken. Charles Emanuel II., duke of Savoy, cauſed a monument to be erected here, of which the French mutilated one of the fineſt parts, as well as the inſcription, during their revolutionary frenzy in 1793.

ECHELSBELK, a ſmall town of France, in the department of the North; ſix miles N. of Bergues, with a very fine caſtle.

ECHEMBROTUS, in *Biography*, an Arcadian, who, according to Pauſanias, in his enumeration of the muſical conteſts that were added to the ancient Pythic games, at the cloſe of the Criſſæan war, accompanied upon the flute, Cephallon, the ſon of Lampus. The Amphictyons afterwards retrenched the flute accompaniment, on account of that inſtrument being too plaintive, and fit only for lamentations and elegies, to which it was chiefly appropriated. A proof of this, ſays Pauſanias, is given in the offering which Echembrotus made to Hercules of a bronze tripod, with this inſcription:

"Echembrotus, the Arcadian, dedicated this tripod to Hercules, after obtaining the prize at the games of the Amphictyons, where he accompanied the elegies that were ſung in the aſſembly of the Greeks, with the flute." See Pythic Games.

ECHENAY, in *Geography*, a town of France, in the department of the Upper Marne, and diſtrict of Joinville; ſeven miles E.N.E. of Joinville.

ECHENEIS, in *Ichthyology*, a genus of the thoracic tribe, having the head naked, flat above, and tranſverſely furrowed, the gill-membrane furniſhed with ten rays, and the body deſtitute of ſcales.

Three ſpecies of this ſingular genus are deſcribed, one of which, the *remora*, is ſufficiently well known to the Engliſh navigators in the Mediterranean by the name of the ſucking fiſh. The ſpecies *neucrates* is leſs frequent, and exceeds the other in ſize. The third, *lineata*, is a recently diſcovered kind, of which a particular account occurs in the Linnæan Tranſactions.

Species.

Remora. Tail furcated; back of the head with eighteen ſtreaks. *Echeneis remora*, Forſk. Arab. *Remora Imperati & Aldrovandi*, Will. *Echeneis*, Plin. &c.

Native of the Atlantic and Mediterranean ſeas, in the latter of which it is moſt abundant. Its length is uſually from twelve to eighteen inches, the body of moderate thickneſs, with the head pointed, and the general colour brown; deepeſt on the back, and becoming white on the belly; the fins ſmall, inveſted with a thick ſkin, and of a cinereous colour, edged with brown. The ſkin is ſmooth, marked with numerous impreſſed points, and covered with a thick mucus.

The extraordinary faculty which this fiſh poſſeſſes, of adhering at pleaſure to other bodies by means of the organ at the back of the head, is mentioned by many writers. Pliny, and ſome other authors among the ancients, do not heſitate to affirm that the remora is able to arreſt the progreſs of a ſhip in full ſail, by faſtening againſt its hull. The moderns are more moderate, and ſimply relate that it is known to affix itſelf to any ſmooth ſurface ſo firmly, as not to be removed without a conſiderable exertion of ſtrength; it would be difficult, it is ſaid, for the ſtrongeſt arm to effect its ſeparation, unleſs it be pulled in a lateral direction, ſo as to ſlide it along the ſurface of the body to which it adheres. This ability of adheſion appears to be a peculiar property deſigned by nature to facilitate its means of obtaining food; for the remora ſwims ſo feebly and indifferently, that it is neceſſary to avail itſelf of other methods of purſuing its courſe in the water, the moſt convenient of which is to faſten itſelf to ſome larger fiſh, or other floating body. The remora for this reaſon is almoſt conſtantly found attached to whales, ſharks of the more gigantic kinds, and other voracious animals.

Neucrates. Tail entire; head with twenty-four ſtreaks. Haſſelq. *Echeneis in extremo ſubrotunda*, Seba. *Iperuquiba et Piraguiba braſilienſis*, Marcg.

This ſpecies grows to the length of five, ſix, or even ſeven feet; the body is of a more lengthened form than the preceding, and the tail is ovate. The head is of a moderate ſize; the body above the lateral line olive green; beneath white; the fins yellowiſh, edged with violet; the ſkin is marked with numerous minute pores as in the other. This ſpecies is confined principally to the Indian and American ſeas. Commerſon relates, that it is very common about the coaſts of Mozambique, where it is ſometimes employed in catching turtle. The proceſs is altogether ſingular: a ring is ſecurely faſtened round the tail of the fiſh to prevent its eſcape, and a long cord being tied to the ring, the fiſh is carried in a veſſel of ſea water till the boatmen obſerve a turtle ſleeping on the ſurface of the water, when they approach as near as poſſible without diſturbing it, and throw the remora into the ſea. The fiſh inſtinctively directs its courſe to the ſleeping turtle, which, by the length of its cord, it is enabled to reach, and immediately faſtens itſelf ſo firmly on its breaſt, that the turtle is drawn by the men into the boat, by means of the cord, with very little trouble.

Lineata. Tail cuneated; head with ten ſtreaks. *Echeneis lineata*, Menz. Linn. Tranſ. i. p. 187. pl. 17. f. 1.

A new ſpecies found in the Pacific ocean, and deſcribed as above in the Tranſactions of the Linnæan ſociety. The body is about five inches long, ſubulate, ſmooth, and of a dark brown colour, dotted all over with minute darker ſpots, and ornamented with two whitiſh longitudinal lines on each ſide, which begin at the eyes and end in the tail; the under mandible is a little longer than the upper, and both are furniſhed with minute teeth; the clypeus on the top of the head has but ten tranſverſe ſtreaks. The ſpecimen deſcribed was found adhering to a turtle.

ECHETLA, in *Ancient Geography*, a town of Sicily, towards the ſprings of the river Achates. It was formerly a very ſtrong place, and during the Punic war, it was ſituated on the frontiers of the Carthaginians and Syracuſans. It is now *Ochula* or *Acquila*.

ECHETRA. See Ecetra.

ECHEVIN. See Eschevin.

ECHIDNA, in *Ichthyology*, a ſpecies of *Muræna*, which ſee.

Echidna, in *Natural Hiſtory*, a name given, by ſome authors, to the ſeveral kinds of ophites, or ſerpent-ſtone, from εχιδνα, a *viper*, or *ſerpent*.

ECHILLEUSE, in *Geography*, a ſmall town of France, in the department of the Loiret; 9 miles E. of Pithiviers.

ECHINARACHNIUS. See Echinus.

ECHINASTRUM, in *Botany*, a name given by ſome perſons to the *Geranium tuberoſum* of Bauhin and Linnæus, on account of the reſemblance of its root to the *Echinus* or Sea-Urchin.

ECHINATUS, is a term applied to any thing beſet with ſpines, like a hedge-hog, as the fruit of the horſe-cheſnut. It is nearly ſynonymous with *muricatus*. It gives the generic character of *Hydnum*, a fungus whoſe head is *ſubtùs echinatus*, prickly underneath.

ECHINI Fossiles. It is a very remarkable obſervation of Auguſtino Scilla, that all thoſe foſſil echini which he had found in the Meſſineſe and Calabrian hills, and about Malta, were, when bruiſed, as was frequently the caſe, always bruiſed by a perpendicular preſſure. See Echinites.

Echini *ſpatangi*. It is obſerved, that the foſſil echini ſpantagi, or ſpatagi, are very frequent in the iſland of Malta, and people who are for having all foſſil ſhells to be real terreſtrial bodies, produced of ſeeds in the earth, and never to have been parts of real animals, object to theſe having ever been ſuch, their being found ſo plentifully in this foſſil ſtate, and ſo rarely in the native or recent one. This is no objetion of weight; becauſe the cornua ammonis give a much ſtronger, which are a more common foſſil, and have never been found recent at all. This is no argument of weight, however, ſince it is eaſy to conceive, that the ſea, at the time of the univerſal deluge, might throw up ſhells from its deep bottom, which we never can get at in fiſhing or otherwiſe. And Scilla has proved the abſurdity of the objection, in regard to the echini ſpatangi, and ſhewn that thoſe people who raiſed it, have been led into it by their ignorance. For he has affirmed, that they may be picked up by hundreds at a time in the port of Meſſina, and that himſelf once took up more than a hundred recent ones in an hour.

The ſhells of this ſpecies, found foſſil in the iſland of Malta, are very frequently full of the marle of which the upper ſtratum of that iſland conſiſts; and ſome of them are cracked, and have been depreſſed a little inwards. This is an evident proof that they once were real ſhells, having, in this caſe, given way, as far as the included marle would let them, on the preſſure of ſome external force. See ECHINUS.

ECHINITES, or ECHINITÆ, in *Natural Hiſtory*, the name given by authors to the foſſil ſhells of the ſeveral ſpecies of echini marini, and to the ſtones formed in them. Of theſe there is almoſt an endleſs variety in the foſſil world. Many of thoſe which we daily find in our chalk pits are the ſame with thoſe now known to us in their recent ſtate, or living in the ſea; but we have numbers of others, of which our imperfect knowledge of the animal world gives us no certain account, in their recent ſtate.

The ſhells of ſome of theſe are found ſcarce at all altered from their original condition. In many others we have plated ſpar filling the places of the ſhells, and retaining every lineament of them. But their moſt frequent appearance is in the form of maſſes of hard flint, or other ſtone, which have been caſt and formed in them, having been received, while in a fluid ſtate, into the hollow of the ſhell, and therefore retaining all the lineaments of the inner ſurface. And, not unfrequently, theſe alſo are coated over with a ſparry or ſtony matter, ſupplying the place of the ſhell they were formed in; and having been made, by the inſenſible depoſition of hard matter, in the place of the particles of the ſhell inſenſibly waſting away; theſe retain all the lineaments of the outer part of the ſhell, as the formed flint does of the inner one. Sometimes pure cryſtal is found in the place of flint in theſe, and often cryſtal, but lightly debaſed by earth; and theſe make very elegant ſpecimens.

The various genera of foſſil echini, or echinitæ, are known among ſome authors by the names of ſpatangi, cordati, galeati, pileati, diſcoides, ovarii, pentaphylloides. See ECHINUS.

What is generally underſtood by the word *echinitæ*, is a ſort of arched ſhells, or ſtones formed in them, covered with divers eminences and cavities, ſome of which are diſpoſed into beautiful lines, diverging from the ſummit; and always having two apertures, the one for the mouth, the other for the anus of the animal. Of theſe,

The echini cordati are ſuch as have a remarkable furrow on one ſide, or end, which is uſually broader than any other part of the body, and by means of this furrow, repreſents, in ſome degree, the figure of a heart on cards.

The galeati are ſuch as have the baſis ſomewhat oblong, and the apertures, one in the very margin, and the other near the margin, on the oppoſite ſide. (See *Galeaſter* under ECHINUS.) The pileati, and diſcoides, are ſub-diſtinctions of this kind.

The pileati are higher, and approach to a conic figure.

The diſcoides are flatter, and more compreſſed.

The ovarii have only one aperture at the baſe, and have large and unequal tubercles and papillæ.

The pentaphylloides have rows of ſhort lines, which are ſo diſpoſed as to repreſent a cinquefoil leaf.

The ſpatangi is a very comprehenſive term, taking in moſt of the others as ſub-diſtinctions. It comprehends all that have two apertures in the baſe, and that are covered with ſmall tubercles. See ECHINUS.

ECHINOCYAMUS. See ECHINUS.

ECHINODERMA, in *Natural Hiſtory*, the name of the ſea animal more commonly known by the name of the *echinus marinus*, or ſea hedge-hog. See ECHINUS.

ECHINODISCUS. See ECHINUS.

ECHINOGLYCUS. See ECHINUS.

ECHINOMELOCACTUS, in *Botany*, the Turk's-cap, or Melon-thiſtle. See CACTUS, ſect. 1.

ECHINOMETRA, a name given by ſome to the ſeveral depreſſed ſpecies of the echinodermata. See ECHINUS.

ECHINONEUS. See ECHINUS.

ECHINOPHORA, in *Botany*, (εχινος, *a hedge-hog*, and φερω, *to bear*, alluding to its prickly heads of flowers and ſeed,) Prickly Sampire, or Sea Parſnep, Linn. Gen. 129. Schreb. 180. Willd. Sp. Pl. v. 1. 1379. Sm. Fl. Brit. 293. Juſſ. 225. Claſs and order, *Pentandria Digynia*. Nat. Ord. *Umbelliferæ*.

Gen. Ch. *General umbel* of numerous rays, of which the inner ones are ſhorteſt; *partial* of numerous flowers, the central one ſeſſile. *General involucrum* of about five unequal, ſharp-pointed, permanent leaves; *partial* turbinate, of one leaf, in ſix acute unequal ſegments, permanent. *Perianth* minute, with five unequal teeth, deciduous. *Cor. Univerſal*, irregular, radiated; *male flowers* numerous, with abortive piſtils; *female* ſolitary, in the centre of each partial umbel; *partial* of five unequal, ſpreading, plaited, inflexed, and cloven petals. *Stam.* Filaments five, ſimple, longer than the petals; anthers roundiſh. *Piſt.* Germen of the female flowers oblong, inferior, imbedded in the partial involucrum; ſtyles two, ſimple, longer than the petals; ſtigmas ſimple. *Peric.* none, except the hardened, ſpinous, partial involucrum. *Seed* one or two, ovate-oblong. Sometimes ſtamens are found in the central, or female flower.

Obſ. The above deſcription is corrected from the manuſcripts of Linnæus, compared with nature.

Eſſ. Ch. Partial involucrum turbinate, of one leaf, in ſix ſegments. Marginal flowers radiant, male, ſtalked; central one female. Seeds imbedded in the partial involucrum.

1. E. *ſpinoſa*, Linn. Sp. Pl. 344. Sm. Prod. Fl. Græc. v. 1. 179. Cavan. Ic. t. 127. Mart. Mill. Dict. v. 2. (Crithmum ſpinoſum; Dod. Pempt. 705. Ger. Em. 533. Paſtinaca marina; Lob. Ic. 710. Bauh. Hiſt. v. 3. 196.) "Leaflets awl ſhaped, ſpinous, three-cleft, or undivided, entire." A native of ſandy ſea-ſhores, eſpecially of the Mediterranean, and in the Levant, flowering from July to September. There are ſo many authorities on record for its having been found, in former times, in various parts of our own coaſts, that though no recent inquiries on the ſubject have been ſucceſsful, it could not be refuſed a place in the *Flora Britannica*. We have gathered this plant near Genoa, Mr. Saliſbury at Montpellier, and Dr. Sibthorp in Greece, and Aſia Minor. A moſt admirable drawing of it by Mr. Ferd. Bauer, exiſts among thoſe deſtined for the *Flora Græca*. *Root* perennial, tap-ſhaped, often branched, long, fleſhy, whitiſh, eatable, having the taſte and ſmell of a parſnep. Turra ſays it is diuretic and aphrodiſiac. *Plant* ſo repeatedly branched, and armed with ſuch a multiplicity of ſpinous leaves, that it forms an impenetrable, inacceſſible, hemiſpherical buſh, two or three feet in diameter, decorated

with numerous, white, or reddiſh, large, radiant umbels, well contraſted with the rather glaucous, ſomewhat downy, foliage, ſo as to be not deficient in beauty. The inflexed point of each petal is curiouſly fringed. The juices of the whole abound with alkaline ſalt. E. orientalis montana ſpinoſa; Tourn. Cor. 45. Buxb. Cent. 5. Append. f. 27, is ſcarcely diſtinct from this ſpecies.

2. E. *tenuifolia*, Linn. Sp. Pl. 344. Sm. Prod. Fl. Græc. v. 1. 179. Mart. Mill. Dict. v. 2. (Paſtinaca echinophora apula; Column. Ecphr. 98. t. 101.) Leaflets pinnatifid, ſinuated, flat, ſcarcely ſpinous. Native of expoſed places near the ſea, in Greece, Aſia Minor, and the weſtern ſide of Italy, flowering in July and Auguſt. *Root* perennial, long, ſlender, blackiſh. *Herb* much branched, downy. *Leaves* bipinnate; leaflets ſinuated and pinnatifid, their points ſomewhat pungent, ſcarcely ſpinous. *Umbels* numerous, ſmall, of a dull yellow. Columna reports the roots to be very good food, like carrots.

3. E. *trichophylla*. Leaflets thread-ſhaped, elongated, undivided, ſcarcely ſpinous. Native of the Levant, preſerved in the herbarium of the younger Linnæus. *Herb* ſmooth. *Leaves* twice or thrice ternate; leaflets undivided, very long, and ſlender, ſo as to be almoſt capillary, ſlightly channelled above, their points acute, but not ſpinous. *Umbels* the ſize of the firſt ſpecies, on long ſtalks, each with a dark-purpliſh convex tumour in the centre; partial ones, when in ſeed, globoſe, muricated. *Petals* whitiſh. The plant abounds with gum. S.

Echinophora, in *Ichthyology*, a name given by Rondeletius to a ſpecies of ſea-ſnail, of the round-mouthed kind, or claſs of the cochleæ lunares.

He calls it echinophora, becauſe it is all over beſet with tubercles; but this is a very ill-choſen name, as it confounds it with the echini, or ſea-eggs; he had much better have called it cochlea tuberculoſa. See Lunaris *cochlea*.

ECHINOPHTHALMIA. This ſurgical term is derived from εχινος, *a hedge hog*, and οφθαλμια, *an inflammation of the eye*. It ſignifies an inflammation of the eye-lids, attended with a projection of the eye-laſhes, which project out like the quills of a hedge-hog.

ECHINOPS, in *Botany*, (altered by Linnæus from *Echinopus*, a name which ſeems to have been firſt given by John Bauhin, from εχινος, *a hedge-hog*, and οπις, *aſpect*, or *appearance*, more eſpecially alluding to the reſemblance of its round prickly heads, to a ſea urchin.) Globe Thiſtle, Linn. Gen. 453. Schreb. 592. Willd. Sp. Pl. v. 3. 2396. Juſſ. 175. Gærtn. t. 160. Mart. Mill. Dict. v. 2. Claſs and order, *Syngeneſia Polygamia-ſegregata*. Nat. Ord. *Compoſitæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Cal.* The *common* one of many awl-ſhaped totally reflexed leaves, containing many flowers; *partial*, to each flower, inferior, oblong, imbricated, angular, of numerous, awl-ſhaped, erect, permanent, leaves, ſpreading in their upper part. *Cor.* of one petal, the length of the calyx, tubular; its limb five-cleft, reflexed, a little ſpreading. *Stam.* Filaments five, capillary, very ſhort; anthers united into a cylindrical five-toothed tube. *Piſt.* Germen oblong; ſtyle thread-ſhaped, the length of the corolla; ſtigmas two, oblong, ſomewhat depreſſed, revolute. *Peric.* none, except the enlarged calyx. *Seed* ſolitary, ovate-oblong, tapering at the baſe, obtuſe at the ſummit. *Down* obſolete. *Common receptacle* globoſe, nearly naked.

Eſſ. Ch. Partial calyx ſingle-flowered. Flowers all perfect. Corolla tubular. Receptacle nearly naked. Seed-down obſolete.

1. E. *ſphærocephalus*, Linn. Sp. Pl. 1314. Mill. Illuſtr. t. 70. "Leaves pinnatifid, white, and cottony beneath. Stem branched." A native of Italy and Germany, a common hardy perennial in our gardens. This is the beſt known ſpecies. Its *ſtems* are four or five feet high. *Leaves* a foot or more in length, pinnatifid with angular lobes, downy above, white and cottony beneath. *Heads* of flowers numerous, terminal, near two inches in diameter, globoſe, white, or blueiſh, viſcid to the touch, and exhaling a faint ſweetiſh ſmell, like ſome ſorts of pomatum. Five more ſpecies are enumerated by Willdenow, chiefly found in the ſouth of Europe, ſmaller, or more ſlender, than the above, and more prickly.

Propagation and Culture.—The moſt of theſe are hardy perennials, eaſily propagated by ſeed, but requiring to be frequently renewed by the ſame means, like many plants of warm, or dry climates, when kept in our gardens. The firſt ſpecies ſcatters itſelf widely in ſhrubberies, ſo as to become a weed.

ECHINOPUS. See Echinops.

ECHINORINCHUS, in *Zoology*, a genus of inteſtinal vermes, the body of which is long and cylindrical, and the anterior part furniſhed with a ſhort retractile proboſcis, armed at the tip with recurved prickles.

All the ſpecies of this numerous genus live in the viſcera of various quadrupeds, birds, reptiles, and fiſhes, generally in the inteſtines. None have yet been found in man. They adhere very firmly by means of their recurved prickles at the anterior extremity to the viſcera, in which they uſually form a kind of trough, and remain fixed in one ſpot during the whole life of the animal upon which they prey. The hooked prickles vary in form, and are more or leſs numerous in different ſpecies, and are in ſome kinds diſpoſed with more regularity than in others.

Theſe deſtructive creatures are gregarious. They ſubſiſt on the lymphatic humours and other fluids, which they copiouſly extract, by wounding and irritating with the hooked prickles, before mentioned, thoſe parts to which they are immediately attached. Nor is it very unfrequent with them to perforate the membranes, and thereby expoſe to deſtruction the life of the animal in which they are nouriſhed. Contrary to the commonly received opinion, that theſe animals are hermaphrodites, we have reaſon to conclude, there are both males and females of the ſeveral ſpecies in this genus; and that they are of the oviparous kind, is inferred from the number of ſmall oval bodies found in the ſuppoſed females. The ſpecies of this genus, at preſent aſcertained, are very numerous; but their manners of life, and the maladies occaſioned to the more valuable kinds of animals, from the ravages of theſe voracious inmates, are far leſs clearly aſcertained than the importance of the inquiry merits. The following ſpecies are deſcribed by Müller, Goèze, and other writers, who treat on this ſubject.

* *Infeſting Mammiferous Animals.*

Phocæ. Body pale; inteſtine milk-white, and ſpiral. *Aſcaris phocæ*, Fabr.

Found in great numbers in the inteſtines of the harp and rough ſeal, which it often devours. The body is pellucid, membranaceous, tapering to both ends, and from three to eight inches long.

Tubifera. Whitiſh, glabrous, and tapering behind into a fine hair. *Aſcaris tubifera*, Fabr.

Length one inch. Diſcovered in the ſtomach of the harp ſeal.

Gigas. Clear white; without neck; proboſcis ſheathed, with numerous rows of hooked prickles; orifices of ſuction ſeven. Goèze. *Taenia hirundinacea*, Pallas.

Found in the inteſtines of ſwine; and grows to the length of eighteen inches; the filaments of the proboſcis appear as if united by two lateral ligaments.

BALÆNÆ. Inhabits the inteſtines of the whale. Phipps' Journ.

** *Infeſting Birds.*

BUTEONIS. Clear white; veſicles of the tail blueiſh and lentiform. Goèze.

Found in the inteſtines of the buzzard, and rather exceeds two inches and a quarter in length.

SCOPIS. Proboſcis covered with numerous prickles. Goèze.

Inhabits the larger inteſtines of the ſtrix ſcops.

ALUCONIS. Body ſub-rugoſe and opake; proboſcis thick. Müll.

Diſcovered in the ſtomach of ſtrix aluco.

STRIGIS. Proboſcis clavate. Goèze.

In the larger inteſtines of ſtrix ſtridula.

PICI. White, without neck; proboſcis with ſmall ſerrated prickles. Goèze.

Lives in the inteſtines of ſome wood-peckers; has been found in thoſe of the two ſpecies viridis and erythrocephalus. The ſpecies is gregarious, and half an inch long.

BOREALIS. Found in the inteſtines of the eider duck. Phipps' Journ.

BOSCADIS. Neck filiform; proboſcis rather prickly. Goèze.

In the inteſtines of the common duck.

ANATIS. Scarlet; body ovate; thorax and proboſcis covered with prickles, with a long ſmooth neck between them. Goèze.

Inhabits the inteſtines of the velvet duck.

MERGI. Head and neck armed with prickles.

Length an inch and a half. This kind is found in conſiderable numbers in the inteſtines of the mergus minutus.

ALCÆ. Body with lateral wrinkles beneath on the fore-part. Müll.

In the inteſtines of the awk tribe. The length of this kind is four inches; the body is roundiſh, beneath flat, pointed at the anterior part, and terminating behind in an extremely fine point; colour whitiſh, with a black line down the back.

ARDEÆ. Body ſtriated; proboſcis clavated. Goèze.

The body is conic behind, and ſinuated, each in the middle. A ſpecies found in the great white heron.

VANELLI. Tail with a white veſicle. Goèze.

In the inteſtines of tringa vanellus.

MERULÆ. Ovate; thorax prickly.

In the inteſtines of the black-bird.

*** *Infeſting Reptiles.*

RANÆ. White; proboſcis united by two ſlender white filaments within. Goèze. *Tænia hæruca*, Pallas.

A ſpecies of a greeniſh, or greyiſh colour, found in the inteſtines of frogs.

FALCATUS. Proboſcis long, and armed with many longitudinal rows of hooks; body marked on the fore-part with a pellucid blotch, and the poſterior with a pellucid dot of the ſame. Froelich.

Found in the ſalamander.

**** *Infeſting Fiſhes.*

ANGUILLÆ. Body white and ſmooth; proboſcis globular. Schreb.

In the inteſtines of the eel.

XIPHIÆ. In the inteſtines of the xiphias gladius. Redi.

Often perforates the inteſtines, and occaſions the death of thoſe fiſhes.

CANDIDUS. Body opake, ſubrugoſe, and wrinkled. Müll. *Acanthrus ſipunculoides*, Act. Stockh.

Length three inches; the body pale-aſh, variable to brown, yellow, &c. Inhabits the inteſtines of many fiſhes, both of the freſh and ſalt water kinds.

LINEOLATUS. Body with tranſverſe brown lines, interrupted in the middle. Pallas, &c.

Inhabits the inteſtines of the cod fiſh; length two inches.

LONGICOLLIS. Reddiſh-white; head rounded, and longitudinally ſtriated; neck filiform; proboſcis ſlightly hooked. Goèze.

Found in the inteſtines of the torſk.

PLEURONECTIS. Sides of the body with undulated impreſſions. Müll.

In the inteſtines of the turbot.

ATTENUATUS. Globiferous; body equal, yellow, and ſmooth; neck filiform. Müll.

In the inteſtines of the flounder.

ANNULATUS. Globiferous; body ending in a point; neck wrinkled. Müll.

In the inteſtines of the torſk and bream.

PLATESSOIDÆ. Snout pointed; body with an elevated terminal belt behind. Müll.

Body pale, ſmooth, and about two inches and a half long; found in the ſtomach of pleuronectes plateſſoides.

PERCÆ. Body ſoft, wrinkled, and obtuſe at each end. Müll.

In the inteſtines of the perch.

CERNUÆ. Proboſcis armed with from ten to twelve rows of prickles. Schreb.

In the perca cernua.

COBITIDIS. Striated; proboſcis clavated. Goèze.

In the cobitis barbatula.

SALMONIS. Body clavated, ſmooth; proboſcis cylindrical. Müll.

Found in the inteſtines of the ſalmon.

SUBLOBATUS. White globiferous, and ſomewhat lobate at the ſides behind; neck cylindrical and annulate, proboſcis with ſixteen ſeries of ten hooks each. Müll.

In the inteſtines of the ſalmon, when young.

QUADRIROSTRIS. White; tail rounded and inſerted into the body; proboſcis quadruple. Goèze.

In the liver of the ſalmon.

TRUTTÆ. In the inteſtines of the trout. Goèze.

MARÆNÆ. Fuſiform, ſmooth and ſlightly wrinkled; behind tapering, and rather obtuſe. Mart. Act. Stockh.

In the inteſtines of ſalmo maræna.

LUCII. Body pellucid and ſmooth. Schreb.

Body yellowiſh, narrower, and obtuſe behind.

ARGENTINA. Inhabits the inteſtines of the argentine. Act. Hafn.

ALOSÆ. Body filiform; anterior part clavated and rediſh, with eight rows of looſe prickles; proboſcis pale, with eight rows of denſer prickles. Herrmann.

Length two inches. Found in the inteſtines of the ſhad.

BARBI. Ovate, yellow, faſciated; neck long, white, cylindrical, and glaſs-ſhaped. Schranck.

Inteſtines of the barbel.

CARPIONIS. Inhabits the inteſtines of the carp. Koelr.

IDBARI. Inhabits the inteſtines of cyprinus idbarus. Müll.

AFFINIS. Inhabits the inteſtines of cyprinus rutilus. Müll.

RUTILI. Proboſcis tuberous and prickly at the tip;

body with a ſingle mouth or ſucker on one ſide, and four on the other. Müll.

Found in the ſame fiſh as the former, but leſs frequently.

Bramæ. Neck filiform; proboſcis armed with very minute prickles. Goëze.

Inhabits the inteſtines of the bream.

Lophii. In the inteſtines of lophius piſcatorius. Müll.

Sturionis. Rounded and white. Goëze.

In the inteſtines of the ſturgeon.

ECHINOS, in *Ancient Geography*, iſlands of the Ionian ſea, called by the Greeks Echinæ and Echinades, ſituated over-againſt Etolia and the mouth of the river Achelous. They are now called *Cuzzolari*.

ECHINOU, in *Geography*, a town of European Turkey, in the province of Albania; 8 miles N.E. of Zeiton.

ECHINUS, in *Ancient Geography*, a town of Greece, in Acarnania.—Alſo, a town of Greece, in the Phthiotide territory, ſituated, as Pliny ſays, at the mouth of the river Sperchius; or, as others ſay, at the bottom of the Maliac gulf.

Echinus, in *Architecture*, a member or ornament, near the bottom of the Ionic, Corinthian, and Compoſite capitals; which, from its circular form or contour, is called by the French, *quart de rond*, and by the Engliſh, *quarter round*, or *boultin;* and from its being uſually carved, or cut with figures of eggs, &c. is called alſo by the Latins, *ovum;* by the Italians, *ovolo;* the French, *œuf;* and the Engliſh, *eggs* and *anchors*. Laſtly, the eggs being encompaſſed with a cover, and thus bearing ſome reſemblance to a cheſnut cut open; the Greeks have called it εχινος, *echinus*, a word which denotes the prickly cover of a cheſnut.

Echinus, in *Botany*, Loureir. Cochinch. 633. a diœcious tree of Cochinchina, ſuſpected by Loureiro to be the *Ulaſſium* of Rumph. Amboin. book 4. chap. 18. t. 23. It appears to belong to the natural order of *Amentaceæ*, and he deſcribes the fruit as two united roundiſh muricated capſules, with a round ſmooth black ſeed in each. The *leaves* are ſcattered, ovate, pointed, undivided or three-cleft, entire, reticulated with veins, downy beneath. *Flowers* many together on a ſtalk. Whatever may be determined concerning this genus, its name is untenable in botany, being preoccupied in zoology.

Echinus. See Salsola and Statice.

Echinus is alſo uſed by ſome botaniſts for the prickly head or top of any plant; thus called from its likeneſs to a hedge-hog, or the cover of a cheſnut.

Echinus, the hedge-hog, in *Zoology*. See Erinaceus.

Echinus, a genus in the Linnæan ſyſtem, included in the molluſca order of vermes. Theſe have the body roundiſh, covered with a bony cruſt, and furniſhed in general with moveable ſpines; the mouth placed beneath, and moſtly conſiſting of five valves.

This is the character aſcribed to the echinus genus by Linnæus, and retained by Gmelin. A ſlight attention to the genus, as it ſtands thus defined, will be ſufficient, it is preſumed, to convince every impartial naturaliſt that ſome amendment is requiſite in the claſſification of theſe bodies, admitting only thoſe ſpecies which Linnæus deſcribes; and if this be allowed, it will be ſeen that the Gmelinian arrangement, being far more copious, is much more liable to objection. Linnæus includes three or four diſtinct natural genera under his genus echinus; Gmelin, no leſs than ten; and many of theſe ſo remote in character, as to bear no affinity whatever with each other, except in being, as Linnæus expreſſes it, of a roundiſh form, covered with a bony cruſt, beſet with ſpines, and having the mouth placed beneath. By ſome it may be urged, that this really conſtitutes them of the echinus genus; and every other difference, whether in figure or any other peculiarity, ought to be regarded as diſtinctions of ſpecies and not of genera. To a certain extent we concede the truth of this; but from the many examples before us, which this extenſive tribe preſents, there can be little difficulty in diſcriminating which characters define natural families, and which form diſtinctions of ſpecies only; the former of which will not fail to afford the beſt generical diſtinctions that can be adopted in the arrangement of this tribe of animals. That conſiderable reformation is requiſite in the Linnæan arrangement, we think, muſt be allowed; nor can we heſitate in believing that Linnæus would himſelf have made much amendment in his claſſification of the echini, had he been acquainted with half the number of ſpecies which have been diſcovered ſince his time. Were we, in fact, to regard all bodies, which may be ſafely included within the definition of his echinus, as appertaining ſtrictly to one genus, we might with equal conſiſtency recaſt the whole ſyſtem of conchology, and conſolidate every ſpecies of whatever families into a ſingle genus. All ſhells have a greater or leſs degree of tendency to a roundiſh form, whether multivalve, bivalve, or univalve, and have the covering alike of a teſtaceous ſubſtance. All echini have a greater or leſs degree of tendency to a roundiſh form, and have the covering alike of a bony ſubſtance: yet, how abſurd would it appear to admit the firſt as a generical diſtinction, though from habit we implicitly admit the latter? It is indeed added, that the echini have moveable ſpines; to which, in ſpeaking of ſhells, we may contraſt the circumſtance of the ſpines on ſhells, when preſent, being always immoveable. This parallel might be purſued ſtill further; but enough, we conceive, has been advanced to prove that the definition of echinus, as retained by the Linnæan ſchool, admits of far more general application than can be conſiſtent with a generical diſtinction: and it will be hereafter ſhewn, that the ſeveral families, which in the latitude of its expreſſion that genus embraces, exhibit as prominent generic features as the ſeveral tribes of ſhells.

That no improper blame be attached to Linnæus, it ſhould be recollected, that ſo lately as the publication of the tenth edition of the "Syſtema," no more than ſeventeen ſpecies of echinus were known to that author; and though theſe included examples of ſeveral diſtinct natural genera, when we conſider the conciſe amount of theſe, he is not altogether inexcuſable for retaining them together: had he divided them into about three genera, it might have been ſufficient. Gmelin poſſeſſed every advantage, and has ſtill done little towards improvement. When Linnæus wrote, his moſt material aſſiſtance was derived from the works of Rumpfius, an early edition of Klein, and Breynius, and laſtly, ſome few ſpecimens in the cabinet of count Teſſin. For the diſpoſal of theſe in methodical order, he formed two ſections: one for thoſe having the body of regular form, and the vent vertical; the other irregular, and having the mouth and vent beneath. The firſt of theſe ſections contain eleven ſpecies; and the ſecond, ſix. Gmelin derived every aſſiſtance from better authors: the labours of Müller on this ſubject, in "Zoologia Danica;" Phelſum's work, entitled, "Briefaan C. Nozeman over de Gewelr-Slekken of Zee-eglen;" and, more eſpecially, the Leſkeian edition of Klein's "Naturalis Diſpoſitio Echinodermatum, &c.;" all which appeared ſubſequent to the time of Linnæus. From theſe publications, Gmelin found the tribe of echinus to be far more numerous than had been before conceived; and clearly ſaw the neceſſity of extending the genus to a conſiderable length for their reception, if he adhered to the

Linnæan method ; or of conſtituting ſeveral new genera, if he deviated from it. The former preſented difficulties ; the latter, innovation and trouble. Thoſe writers had not only deſcribed many ſpecies which belonged to either one or another of the families propoſed by Linnæus, but many more, which, without great impropriety, could not be referred to either ; the ſpecies altogether amounting to above one hundred ſubjects. The only circumſtance to be regretted was the want of harmony in the different ſyſtems ; for, although the ſeveral writers agreed in the moſt eſſential point, namely, the neceſſity of forming a number of new genera, they were neither diſpoſed to accord in the conſtruction of thoſe genera, or in the application of names, even to thoſe particular families, which in any ſyſtem might be deſignated by the ſame appellation. Gmelin does not attempt to unravel theſe, and overcome the perplexity : he at once ſevers the gorgon knot, by rejecting the genera of every author indiſcriminately, and referring the whole of the ſpecies to the genus echinus. For the admiſſion of theſe, he forms twenty-ſeven principal and ſecondary diviſions ; and, in this ſtate, it may be truly obſerved, that there is no genus whatever, throughout the whole Linnæan ſyſtem, the cancri perhaps excepted, which preſents ſuch an incongruous aſſemblage.

Any arrangement formed on ſuch a plan muſt prove defective ; and the echinus genus, as conſtructed by Linnæus, ought rather to be conſidered, in the preſent time, as the character of an extenſive order of vermes than as a genus. There is in each of the ſyſtems which have appeared much to commend ; none, however, which in our opinion is ſo conſtructed as to deſerve entire approval. Some of thoſe eſtabliſhed by Leſke, and others by Müller, are excellent ; and ſeveral of the new genera of La Marck ought in particular to be retained. In the following arrangement of genera, we have endeavoured to combine the advantages of each ; and are inclined to believe, that no difficulty can occur in referring any of the known ſpecies of Linnæan echini to its natural genus, according to the method now propoſed. The ſeveral genera, though conſidered diſtinctly, are brought together into one point of view, to avoid that perplexity to the Linnæan reader which muſt neceſſarily ariſe, were each genus referred to its alphabetical order through the work.

Before we conclude this topic one point muſt be conſidered. It muſt be confeſſed that there is one radical fault in the arrangement of theſe bodies, in which all writers have participated, with the exception of Linnæus ; and that is, the incorporation of the recent with the remains of foſſil ſpecies. Some of the former we have occaſional opportunities of examining, in a perfect ſtate, in muſeums and collections ; while, on the contrary, the others occur almoſt conſtantly in a ſtate of mutilation, or are ſo enveloped and diſguiſed in ſtony matter, as to render their characters ambiguous. The latter, when tolerably elucidatory of the ſpecies, or eſpecially with any remains of the ſpines affixed, are deemed ineſtimable. The remains of foſſil echini mentioned by writers are, therefore, to be at all times received with caution ; and ſome within our own knowledge muſt be rejected : neither is it adviſeable to form any genera of the foſſil kinds, except from ſuch examples as perfectly diſplay every character of the general form, together with both the ſituation of the mouth and the anal aperture.

Naturaliſts have entertained very different opinions concerning theſe bodies. Ariſtotle, who is one of the earlieſt writers on the ſubject, calls them echinos, echinometra, and ſpatagus, placing them with multivalve ſhells. This example is followed by Pliny, and many much later writers. Among the moderns, it ſhould be mentioned that Bruguiere forms a diſtinct claſs of theſe, and the aſterias; Cuvier refers them to the zoophytes claſs, and La Marck to his *radiares*, the claſs in which he comprehends the aſterias and holothuria.

The recent animals of this claſs are inhabitants of the ſea, and thoſe ſpecies which occur in a foſſil ſtate are found moſt commonly in ſecondary calcareous rocks, or more frequently in chalk and flint. The cruſt or covering is compoſed of a great number of plates, amounting, in many ſpecies, to nearly a thouſand in a ſingle ſhell ; their form is various in different families, and the perforations of the ſhell diſpoſed as variouſly. Theſe perforations in the ſhell are the apertures to which the tentacula of the incloſed animal are protruded. The ſurface of the ſhell is alſo more or leſs beſet with tubercles, upon which the ſpines are ſituated. Theſe in the living animal are attached by very ſtrong ligaments, but almoſt conſtantly fall off when the animal dies. The mouth, which is placed beneath, conſiſts of five or ſix teeth of a triangular form. Their internal organization, notwithſtanding the inveſtigations of Cuvier, remains in conſiderable obſcurity, and their ſexual organs are unknown. They are aſcertained to be oviparous, and to ſpawn in the ſpring. The ſpines are the inſtruments of motion, an intereſting account of which appeared from the pen of Reaumur, in the Memoirs of the French Academy of Sciences, in 1772. Their tentacula are the proceſſes by means of which they adhere very ſecurely to the rocks, or ſeize upon their prey, and by the aſſiſtance of which they conduct it to their mouth. They live chiefly on crabs and teſtaceous animals, marine worms, &c.

The ſucceeding appear to be the principal natural families into which the Linnæan echini, aſcertained at this time, may with propriety be divided ; and which, as before remarked, to avoid confuſion, are concentrated in the preſent article.

Echinus.

Body hemiſpherical, globular, or ſuboval, with avenues of pores, which diverge equally on all ſides from the vent to the mouth; vent vertical; mouth beneath and central.

ESCULENTUS. Hemiſpherical-globular, with ten avenues of pores, the ſpaces between covered with ſmall tubercles ſupporting the ſpines. *Echinus eſculentus*, Linn. *Echinometra*, Rondel. *Melo marinus*, Plancus. *Cidaris miliaris*, Klein.

Native of the Mediterranean and other European ſeas, and one or more of its varieties found in India. The body is generally reddiſh and yellow, varied with green or purple ſpines, which fade in colour, and fall off after the death of the animal. The fleſh is eatable.

SPHÆRA. Spherical, red, with blueiſh ſpines. Müll.

Inhabits the northern ſeas, and is by ſome ſuppoſed to be the young of the ſpecies eſculentus.

DRÆBACHIENSIS. Hemiſpherical, pale, with long pale ſpines. Müll.

Found in the northern ſeas.

MILIARIS. Hemiſpherical, depreſſed with ten avenues of pores, the ſpaces between with two rows of protuberances. Gmel. *Cidaris miliaris ſaxatilis*, Klein. *Echinus ovarius*, Rondel.

An European ſpecies.

BASTERI. Shell depreſſed, with few tubercles, and ſerrated line down the middle of the ſpaces; pores of the avenues placed in alternate rows of two and three foramina. Klein.

A native of Europe, and by ſome authors conſidered as a variety of the former. The colour is greeniſh-grey, variable to olive or reddiſh violet. The larger ſpaces are marked with eight rows of ſmall tubercles, and ſprinkled with a few others of ſmaller ſize; the leſſer ſpaces with two rows of larger, and as many ſmall tubercles; avenues with a triple row of double pores; ſpines ſtriated whitiſh.

HEMISPHÆRICUS. Hemiſpherical, depreſſed, with ten avenues of pores, the ſpaces with a ſerrated ſuture down the middle, and tranſverſe lines; mouth pentangular, the angles obtuſe. Klein.

Reſembles E. eſculentus. Colour red with paler avenues, the baſe ochraceous; rough with larger and ſmaller protuberances.

ANGULOSUS. Hemiſpherical; the ſpaces granulate and bifariouſly warted, the larger ones bipartite by a ſerrated ſuture down the middle; avenues trifariouſly porous. Klein.

Shell grey, with a violet tinge; ſpaces with rows of granulations and protuberances; avenues with double diſtant pores. Klein deſcribes alſo a variety of this ſpecies of a ſmaller ſize, and greeniſh grey colour.

EXCAVATUS. Hemiſpherical; ſpaces granulated, and bifariouſly tuberculated; avenues excavated and bifariouſly porous. Klein.

Found in a petrified ſtate at Verona.

GLOBULUS. Hemiſpherical, ſub-globular, with ten avenues, the ſpaces muricated at the ſides, and porous in the middle. Linn.

Inhabits the Indian ocean.

SPHÆROIDES. Hemiſpherical, gibbous; avenues ten, muricated throughout, and porous in the middle.

Native of the Indian ocean.

GRATILLA. Hemiſpherical, gibbous; avenues ten, triplicate, the ſpaces muricated in a decuſſate manner. Linn.

Inhabits ſame ſeas as the latter.

LIXULA. Hemiſpherical, with ten avenues in contiguous pairs, the ſpaces tranſverſely muricated and punctured. Linn.

Native of the Indian ocean.

SAXATILIS. Hemiſpherical, depreſſed; pores of the avenues in a curved line, the curves oblique at the baſe. Linn. *Cidaris rupeſtris*, Klein.

Several ſuppoſed varieties of this ſpecies are found in the Mediterranean and Indian ſeas. The colour is commonly violet-grey or white, with the protuberances reddiſh or yellowiſh in two or three longitudinal rows; pores of the avenues double; ſpines rigid, reddiſh-brown, with violet tips.

FENESTRATUS. Orbicular, with a flat feneſtrate baſe; ſpaces ten, with unequal ſmall and large tubercles; mouth with ten angles. Klein.

White, and granulated throughout; in the larger ſpaces are ſix rows of papillous warts; avenues broad with three pair of pores; ſpines violet-black; vent pentangular.

SUBANGULARIS. Hemiſpherical, orbicular, with ten ſpaces, the leſſer ones elevated, and ten rows of tubercles in each. Klein.

Shell greeniſh-grey, rather inclining to cheſnut; ſpaces with four tubercles placed in a rhombic form; pores of the avenues curved in four or five pairs.

Native place unknown.

OVARIUS. Ovate, the larger ſpaces bifariouſly tuberculate. Plott, &c.

Found in a foſſil ſtate in England.

DIADEMA. Hemiſpherical, depreſſed, with five avenues longitudinally tuberculate; the ſpaces lanceolate. Linn.

Inhabits the Indian ſeas. The ſhell is orbicular with the top depreſſed, colour generally blueiſh; mouth large; vent circular, and ſurrounded with a pentangular ſkin; ſpaces bifariouſly tuberculate, the tubercles perforated at the tip; avenues with three pair of pores at the baſe and one at the tip; ſpines violet and blue-grey. There are ſeveral varieties of this ſpecies differing in colour and diſpoſition of the ſpots, &c.

CALAMARIUS. Spheroid, depreſſed; avenues five, with black porous margins, granulated in the middle with a row of larger prominent dots. Pallas.

Native of the Indian ſea, the colour greeniſh-white; the ſpines reſemble the ſtem of the equiſetum, and are whitiſh annulated with green and grey at the tip.

ARANEIFORMIS. Orbicular, grey, with purple-grey ſpines thicker in the middle. Gmel. *Spinnekopf*, Phelſ.

Inhabits American ſeas.

STELLATUS. With the lower ſpines capillary. Gmel. *Kleine komeet*, Phelſ. *Echinometra purpurea americana*, Seba. *Erinaceus marinus*, Pontopp. Norſk. Naturh.

Found in the American ſeas.

RADIATUS. With five radiated avenues, forked at the tip. Klein. *Groote komeet*, Phelſ. *Echinanthus major ſpinis orbus*, Seba.

Native place unknown.

CIRCINATUS. With ten granulate ſpaces, bifariouſly tuberculated, the larger ones excavated, the leſſer ones elevated, and ſub-pulvinate at the baſe. Leſke. *Echinometra circinata*, Breyn. *Krunsje*, Phelſ.

Found in a foſſil ſtate.

CIDARIS. Hemiſpherical, depreſſed, with five flexuous linear avenues, the ſpaces alternately bifarious. Linn.

Many very diſſimilar kinds of echini are included by Gmelin as varieties of this ſpecies, ſeveral of which we are perſuaded will be found on further inveſtigation to be diſtinct. E. cidaris inhabits European and Indian ſeas.

MAMMILLATUS. Hemiſpherical, oval, with ten winding avenues; the ſpaces muricated and warty, the narrower ones abbreviated. Linn. *Cidaris mammillata*, Klein.

Inhabits the ſouth ſeas, is of a depreſſed form and yellowiſh aſh-colour inclining to browniſh, beneath paler.

LACUNTUR. Hemiſpherical-oval with ten flexuous avenues; ſpaces muricated, the narrower ones longitudinal. Gmel. *Cidaris lacuntur*, Klein.

Variable in colour from yellow-cinereous to blueiſh or blackiſh. The ſpecies inhabits the Indian ocean.

ATRATUS. Hemiſpherical-oval and ſlightly depreſſed; with very ſhort obtuſe-truncated ſpines; the marginal ones clavated and depreſſed. Klein.

Orbicular cinereous inclining to violet; ſpines violet. Native of the Indian ſeas.

CORONALIS. Hemiſpherical-orbicular with ten ſpaces alternately narrower and covered with ſcattered papillæ; avenues flat, uniting in confluent pairs before the area of the crown. Leſke.

Found in a foſſil ſtate in chalk and flint in various parts of the world.

ASTERIZANS. Orbicular depreſſed; tubercles furrowed with a groove up to the tip, and ſurrounded with a circle of granulations, Leſke. *Sterrewrat Zee-egel*, Phelſ. *Zee-eg.*

A mineralized ſpecies met with in chalk.

ASSULATUS. Shell ſcutellate, the ſcutels united by tranſverſe ſutures. Klein.

SARDICUS. Orbicular depreſſed tuberculate, with ten impreſſed avenues; the ſpaces multifariouſly tubercled, with an impreſſed ſuture down the middle. Klein. *Sardiſche Zee-egel*, Phelſ.

A large ſpecies, found in the Tuſcan and Adriatic ſeas; the colour grey, tinged with yellowiſh red; the baſe nearly flat and yellow; larger ſpaces with tubercles diſpoſed in about twelve rows, with leſſer ones and ſmall granulations in the interſtices; the leſſer ſpaces with about ſix rows of ſmaller tubercles; avenues with five pairs of pores placed in an arched ſeries; mouth ſmall.

Flammeus. Hemiſpherical depreſſed; the ſpaces void of tubercles in the middle towards the upper parts, the leſſer ones more elevated; avenues narrow and bounded each ſide by a row of tubercles. Klein. *Gevlamde Zee-egel*, Phelſ.

Native place unknown. The colour is olive green, with the tubercles and baſe whiter; larger ſpaces with twelve rows of tubercles at the broadeſt part, leſſer ſpaces with three; each tubercle ſurrounded with a circle of leſſer ones; mouth ſmall, vent ſurrounded with pentangular ſcales.

Variegatus. Orbicular ſubangular; middle ſpaces roſy, rich green each ſide; avenues whitiſh-green; baſe whitiſh. Leſke, *Buntgeflamte Zee-egel*, Phelſ.

A rare kind, the native place unknown.

Pustulosus. Larger ſpaces divided in the middle by a ſuture, with numerous tranſverſe rows of tubercles increaſing in number towards the middle; leſſer ſpaces more elevated. Klein.

This is a ſmall ſpecies, about an inch in height and two in diameter, the colour browniſh-grey inclining to red, the leſſer ſpaces paler, baſe whitiſh, and protuberances tinged red. Mouth with broad ſinuoſities. Country unknown.

Granulatus. Sub-orbicular, ſub-angular; middle of the ſpaces naked and divided by a ſuture ſerrated each ſide, the larger ones with ſeven rows of tubercles, the leſſer ones with four. Klein. *Zand-korlige Zee-egel*, Phelſ.

About one fourth leſs than the former; colour dull green, with the margin of the larger ſpaces, and the baſe inclining to greyiſh; avenues with three pair of pores placed in a triangle; vent circular with ten ſcales at the margin expanded like a roſe.

Tessellatus. With ten ſpaces divided in the middle by a ſuture, and teſſellated; avenues ten biporous; mouth circular. Klein. *Leyendak*, Phelſ.

Found in a foſſil ſtate.

Botryoides. Spaces divided by a longitudinal ſuture in the middle, the larger ones bifariouſly tuberculated; avenues with a double curved row of pores. Klein. *Geribde Zee-egel*, Phelſ.

Found in ſame ſtate as the former.

Toreumaticus. Hemiſpherical, with ten ſpaces bifariouſly tuberculated, the tubercles crenated and ſurrounded by a circle of granulations, the larger ſpaces with four longitudinal grooves, the leſſer ones with two grooves. Klein. *Gegraveerde Zee-egel*, Phelſ.

Cinereous greeniſh or blueiſh, the baſe and avenues yellowiſh; avenues biporous, the pores placed in a thickly-ſerrated line; vent ſurrounded with ten ſcales.

Clypeus.

Body ſhield form; vent vertical; mouth beneath and central.

Sinuatus. Convex; avenues ten, ſtriated; ſpaces ten; tubercles ſurrounded with a circle of granulations. Plott.

Found in a foſſil ſtate in Britain.

Semiglobosus. Hemiſpherical, grooved, with a flat baſe, the protuberances placed in rows. Klein.

Found in a foſſil ſtate.

Quinquelabiatus. Painted with innumerable annulations, with a hollow in the middle, ſurrounding a five-rayed convex ſtar. Klein. *Vyſlip*, Phelſ.

Found in a foſſil ſtate.

Conoideus. Sub-conic, with an elliptic circumference; ſpaces and avenues ten, the latter tranſverſely grooved, and porous at the margin, the former divided by a ſtraight ſuture. Leſke.

Found in a foſſil ſtate.

Galerites.

Conoid, or oval, with avenues of pores radiating from the ſummit to the baſe; mouth central; vent in the margin or contiguous.

Albogalerus. Spaces ten; covered with numerous ſmall tubercles, the larger ones united by a ſerrate ſuture and tranſverſely lineated, the leſſer ones terminated by a foramen at the crown; avenues ten and biporous. Gmel. Plott, &c.

A foſſil ſpecies, met with in various parts of Britain.

Depressus. Spaces ten, the larger ones divided in the middle by a ſuture; avenues ten, biporous; crown depreſſed; vent orbicular. Leſke. *Egelſteen tienband plattop*, Phelſ.

A foſſil ſpecies.

Vulgaris. Orbicular, with ten avenues, two of which are near each other. Morton, &c.

Common in a foſſil ſtate in various parts of Europe.

Quadrifasciatus. With four avenues of pores. Gehler, &c.

Found in a foſſil ſtate.

Sexfasciatus. With ſix avenues of pores, Gehler, &c.

A foſſil ſpecies.

Discoideus.

Body roundiſh, with the baſe exactly circular; mouth and vent beneath, ſmall and orbicular.

Subuculus. Avenues ten, biporous; ſpaces ten, alternately large and ſmaller. Klein.

In this ſpecies the ſpaces are beſet with very ſmall circles; pores of the avenues very minute, and crowded cloſe together.

Found in a foſſil ſtate.

Echinoneus.

Body oval or orbicular, and rather depreſſed; rays of pores numerous and radiate from the ſummit to the baſe; mouth ſomewhat central; vent beneath and near the mouth.

Cyclostomus. Oblong, ſub-depreſſed; crown with five pores; mouth placed in the middle and round; vent oblong and near the mouth. Leſke. *Spatagus puſillus*, Müll. *Rond-mond*, Phelſ.

Cinereous or yellowiſh; ſpaces ten, divided by a ſerrated line down the middle, and beſet with minute tubercles incloſed in a circle; avenues ten, biporous, and extending to the mouth. A foſſil ſpecies.

Semilunaris. Vent longitudinally oblong; mouth tranſverſe and ſemilunar. Klein. Muſ. *Echinus ovalis*, Telſin. *Spleet-mond*, Phelſ.

Colour pale yellowiſh-aſh. The ſpecies inhabits the Aſiatic ſeas.

Scutiformis. Mouth pentangular; avenues ten, ſtriated; larger ſpaces divided into plates, the pieces pentangular. Leſke.

Native place unknown.

Galeaster.

Body uſually convex above and flat beneath; baſe ovate and acute; vent and mouth beneath and oppoſite.

Scutatus. Convex, beneath flat; ſpaces tuberculated and alternately larger, the large ones divided by a ſerrated ſuture in the middle; mouth tranſverſely kidney-ſhaped. Lhuyd. *Galea vertici ſcutata*, Klein. *Vyfblad*, Phelſ.

Found in a foſſil ſtate in Britain.

Ovatus. Ovate, divided into plates of an hexangular form; crown naked; vent ſomewhat oval. Klein.

A foſſil ſpecies. The ſhell is compoſed of twenty rows of plates, which are alternately larger and ſmaller, and all united by a ſerrated ſuture; mouth round and ſmall; vent ſlightly oval.

Pustulosus. Spaces obſolete and tuberculated; avenues with raiſed dots diſpoſed in pairs; crown impreſſed. Plott, &c.

Found in a foſſil ſtate in England and Germany.

Quadriradiatus. With four double rows of dots. Klein. *Echinites Niendorpienſis*, M ll. de lap.

Found in Germany in a foſſil ſtate.

Minor. Ovate, with a flat or concave baſe; ſpaces and avenues ten, the avenues biporous; mouth tranſverſe, roundiſh; vent ſub-oval. Leſke.

A foſſil ſpecies.

Dubius. Ovate, with ten porous avenues; half the vent marginal. Leſke.

The five larger ſpaces are marked with impreſſed circles.

Found in a foſſil ſtate.

Clypeaster.

Body irregular, convex above, beneath ſubconcave; margin angularly ſinuous; ſurface with a quinque-petalous mark of pores; mouth beneath, and central; vent beneath, and near the margin.

Rosaceus. Flattiſh, and roundiſh-oval; avenues five, oval, with a dotted ſurface. Linn. *Echinanthus humilis*, Klein. *Groot egel-roozen ſtomp-blad*, Phelſ.

Native of the Aſiatic ſeas.

Altus. Crown elevated and orbicular; avenues broad, with convergent granulated tips. Walch, &c.

A foſſil ſpecies.

Pentaphyllus.

Body irregular and ovate, above convex, beneath flat; margin entire; ſurface with a quinque-petalous mark of pores; mouth tranſverſe; vent marginal.

Oviformis. Convex, beneath flat; avenues ten, biporous, and expanded in a ſtellated form; crown with four pores. Klein.

Found in a foſſil ſtate.

Orbiculatus. Granulated; avenues biporous, the pores united by a tranſverſe impreſſed line, and the intermediate ſpaces divided by a ſerrated line in the middle; the reſt of the ſurface quinque-partite. Leſke. *Monoſtroites minor*, Mercat.

A ſpecies of the foſſil kind, and perhaps not ſtrictly of this genus.

Echinodiscus.

Body flat above and beneath; ſurface perforated with foramina, and a quinque-petalous mark of pores; mouth central; crown with four pores.

* *Section. With ſinuate Margin.*

Biforis. Baſe with five grooves, and ten flexuous radiated lines; near the vent two oblong foramina. Leſke.

Native place unknown.

Pentaphorus. Avenues emarginate at the tip; vent near the mouth, with five foramina. Klein, &c. *Vyf-buizige egelkoek*, Phelſ.

Colour above whitiſh-aſh, tinged with reddiſh, beneath white and yellow, with blue veins; crown marked with a pentagonal ſtar.

Hexaporus. Orbicular, with narrow avenues, and ſix narrow foramina near the vent. Seba, &c.

Inhabits the Indian, American, and South ſeas. The colour cinereous; crown umbilicated, baſe rather hollow.

Emarginatus. Sub-pentagonal, with ovate avenues; vent oval, more remote from the mouth, with ſix foramina cloſe to the margin. Leſke. *Loeſwerk*, Phelſ.

This is of an oval form, and ſomewhat heart-ſhaped; the length above four inches; the crown is petulous, baſe rather flatter, and marked with deep flexuous ramoſe lines. The ſpecies inhabits the iſland of Bourbon, and is of a greeniſh-brown colour.

Auritus. Margin waved, the lower one rounded, the upper one nearly ſquare, and twice divided, with an opening pore between every two of the avenues. Leſke. *Geoorde ſtomp-hart*, Phelſ.

Native of the Perſian ſeas. Yellowiſh-grey, with the upper margin tawny; baſe flat, punctured, and marked with radiated ſtriæ; vent oblong, and placed near the mouth.

Inauritus. Sub-cordate, and divided into plates, the pieces hexagonal; avenues five, oval, emarginate at the tip, the fifth longer, and a pore between every two of them. Leſke. *Ongeoorde ſtomp-hart*, Phelſ.

Inhabits Amboyna. Height five or ſix inches, and breadth the ſame; colour above reddiſh-aſh, beneath violet-red.

Tetraporus. Orbicular, ſlightly ſinuous, and perforated each ſide with four foramina; vent circular. Seba, &c.

Colour pale yellow-grey. Native place unknown.

** *Section. With the Margin toothed or lobate.*

Decadactylos. Shell perforated with four oblong foramina; the margin with ten teeth. Leſke.

Native place unknown. The ſhell is rough with granulations, above blueiſh-green, varied with cinereous; the avenues and ſutures pale fleſh-colour; baſe yellowiſh-fleſh-colour, with ten impreſſed flexuous grooves, bifid at the tip, and greeniſh-aſh; mouth rounded; vent ovate.

Octodactylos. Anterior part orbicular, and perforated with two foramina; poſterior part with eight teeth; avenues lanceolate. Breyn, &c.

Whitiſh-aſh, divided into convex plates; crown umbilicate; avenues emarginate. Country unknown.

Orbiculus. Fore-part orbicular and entire; hind-part unequally toothed; avenues lanceolate, cleft, and bent. Rumpf., &c.

Native of the Indian ſea. This ſhell is flat, ſub-orbicular, not perforated, and compoſed of hexangular pieces; the baſe flat, with impreſſed grooves; avenues oval; mouth rounded; vent oval.

Echinoglycus.

Body flat above and beneath, with entire ſurface, and quinque-petalous mark of pores; mouth central; crown with four pores.

Laganum. Avenues oval, finely ſtriated and cleft at the tip; crown prominent; vent circular and near the margin. Leſke. *Zeereal*, Rumpf.

Found in a foſſil ſtate.

Subrotundus. Orbicular, with radiated avenues. Klein. Aldrov., &c.

A foſſil ſpecies.

Reticulatus. Ovate, flattiſh, with five oval avenues; the ſurface reticulated. Rumpf. *Echinoglycus ovalis*, Phelſ.

Native of the American and Indian ſeas.

Corollatus. Orbicular, with ſhort, oval, obtuſe avenues. Klein.

A mineralized ſpecies.

Echinocyamus.

Body uſually globular or oval, with ten avenues on the crown; rays on the ſurface biporous, ſtraight, and forming a ſtar of five rays; mouth and vent contiguous in the middle of the baſe.

Nucleus. Surface globular, with an orbicular circumference; baſe narrow and flat in the middle; ſides grooved; avenues pulvinate; crown excentric. Klein, &c.

Yellowiſh-aſh; crown perforated with four pores; mouth circular; vent rather oblong, and ſmaller than the mouth. Native place of this and the two following unknown.

Centralis. Surface globular, circumference orbicular; baſe pulvinate; ſides very finely grooved; avenues ſlightly pulvinate; crown central.

Allied to the former; the mouth minute and orbicular.

Ervum. Surface globular, circumference ſomewhat oval; baſe a little narrowed; ſides furrowed; avenues ſomewhat pulvinate; crown central. Phelſ.

Craniolaris. Surface globular on the anterior part; poſterior nearly five-angled, pulvinate, and ſloping; circumference elliptic; baſe a little narrowed; ſides grooved; avenues pulvinate; crown excentric. Pallas, &c.

Native of India. The colour white, covered with granulations, ſurrounded by a hollow line; crown with four pores.

Turcicus. Surface and baſe pulvinate, circumference elliptic; ſides ſlightly grooved; avenues ſub-pulvinate; crown ſlightly depreſſed and central. Phelſ.

Vicia. Surface globular, circumference obtuſely oval; baſe a little narrowed; ſides grooved; avenues flattiſh; crown central. Phelſ.

Reſembles echinus craniolaris, and inhabits the Adriatic.

Ovulum. Surface pulvinate, circumference obtuſely oval; ſides ſlightly grooved; crown central. Leſke.

Lathyrus. Surface and baſe pulvinate; circumference oval; ſides ſlightly grooved; avenues pulvinate; crown nearly central. Phelſ.

Colour dull yellowiſh-grey.

Equinus. Surface and baſe pulvinate; circumference elliptic; ſides ſmooth; avenues ſub-pulvinate; crown central. Leſke.

Minutus. Surface pulvinate and nearly flat, circumference ovate and ſub-pentangular; baſe narrowed; ſides grooved; avenues pulvinate; crown central. Pallas, &c.

A ſmall ſpecies, found frequently on the ſandy coaſts of the Netherlands.

Faba. Surface and baſe pulvinate; circumference obtuſely oval; ſides hardly grooved; avenues flat; crown a little prominent and central. Phelſ.

Very ſmall, ochraceous, and granulate.

Inequalis. Surface gibbous on the fore-part, poſterior flat and ſloping; circumference oblong-oval and nearly pentangular; baſe globular and rather narrowed; ſides grooved; avenues ſub-pulvinate; crown central. Phelſ.

In this ſpecies the back is unequal.

Raninus. Surface globular, and more ſloping behind; circumference acutely oval; baſe globular; ſides grooved; avenues ſub-pulvinate; crown central. Phelſ.

Reſembles echinus minutus.

Bufonius. Surface globular; circumference ovate, heart-ſhaped, and ſub-triagonal; baſe pulvinate; ſides ſlightly grooved; avenues pulvinate; crown nearly central.

Much allied to the laſt.

Cassidulus.

Body elliptic or ſub-cordiform; upper ſurface with a five rayed ſtar of pores; mouth ſub-central beneath; vent above, and near the margin.

Americanus. Body ſub-globoſe; circumference ſomewhat oval; crown with four pores. Boſc.

Inhabits American ſeas.

Spatangus.

Body cordiform or ovate; vent lateral.

Section *. *Heart ſhaped; the crown grooved.*

Cor Anguinum. Above convex, with five impreſſed quadrifariouſly porous avenues, and five ſpaces. Lhuyd, &c. *Pokhart*, Phelſ.

A foſſil ſpecies found in Britain.

Lacunosus. Ovate, gibbous, with five depreſſed avenues. Linn. *Spatangus lacunoſus*, Klein. *Groote holblad*, Phelſ.

Native of the Indian and European ſeas.

Section **. *Heart-ſhaped, the crown not grooved.*

Radiatus. Avenues four, with impreſſed ſtriæ, porous on each ſide; crown with four pores; ſpaces ten, divided by a ſerrated ſuture in the middle, and arched tranſverſe ſutures. Walch.

Found in a foſſil ſtate; the baſe is flat; mouth rather kidney-ſhaped, and ſurrounded with a ſub-pentagonal ſtar of pores; vent roundiſh.

Purpureus. Avenues four, petal-ſhaped and lanceolate; larger tubercles placed in a zig-zag manner; ſpines acicular, incurved, and white. Klein. *Dickblad*, Phelſ. *Pas de poulain*, Argenv. *Scolopendrites*, Aldr.

Native of the North ſeas. The back convex, ſides ſloping; anterior part with two projections; poſterior truncated; beneath flat; ſurface granulated, and covered with ſubclavate, and ſpatulate briſtly ſpines.

Pusillus. Oval, with five avenues; vent remote. Müll.

A minute ſpecies found in the North ſeas.

Complanatus. Rather flattened each ſide; ſpaces and avenues ten, two of which are placed in the furrows of the back. Klein.

This is of a roundiſh form, and is found in a foſſil ſtate.

Subglobosus. Both ends convex, ſub-globular, and divided into plates; avenues ten, with biporous ſtriæ; vent ovate. Liſt, &c.

Found in a foſſil ſtate in Britain; the ſhell is granulated, with four pores on the crown; ſpaces divided by a longitudinal ſerrated ſuture, and grooved with tranſverſe curved lines; mouth ſomewhat kidney-ſhaped, and ſurrounded with tubercles diſpoſed in a ſtellated form.

Ananchytis. Oblong; heart-ſhaped and ſub-conic; the baſe flatter; avenues and ſpaces ten; mouth rounded and ſurrounded with an elevated margin; vent oval and emarginate below. Klein.

A foſſil ſpecies.

Bicordatus. With a double crown. Leſke.

A rare ſpecies, found in a foſſil ſtate.

Carinatus. Middle of the back carinated. Bayer.

Reſembles the laſt, but is narrower behind; mouth kidney-ſhaped; vent obſolete. A foſſil kind.

*Section ***. Body ovate, the avenues grooved.*

SPATAGUS. Ovate, gibbous, with four depreſſed avenues. Linn.

Native of European ſeas. Many of the echini tribe are deſcribed by Gmelin as varieties of this ſpecies, but which are certainly diſtinct.

*Section ****. Ovate, the avenues not grooved.*

BRISSOIDES. Oblong; with four biporous ovate lanceolate avenues, united by tranſverſe grooves, with larger tubercles placed archwiſe between them. Klein.

A foſſil ſpecies.

TERES. Convex, with four biporous petal-ſhaped avenues not united. Klein.

Reſembles the laſt, but has the mouth broader.

OLIVA. Above convex, punctured olive, with a double naked band reaching from the mouth to the vent. Leſke. *Kleine egelnoot*, Phelſ.

Found in the recent ſtate, the native country unknown; ſhell with four ſtellated rays above.

AMYGDALA. Reſembling an almond in form. Klein.

Native place uncertain.

OVALIS. Divided into plates; with ten avenues and ſpaces; the latter divided by a ſerrated ſuture in the middle. Leſke. *Egelſchuitje twee top*, Phelſ.

A foſſil ſpecies.

PYRIFORMIS. Ovate, and gibbous at one end, the baſe flat; avenues five, ſomewhat petal-ſhaped; and obſoletely porous. Klein.

Found in a foſſil ſtate.

LAPISCANCRI. Obtuſely oval, convex; crown excentric, and perforated with four pores; avenues five, biporous, ovate-lanceolate, and cleft at the tip. Klein.

Found in the ſame ſtate as the former. The baſe of this ſhell is flat and ſlightly excavated.

PATILLARIS. Very much depreſſed, with avenues reſembling a ſtar. Klein.

Circumference ovate; back ſlightly convex; baſe rather excavated; ſides granulated; mouth orbicular.

A foſſil ſpecies.

ECHINARACHNIUS.

Body circular; mouth central; vent lateral and ſquare.

PLACENTA. Sub-conic, with ten ſpaces alternately narrower; avenues five, lax, flat, and gaping at the tip. Breyn.

Native of the Southern ocean. Shell a little convex and conoid, the circumference ſomewhat angular; the baſe flat; ſpaces divided by an obtuſely-toothed vertical line; vent placed on the ſurface, and nearly marginal.

ECHIOIDES, in *Botany*. See LYCOPSIS and MYOSOTIS.

ECHIQUETTE, in *Heraldry*. See CHECKY.

ECHIRE, in *Geography*, a town of France, in the department of the Two Sevres, and diſtrict of Niort; four miles N. of Niort.

ECHITES, in *Botany*, was ſo named by Browne, in his Natural Hiſtory of Jamaica, from εχις, a *ſerpent* or *viper*, as profeſſor Martyn preſumes, on account of its deleterious quality. Perhaps its ſmooth twining habit may have confirmed the idea. Linn. Gen. 117. Schreb. 164. Willd. Sp. Pl. v. 1. 1237. Juſſ. 146. Browne Jam. 182. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſmall, deeply five-cleft, acute. *Cor.* of one petal, funnel-ſhaped, pervious; limb five-cleft, flat, widely ſpreading. Nectary five glands placed round the germens. *Stam.* Filaments five, ſlender, erect; anthers rigid, oblong, pointed, converging. *Piſt.* Germens two; ſtyle ſingle, thread-ſhaped, the length of the ſtamens; ſtigma oblong-capitate, two-lobed, connected with the anthers by a viſcid juice. *Peric.* Follicles two, very long, each of one cell and one valve. *Seeds* numerous, imbricated, crowned with long down, and affixed to a linear receptacle.

Eſſ. Ch. Corolla contorted, funnel-ſhaped, with a naked orifice. Follicles two, elongated, ſtraight. Seeds with a hairy crown.

Browne founded this genus upon a ſingle ſpecies, E. *umbellata* of Linnæus, Jacq. Amer. t. 22, which Linnæus was at firſt inclined to reduce to *Tabernæmontana*. Jacquin, however, confirmed the genus *Echites*, and enlarged it with nine more ſpecies. Swartz diſcovered ſeveral others, ſo that with the addition of a few from the Cape and the Eaſt Indies, Willdenow enumerates twenty-two. Theſe are not all perhaps correctly of the ſame natural genus, at leaſt no one botaniſt has ſufficiently compared them together, to determine this point; but on the other hand, their number is to be augmented by ſome fine non-deſcript plants of this genus from Sierra Leone.

The habit of *Echites* is climbing, and for the moſt part ſmooth; the leaves oppoſite, ſtalked, ſimple, undivided, entire, ſhining, with parallel veins interbranching at their extremities. Flowers generally axillary, cluſtered or umbellate, yellow, white or greeniſh, rarely red, almoſt univerſally, according to Jacquin, without ſcent. The ſhape and proportions of the corolla are very different in different ſpecies. The ſeed-veſſels are remarkably long and ſlender. The plants abound with acrid milky juice. Being moſtly natives of very hot climates, they have ſcarcely been introduced, with any ſucceſs, even into our ſtoves, though many of them ſeem highly ornamental.

ECHIUM, ſuppoſed to be the εχιον of Dioſcorides, and to have been ſo called from εχις, a *viper*, either becauſe it cured the bite of that ſerpent, or becauſe the ſeeds were ſhaped like its head. It is not improbable that the mucilaginous juices of this whole family of plants might act like olive oil in allaying the poiſon of a viper's bite, if applied to the wound. Viper's Bugloſs. Linn Gen. 78. Schreb. 103. Willd. Sp. Pl. v. 1. 781. Sm. Fl. Brit. 221. Juſſ. 130. Gærtn. t. 67. Tourn. t. 54. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Aſperifoliæ*, Linn. *Borragineæ*, Juſſ.

Gen. Ch. *Cal.* Perianth in five deep awl-ſhaped ſegments, erect, permanent. *Cor.* of one petal, bell-ſhaped; tube very ſhort; limb erect, gradually dilated, five-cleft, obtuſe; its ſegments more or leſs unequal; the two uppermoſt longeſt, the lower one ſmalleſt, acute, reflexed; orifice pervious. *Stam.* Filaments five, awl-ſhaped, about the length of the corolla, declining, unequal; anthers oblong, incumbent. *Piſt.* Germens four; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma obtuſe, deeply cloven. *Peric.* none, the hardened calyx protecting the ſeeds. *Seeds* four, roundiſh, obliquely pointed.

Obſ. In E. *lævigatum*, *italicum*, and *grandiflorum*, the corolla is almoſt regular.

Eſſ. Ch. Seeds four, naked. Corolla of one petal, irregular, pervious, and naked. Stigma deeply cloven.

About 30 ſpecies of *Echium* are deſcribed by authors, Willdenow has 26, all natives of Europe or Africa. Their herbage is clothed with thick-ſet, rigid briſtles, often originating from, or intermixed with, curiouſly formed callous tubercles, and in ſome of the more ſhrubby kinds, natives of a warm climate, ſo fine and ſlender as to be almoſt ſilky. The flowers are commonly pink in the bud, blue when expanded, and thence not inelegant; in ſome they are always red, and in others white. E. *vulgare*, Engl. Bot. t. 181, common with us in dry chalky fields, or waſte places, a well-known ſpecies, makes a gay appearance in the open country of Cambridgeſhire. E. *grandiflorum*, Andr. Repoſ. t. 20, native of the Cape of Good Hope, is perhaps the moſt handſome of all, being ſhrubby, with green briſtly leaves, and large tubular ſcarlet flowers. This is with us a tender green-houſe plant, ſcarcely perfecting its ſeeds, and with difficulty increaſed by cuttings. In a conſervatory it ſoon becomes ſtraggling, naked, and unſightly.

E. *giganteum*, Linn. Suppl. 131, bears huge denſe cluſters of innumerable white flowers, and is ſometimes ſeen in our green-houſes. Mr. Maſſon brought it from Teneriffe. The three following new ſpecies, diſcovered in his tour to Greece, by the late Dr. Sibthorp, are as ſuch defined in the Prod. Fl. Græc. v. 1. 125, though not perhaps to be met with in Greece itſelf.

E. *puſtulatum*, leaves linear-oblong, waved, tuberculated, briſtly. Stem erect. Spikes lateral. Stamens prominent. Native of Sicily. Biennial.

E. *hiſpidum*, leaves linear-oblong, briſtly, ſomewhat tuberculated. Stem erect, very hairy. Spikes lateral. Stamens prominent. Native of the country near Naples. Biennial.

E. *diffuſum*, leaves linear-ſpatulate, tuberculated, briſtly. Stem diffuſe. Spikes terminal, ſolitary. Stamens concealed. Native of Crete. Annual. Theſe two laſt have ſcarlet flowers.

ECHIUS, or Eckius, John, in *Biography*, was born in Suabia in the year 1486. When he had attained to a proper age, he embraced the eccleſiaſtical life, and was appointed profeſſor of theology in the univerſity of Ingolſtadt. He became celebrated for the part that he took in the public diſputes, concerning the reformation, againſt Luther, Carloſtadt, and Melancthon. He began his conteſts with Luther, on the ſubject of the propoſitions againſt indulgences, and was the means of exciting a great degree of attention to the controverſies that were then dying away, but which he rekindled to the injury of the power aſſumed by the Roman pontiffs. He next challenged Carloſtadt to public diſputations on the ſubject of the freedom of the human will, and defied Luther himſelf to enter the liſts with him, while he defended the authority and ſupremacy of the pope. The diſputations were carried on at Leipſic, in the year 1519, before a numerous and highly reſpectable audience; they were conducted with great ſkill by all parties, but Echius, who had been the challenger, was generally deemed the vanquiſhed party. His opponents, not ſatisfied with the mere victory, purſued the blow which they had given to the credit and authority of the pope. Echius could not bear the idea of being thrown in the back ground: his haughty ſpirit urged to ſeek for vengeance; but his zeal and fury were fatal to the cauſe which he eſpouſed, and the doctrines of Luther obtained a rapid progreſs in Germany. Echius was next employed with Faber and others to draw up a confutation of the famous confeſſion of Augſburg, which, by command of the emperor Charles V., was laid before the diet aſſembled at that city, and the unlimited ſubmiſſion of the proteſtants required to the doctrines and opinions contained in it. This confutation was very ably anſwered by Melancthon, in a work, entitled "The Defence of the Confeſſion of Augſburg." During the reſt of his life, Echius was a principal in all the diſputes between the catholics and proteſtants, and was zealous as a writer, as well as a diſputant, againſt the proteſtants. He died at Ingolſtadt in 1543, in his 58th year. He was regarded as one of the moſt learned and able defenders of the pretenſions and opinions of the church of Rome. He was author of two treatiſes, "On the Sacrifice of the Maſs," "A Commentary on the Prophet Haggai," "Homilies," in four volumes, and a great number of controverſial tracts. Moreri. Moſheim.

ECHO, in *Architecture*, is applied to certain vaults, and arches, moſt commonly of elliptical or parabolical figures; uſed to redouble ſounds, and produce artificial echoes.

The method of making an artificial echo is taught by the Jeſuit Blancani, in his Echometria, at the end of his book on the ſphere.

Vitruvius tell us, that in divers parts of Greece and Italy there were brazen veſſels, artfully arranged under the ſeats of the theatres, to render the ſound of the actors' voices more clear, and make a kind of echo; by which means, of the prodigious multitude of perſons preſent at thoſe ſpectacles, every body might hear with eaſe and pleaſure.

Echo, in *Geography*, a town of Spain, in the kingdom of Aragon; 13 miles N.N.W. of Jaca.

Echo, in *Muſic*, pieces compoſed in imitation of echoes. Sometimes alſo the word echo ſtands for piano, intimating that the inſtrument, or voice, is to play, or ſing, after a ſoft and ſweet manner. Organs and harpſichords have what they call an echo ſtop.

Echo, (from the Greek *ηχος*, *ſound*, of the verb *ηχεω*, *I ſound*,) in *Natural Philoſophy*, is a reflected ſound; for ſounds are reflected by bodies of certain configurations, ſomewhat like the reflection of light from poliſhed ſurfaces; ſo that if a perſon, ſituated before one of thoſe bodies, and at ſome diſtance from it, utters a word, he will, a ſhort time after, hear the echo; that is, the repetition of that word, as if another perſon mocked him.

The ancient philoſophers, who were entirely unacquainted with the true nature of the echo, aſcribed it to ſeveral cauſes, which are too abſurd to deſerve any notice in this place. The poets ſuppoſed it to have been once a nymph, who pined into a ſound for love of Narciſſus. The modern ſtate of philoſophical knowledge, eſtabliſhed upon experience, and upon unerring calculation, ſhews, that ſound, or that vibratory motion of the air which conſtitutes a ſound, is reflected by hard ſolids, and, in certain caſes, even by fluids. Thus, the ſides of a hill, houſes, rocks, banks of earth, the large trunks of trees, the ſurface of water, eſpecially at the bottom of a well, and ſometimes even the clouds, have been found capable of reflecting ſounds. The configuration of the ſurface of theſe bodies is much more concerned in the production of the echo than their ſubſtance. A ſmooth ſurface reflects ſounds much better than a rough one. A convex ſurface is a very bad reflector of ſound; a flat one reflects very well; but a ſmall degree of concavity, and eſpecially when the ſounding body is in the centre, or focus, of the concavity, renders that ſurface a much better reflector, and the echo is heard conſiderably louder. Thus, in an elliptical chamber, if the ſounding body be placed in a focus of the ellipſis, that ſound will be heard much louder by a perſon ſituated in the other focus of that ellipſis, than in any other part of the chamber. In this caſe, the effect is ſo powerful, that even when the middle part of the chamber is wanting; *viz.* when the two narrow oppoſite elliptical ſhells only exiſt, the ſound expreſſed in one focus will be heard by a perſon ſituated in the other focus, but hardly at all by thoſe who ſtand in the intermediate ſpace.

Without attempting to explain the manner in which the vibrating air impinges upon, and is ſent back by the reflecting body, which has not as yet been thoroughly inveſtigated;

gated; the facts which have been aſcertained are as follow:

If a perſon, ſtanding before a high wall, a bank, a rock, &c. at a certain diſtance, and uttering a word, with a pretty ſtrong voice, or, in ſhort, producing a ſound with a hammer, or ſtone, &c. hears a repetition of that word, or ſound; he will find that the time elapſed between his uttering the word, and hearing the echo, is equal to that time which a ſound is known to employ in going through an extenſion equal to twice the diſtance between him and the reflecting wall, or rock, &c.; for the vibratory motion of the air muſt proceed from the ſounding perſon to the wall, or rock, and back again from the latter to the former. Now, ſound is known to travel equally at the rate of 1142 feet *per* ſecond; therefore, if the perſon that expreſſes the word, or any ſound whatever, ſtands at the diſtance of 1142 feet from the echoing-wall, then two ſeconds of time muſt elapſe between his uttering the ſound and his hearing the echo of it. If the diſtance be equal to 4568 feet, then eight ſeconds of time muſt elapſe between the uttering of the ſound and the arrival of the echo, and ſo on. But the ſame original ſound, and the repetition of it, *viz.* the echo, may be heard by other perſons ſituated at different diſtances, both from the original ſounding-place, and from the reflecting body. The effect, however, will not be exactly alike; *viz.* thoſe who are nearer to the reflecting body will hear the echo ſooner than other perſons; thoſe who are farther off, will hear it later; and a ſituation is eaſily found, from which they will hear both the original ſound and the echo at the ſame time; in which caſe they will perceive, as it were, one ſound, but louder than they would without the echo.

But though ſeveral perſons, in different ſituations, will hear the echo, or repetition, of the ſame ſound; yet, in a particular direction, the echo may be heard much better than in any other direction. Now, if two ſtraight lines be drawn from the centre, or middle, of the reflecting ſurface, one to the place from which the original ſound proceeds, and the other in the above-mentioned beſt direction; thoſe two lines will be found to make equal angles with, or to be equally inclined to, that ſurface. Hence, it appears, *that, in the reflection of ſound, the angle of incidence is equal to the angle of refraction.* Therefore, if a perſon wiſhes to hear the echo of his own voice in the beſt manner poſſible, he muſt ſtand in a direction perpendicular to the reflecting ſurface. And this ſhews, that though ſound proceeds from an original ſounding body, or from a reflecting ſurface, in every direction; yet a greater quantity of it proceeds in ſome particular direction than in any other, which is probably owing to the original impulſe being given to the air more forcibly in one direction than in any other, as alſo to the want of perfect freedom in the motion of the aerial fluid.

Several phenomena may be eaſily explained upon the above-mentioned property of ſound. Thus, for inſtance, ſeveral reflecting ſurfaces frequently are ſo properly ſituated with reſpect to diſtance and direction, that a ſound proceeding from a certain point is reflected by one ſurface firſt, then by a ſecond, ſoon after by a third, and ſo forth; but by all in one direction; in which caſe, a multiple, or manifold, or tautological echo is produced; *viz.* the ſame word is heard repeated ſeveral times ſucceſſively in the ſame tone and accent; the expreſſion of one *ha* will appear like a laughter; a muſical inſtrument, properly played, will produce an agreeable repetition, as if many inſtruments of the ſame ſort imitated each other.

According to the various diſtances from the ſpeaker, a reflecting object will return the echo of ſeveral, or of a few ſyllables, for all the ſyllables muſt be uttered before the echo of the firſt ſyllable reaches the ear, otherwiſe it will make a confuſion. In a moderate way of ſpeaking, about three and a half ſyllables are pronounced in one ſecond, or ſeven ſyllables in two ſeconds. From the computation of ſhort-hand writers, it appears, that a ready and rapid orator, in the Engliſh language, pronounces from 7000 to 7500 words in an hour; *viz.* about 120 words in a minute, or two words in each ſecond. (Memoirs of Gibbon's Life.) Therefore, when an echo repeats ſeven ſyllables, the reflecting object is 1142 feet diſtant; for, ſince ſound travels at the rate of 1142 feet *per* ſecond; the diſtance from the ſpeaker to the reflecting object, and again from the latter to the former, is twice 1142 feet. When the echo returns 14 ſyllables, the reflecting object muſt be 2284 feet diſtant, and ſo on. A famous echo is ſaid to be in Woodſtock park, near Oxford. It repeats 17 ſyllables in the day time, and 20 at night, when the air being ſomewhat denſer, the ſound does not travel quite ſo faſt. (Dr. Plot's Nat. Hiſt. of Oxfordſhire.) Another remarkable echo is ſaid to be on the north ſide of Shipley church, in Suſſex. In favourable circumſtances it repeats, diſtinctly, 21 ſyllables. Harris's Lex. Tech. Art. Echo.

Therefore, the farther the reflecting object is, the greater number of ſyllables the echo will repeat; but the ſound will be enfeebled nearly in the ſame proportion, and, at laſt, the ſyllables cannot be heard diſtinctly. When the reflecting object is too near, the repetition of the ſound arrives at the ear, whilſt the perception of the original ſound ſtill continues, in which caſe, an indiſtinct reſounding noiſe is heard. This effect may be frequently obſerved in empty rooms, paſſages, &c. eſpecially, becauſe in ſuch places, ſeveral reflections from the walls to the hearer, as alſo from one wall to the other, and then to the hearer, claſh with each other, and increaſe the indiſtinctneſs.

From what has been ſaid above, it will be eaſily conceived, that, with reſpect to echoes, a vaſt variety of effects may be produced, by varying the form, the ſhape, the diſtance, and the number of reflecting ſurfaces; and hence we hear of various ſurpriſing echoes being met with at different places. At Roſneath, near Glaſgow, in Scotland, there is an echo that repeats a tune played with a trumpet three times, completely and diſtinctly. (Birch's Hiſt. of the Royal Society, vol. i. p. 137.) At the ſepulchre of Metella, wife of Craſſus, there was an echo which repeated a ſentence five times. A tower is ſaid to have exiſted at Cyzicus, where an echo repeated ſeven times. And there is an echo at Bruſſels which repeats fifteen times.

Barthius, in his Notes on Statius's Thebais, lib. vi. ver. 30, mentions a very extraordinary echo, and, perhaps, too extraordinary to be entirely believed; however, he aſſures the reader, that this echo not only repeated words ſeventeen times, but different from common echoes, where the repetition is not heard till ſome time after hearing the word ſpoke; in this, the perſon who ſpeaks, or ſings, is ſcarcely heard at all; but the repetition is heard very clearly, and always in ſurpriſing varieties; the echo ſeeming ſometimes to approach nearer, and ſometimes to be farther off. Sometimes the voice is heard very diſtinctly, and ſometimes ſcarcely at all. One perſon hears only one voice, and another ſeveral; one hears the echo on the right, and the other on the left, &c.

Addiſon, and other travellers into Italy, mention an extraordinary echo in that country, at Simonetta palace, near Milan. It will return the ſound of a piſtol fifty-ſix times, even though the air be very foggy. The echo is heard behind the houſe, which has two wings; the piſtol is diſcharged from a window in one of thoſe wings; the ſound is returned from a dead wall in the other wing, and is heard from a window in the back-front. Addiſ. Trav. edit. 1718, p. 32. Phil. Tranſ. N° 480. p. 220.

Several authors, who treat of echoes, have uſed a few peculiar words, which are not in common uſe, therefore we deem it proper to mention thoſe words and their meanings in this place. That department of philoſophy which treats of ſound, is called *acouſtics;* and this is divided into branches; one of which is called *catacouſtics,* and treats of reflected ſound, ſuch as the echo, and the effects of the whiſpering domes, galleries, &c. which alſo depend upon the reflection of ſound. (See WHISPERING GALLERIES.) The word *echo* has ſometimes been uſed for denoting the place itſelf where the repetition of the ſound is produced, or heard. In echoes, the ſounding point, or place where the perſon ſtands who utters the words, &c. has been called the *centrum phonicum,* and the object, rock, or place, that reflects the ſound, has been called the *centrum phonocampticum.*

ECHO, in *Poetry,* denotes a kind of compoſition, wherein the laſt words or ſyllables of each verſe, contain ſome meaning, which being repeated apart, anſwers to ſome queſtion, or other matter contained in the verſe.

Such is that famous echo of Eraſmus, "Decem annos conſumpſi in legendo Cicerone—one," *i. e.* ονε, aſine.

The firſt echo in verſe, according to Paſquier, is that in the Sylvæ of Johannes Secundus: but Paſquier is miſtaken; for the ancient Greek and Latin poets have wrote echoes. This Martial intimates plainly enough; when, laughing at ſome ſorts of baubles, he ſays, there is nothing like them among his poems. "Nuſquam Græcula quod recantat echo:" by which, on the one ſide, he ſhews there were Latin poets, in his time, who made echoes, and, on the other, that the invention came from the Greeks.

Ariſtophanes, in his comedy entitled Θεσμοφοριαζυσαι, introduces Euripides in the perſon of Echo: and Callimachus, in the epigram, Εχθαιρω το ποιημα το κυκλικον, ſeems to have intended a kind of echo.

There is a humorous ſpecimen of this kind of poetry in Hudibras.

ECHOMETER, in *Muſic,* a rule, or graduated ſcale divided into many parts for the purpoſe of meaſuring the length or duration of ſounds, determining their different value, and even the ratios of their intervals. The word is derived from the Greek ηχος, *ſound,* and μετρον, *meaſure.* We ſhall not attempt to deſcribe this machine, as it is never uſed, and there is no good echometer. Thoſe who wiſh for more information on the ſubject, will find it in the Mem. de l'Acad. des Inſ. for 1701. M. Sauveur ſuggeſted the invention.

ECHOS, Ηχος, *a ſound,* in *Phyſic.* In Hippocrates, this frequently imports what the Latins call *tinnitus aurium,* and the Engliſh a ringing of the ears; a ſymptom very frequent in acute diſtempers.

ECHPHYAS, from εκ and φυω, *I produce,* an excreſcence, or appendix, a word uſed by many of the ancient writers in medicine. The appendicula vermiformis is thus called by many authors.

ECHTERNACH, in *Geography,* a ſmall town of France, in the department of Forêts, chief place of a canton, in the diſtrict of Bitſbourg, with a population of 2736 individuals. The canton contains 17 communes, and 10,477 inhabitants, on a territorial extent of 250 kiliometres.

ECHTHELYNSIS, from εκθηλυγω, of θηλυς, *feminine, I render effeminate,* a term uſed by the ancient phyſicians for a laxneſs, or flabby ſoftneſs of the fleſh of the legs, or any other part of the body. Some have alſo uſed the word to expreſs a fault in bandages, when too looſe.

ECHTRUS, in *Botany,* from εχθρος, *hateful,* or *inimical.* Loureir. Cochinch. 344. Claſs and order, *Polyandria Monogynia.* A genus founded by Loureiro, but which from his deſcription is evidently nothing elſe than *Argemone mexicana* of Linnæus. He mentions it as common every where by the way ſides in Bengal and the coaſt of Coromandel, and he applied the above name on account of the innumerable thorns with which the plant is armed.

ECIJA, or EXIJA, in *Geography,* a town of Spain, in the kingdom of Seville, delightfully ſituated on the banks of the Xenil, eight leagues from Cordova. It has pleaſant walks, ſerving, like thoſe of the great cities of Spain, for an evening reſort. It contains 28,176 inhabitants, and has ſix pariſh churches, eight chapels, 20 convents, and ſix hoſpitals. The churches, built entirely of brick, are fitted up in the old taſte, and crowded with pillars, which are loaded with prepoſterous ornaments, and covered with gold. The moſt extravagant of all is the church of "Nueſtra Senora del Roſario," in the convent of the Dominicans, which may ſerve as a model for the perfection of vitiated taſte. The "Plaza Mayor" is a fine object, very ſpacious and much to be admired for its balconies, occupying the whole front of the houſes. The rent of land in the vicinity of this town is high, being commonly two buſhels of wheat and one of barley, for every buſhel of their ſeed; or if the rent be paid in money by the occupiers, it is not delivered immediately to the land-owner, but as under-tenants to rich land-jobbers, from whom no moderation can be expected. Incloſed farms let at a much higher rate than thoſe that are open, becauſe the latter are liable to be fed by the Merino ſheep; whereas, if they ſhould enter the former, one-fifth of the number treſpaſſing would be forfeited. Hence ariſe various contentions, which frequently terminate in murders. Wool and hemp are the chief riches of this place. N. lat. 37° 33'. Long. 11° 43' E. of Peak of Teneriffe. Townſhend's Spain, vol. ii.

ECKARD, in *Biography,* a harpſichord-player of great abilities, though little known, except in private, by connoiſſeurs. There are many great German muſicians, diſperſed throughout Europe, whoſe merit is little known in England, or even in their native land; among theſe, is Eckard, who has been 50 years at Paris. We never heard him perform; but his compoſitions manifeſt great ſkill, refinement, and knowledge of his inſtrument. He is ſaid, but erroneouſly, to have been one of the firſt, who, after the manner of the celebrated Alberti, introduced in France a perpetual baſe in batteries of ſemiquavers; but Jerig. Edelman, and Balbaſtre, long before Eckard arrived at Paris, had tired all ears with the abuſe of this eaſy expedient.

The treble part of Alberti's ſonatas is ſo elegant, and ſo much the melody of ſongs of the firſt claſs, as to make ample amends for the want of variety in the baſe.

This admirable dilettante (Alberti) who ſung as well as played in an exquiſite taſte, finding that the tones of the harpſichord were too tranſient to ſuſtain vocal paſſages, and to intereſt an audience through a whole movement, has given a ſpirited baſe, which keeps the tone alive, without calling off the attention from the treble, or diſturbing that unity of melody, which Rouſſeau ſo ſtrongly recommends, and we believe, in a great meaſure, formed his precepts upon the examples. Alberti was a Venetian gentleman, extremely admired for his compoſitions and performance, during the time that Rouſſeau was reſident in that city as ſecretary to the French ambaſſador. Now, M. Eckard was in want of no ſuch model; he had reſources of his own, which, in extempore playing, could amuſe and charm the moſt faſtidious judges for ſeveral hours together; and in the leſſons which we have ſeen of his compoſition, there is an elegance of ſtyle built upon ſuch ſound principles of harmony and modulation as few have ſurpaſſed. His variations to the Minuet d'Exaudit, or, as we call it, Marſhal Saxe's minuet, are in the higheſt degree, ingenious, elegant, and fanciful.

ECKARDTSBERGA, in *Geography*, a ſmall town of the kingdom of Saxony, in the circle of Thuringia, with 1200 inhabitants and ſome manufactures, chiefly of worſted ſtockings and alum works. Of the ancient caſtle Eccardtſburg, built in the year 998 by margrave Eccard, there are but two towers left, which are kept in repair, and ſerve as corn magazines.

ECKEREN, a ſmall town of France, in the department of the two Nethes, chief place of a canton, in the diſtrict of Anvers, or Antwerp, 27 miles S.W. of Breda, 24 miles S.E. of Bergopzoom, and ſix miles N. of Antwerp, with a population of 2826 individuals. It is remarkable for the battle which was fought in its neighbourhood in 1703, between the allies and the French. The canton has an extent of 170 kiliometres, and contains 10 communes, with 10,764 inhabitants.

ECKERNFORDE, or Eckelnföhrde, a ſmall but neat town of Denmark, in the duchy of Sleſwick, diſtrict of Hutten, ſituated on the Baltic, with a commodious harbour, 15 miles S.E. of Sleſwick. It is remarkable for being the place where the famous count St. Germain, of life elixir notoriety, ended his days.

ECKERO, a ſmall iſland of Sweden, between the Baltic and the gulf of Finland, W. of the iſland of Aland.

ECLAMPSIA, or Eclampsis, in *Medicine*, is nearly ſynonymous with *Epilepſy*, which ſee. The difference between the two diſeaſes, as ſtated by Sauvages, appears to be altogether hypothetical, and not to be aſcertained in practice. Eclampſia, he ſays, differs from epilepſy, in being an acute, febrile diſeaſe, ſometimes remittent, or abſolutely unceaſing *i. e.* not recurring by diſtant paroxyſms. Thus, under the head of eclampſia, are arranged the convulſions of puerperal women, thoſe occaſioned by wounds, by inanition, plethora, dentition, ſevere pain, fever, &c. Yet under the genus epilepſy, wounds, fever, ſevere pain, plethora, &c. are alſo mentioned as cauſes of the diſeaſe, and as ſerving to diſcriminate the different ſpecies. As the diſtinction, therefore, is not leſs uſeleſs in a practical view, than it is fanciful in noſology, we ſhall refer the whole to the article Epilepsy.

The word eclampſis, probably from εκλαμπτω, *effulgeo, I ſhine*, is uſed by Hippocrates and Galen under different acceptations. The moſt obvious origin of its application to epilepſy, appears to ariſe from the ſparklings and flaſhes of light, which often precede the epileptic convulſion, in many individuals. But the two phyſicians of antiquity, juſt named, have alſo uſed the word to denote the higheſt degree of the paroxyſm of fever, immediately preceding the criſis, when the heat and violence of the ſymptoms are at the greateſt height.

ECLANUM, in *Ancient Geography*, a town of Italy, called *Æculanum* by Ptolemy. It is ſituated in the Campania, and now known under the name of "The Colony."

ECLARON, in *Geography*, a ſmall town of France, in the department of the Marne, ſituated on the river Blaiſe, 15 miles N.W. of Joinville.

ECLECTICS, Eclectici, a name given to ſome ancient philoſophers; who, without attaching themſelves to any particular ſect, formed the flattering deſign of ſelecting, from the doctrines of all former philoſophers, ſuch opinions as ſeemed to approach neareſt the truth, and combining them into one ſyſtem. But in executing this plan, they only piled up a ſhapeleſs and incoherent maſs, "rudis indigeſtaque moles," not unlike that chaos, which they admitted as an eſſential article in the ſcience of nature. They attempted, however, but without ſucceſs, to adorn and enrich the ſyſtem with fancies of their own.

Hence their denomination: which, in the original Greek, ſignifies, *that may be choſen*, or, *that chooſes*; of the verb, εκλεγω, *I chooſe.*

Laertius notes, that they were alſo, for the ſame reaſon, denominated *analogetici;* but that they call themſelves *philalethes*, *i. e.* lovers of truth.

The chief, or founder of the eclectici, was one Potamo, of Alexandria, who lived under Auguſtus and Tiberius, according to Suidas; but it is more probable, from the account of Laertius, that he commenced his undertaking about the cloſe of the ſecond century. This Platoniſt, weary of doubting of all things with the Sceptics and Pyrrhonians, formed the eclectic ſect; which Voſſius calls the eclective.

Towards the cloſe of the ſecond century a ſect aroſe in the Chriſtian church under the denomination of Eclectics, or modern Platonics. They profeſſed to make truth the only object of their inquiry, and to be ready to adopt, from all the different ſyſtems and ſects, ſuch tenets as they thought agreeable to it. However, they preferred Plato to the other philoſophers, and looked upon his opinions concerning God, the human ſoul, and things inviſible, as conformable to the ſpirit and genius of the Chriſtian doctrine. One of the principal patrons of this ſyſtem was Ammonius Sacca, who, about the beginning of the third century, laid the foundation of that ſect, afterwards diſtinguiſhed by the name of the new Platonics, in the Alexandrian ſchool. This philoſopher was born of Chriſtian parents, and educated in the Chriſtian faith, and probably never deſerted the outward profeſſion of this religion; though Porphyry maintains, in oppoſition to the teſtimony of Euſebius, that in maturer life he became a pagan; and Fabricius, who is followed by Dr. Lardner, alleges that there were two perſons of the ſame name, the one a heathen philoſopher, and the other a Chriſtian writer. Thoſe who are deſirous of acquainting themſelves with the grounds of theſe oppoſite opinions, may conſult Fabricius's Bibl. Græc. lib. iv. cap. 26. p. 159. Lardner's Collection of Jewiſh and Heathen Teſtimonies, vol. iii. p. 195, &c. and Moſheim, De Rebus Chriſtianorum ante Conſt. Mag. p. 281, &c.

It was evidently the deſign of Ammonius to reconcile and unite all ſects, philoſophical and religious, and to inculcate a doctrine that ſhould comprehend all, the Chriſtians not excepted, in one common profeſſion. For this purpoſe he maintained, that the great principles of all philoſophical and religious truth were to be found, equally in all ſects; that they differed from each other only in their method of expreſſing them, and in ſome opinions of little or no importance; and that, by a proper interpretation of their reſpective ſentiments, they might eaſily be united into one body. Accordingly, all the Gentile religions, and even the Chriſtian, were to be illuſtrated and explained by the principles of this univerſal philoſophy; and the fables of the prieſts were to be removed from paganiſm, and the comments and interpretations of the diſciples of Jeſus from Chriſtianity. In conformity to this plan he inſiſted, that all the religious ſyſtems of all nations ſhould be reſtored to their original purity, and reduced to their primitive ſtandard, *viz.* the ancient philoſophy of the Eaſt, preſerved uncorrupted by Plato; and he affirmed that this project was agreeable to the intentions of Jeſus Chriſt, whoſe ſole view, in deſcending upon earth, was to ſet bounds to the reigning ſuperſtition, to remove the errors that had blended themſelves with the religions of all nations, but not to aboliſh the ancient theology from which they were derived. He therefore adopted the doctrines which were received in Egypt concerning the univerſe, and the deity, conſidered as conſtituting one great *whole*, concerning the eternity of the world, the nature of ſouls, the empire of Providence, and the government of the world by dæmons. He alſo eſtabliſhed a ſyſtem of moral diſcipline, which allowed the people in general to live according to the laws of their country, and the dictates of nature, but required the wiſe to exalt their minds by contemplation, and to mortify the body, ſo that they might be capable of enjoying the preſence and aſſiſtance of the dæmons, and of aſcending after death to the preſence of the Supreme Parent. In order to reconcile the popular religions, and particularly the Chriſtian, with this new ſyſtem, he made the whole hiſtory of the heathen gods an allegory, maintaining that they were only celeſtial miniſters, intitled to an inferior kind of worſhip; and he acknowledged that Jeſus Chriſt was an excellent man, and the friend of God, but alleged that it was not his deſign entirely to aboliſh the worſhip of dæmons, and that his only intention was to purify the ancient religion. This ſyſtem, ſo plauſible in its firſt riſe, but ſo comprehenſive and complying in its progreſs, has been the ſource of innumerable errors and corruptions in the Chriſtian church. At its firſt eſtabliſhment it is ſaid to have had the approbation of Athenagoras, Pantænus, and Clemens the Alexandrian, and of all who had the care of the public ſchool belonging to the Chriſtians at Alexandria. It was afterwards adopted by Longinus, the celebrated author of the Treatiſe on the Sublime, Plotinus, who continued the ſchool of Ammonius, and completed the eclectic ſyſtem, Herennius, Origenes, a pagan and a different perſon from Origen, the celebrated Chriſtian teacher, Amelius, a Tuſcan, Porphyry, an inveterate enemy to Chriſtianity, who ſucceeded Plotinus and taught his doctrines, Jamblichus the diſciple of Porphyry, Sopater, Edeſius, Euſtathius, Euſebius of Mindus in Caria, Maximus of Epheſus, Priſcus of Theſprotium, who accompanied the emperor Julian to Perſia, Chryſanthius, the maſter of Julian, appointed by him high prieſt of Lydia, Julian the Apoſtate, Eunapius, a pupil of Chryſanthius, Hierocles, and many others, both Pagans and Chriſtians.

Such as we have enumerated were the principal promoters of the Eclectic philoſophy in Alexandria, and in various parts of Aſia. After Greece became ſubject to Rome, its philoſophers were diſperſed; but by the favour of the Roman emperors, particularly Adrian and Marcus Aurelius Antonius, Athens, the ancient ſeat of wiſdom, recovered, in ſome degree, its former honour. Adrian founded a library, and Aurelius erected magnificent ſchools, and eſtabliſhed profeſſors in rhetoric, and in the principal ſects of philoſophy. Theſe ſchools were liberally endowed, and Athens was again diſtinguiſhed by a numerous train of philoſophers and ſcholars. Theſe Athenian ſchools, though they ſuffered great injury, during the incurſions of the Goths, at the cloſe of the 4th century, ſurvived that hazardous period, and continued to flouriſh till after the time of Juſtinian. It was not till the reign of Julian that the Alexandrian philoſophy was publicly profeſſed at Athens. After Chryſanthius, already mentioned, who was appointed preceptor in Athens by Julian, the next profeſſor of this ſyſtem was Plutarch, the ſon of Neſtorius. He died about the year 435, and left the charge of his ſchool to Syrian, an Alexandrian. Among the pupils of Syrian, his chief favourite was Proclus, and he was allowed to ſhare with him the honours and profits of the Platonic chair. (See Proclus.) Upon the death of Proclus in the year 485, the eclectic ſchool at Athens was continued by Marinus, a native of Sichem in Paleſtine, and a convert from the Samaritan to the Gentile religion. From him it was transferred to Iſidorus, and by Iſidorus, on his removal to Alexandria, it was committed to Zenodotus, a pupil of Proclus. The ſucceſſion of the Platonic or Eclectic ſchool in Alexandria terminated in Damaſcius, a native of Syria. Hypatia, a celebrated female, belonged alſo to this ſchool, and maintained its honour. (See Hypatia.) Beſides the philoſophers of the Alexandrian or Eclectic ſect, who have been enumerated, and others of inferior note, there were many perſons, who, though not philoſophers by profeſſion, eſpouſed the doctrines of Platoniſm, as they were new modelled in this ſchool. Among theſe there were ſeveral celebrated writers; particularly Macrobius, and Ammianus Marcellinus.

The Eclectic ſect, as we have already ſeen, took its riſe among the Egyptians, a people peculiarly addicted to ſuperſtition, among whom the art of divination is ſaid to have originated. It was formed in Alexandria, a city coloniſed from many different nations, whoſe inhabitants brought with them their reſpective tenets both in religion and philoſophy. From an attentive compariſon of various circumſtances, which we cannot recite in this place, it would appear, that the Eclectic method of philoſophizing began at a period prior to the time of Chriſt. The diſſenſions produced by diverſity of opinions in the Alexandrian ſchools, induced many to wiſh for a general coalition of ſects. Potamo, as we have ſeen, firſt formed this project, and it was carried into execution by Ammonius and his followers. The philoſophy of Plato, already united with that of Pythagoras, was made the baſis of this new ſyſtem; whence the ſect was conſidered as a Platonic ſchool, and its followers have been commonly diſtinguiſhed by the appellation of the later Platoniſts. With the doctrines of Plato, they attempted to blend thoſe of Ariſtotle. The Stoic ſyſtem was alſo in the Eclectic ſchool accommodated to the Platonic; and the moral writings of the followers of Zeno were explained upon the principles of Plato. The only ſect with which the Alexandrian ſchool could not agree, was that of Epicurus, whoſe mechanical principles of nature were contrary to the fundamental doctrines of Platoniſm.

The Platonic ſect, we may obſerve, had leaned, from its firſt inſtitution, towards enthuſiaſm. That part of their ſyſtem, which theſe later Platoniſts had borrowed from the oriental philoſophy, was wonderfully calculated to cheriſh the flights of a luxuriant fancy. But in order to mark more preciſely ſome of the more ſtriking features of the Eclectic ſect, we may direct our attention to the arts, which the leaders of this ſect employed to obſtruct the progreſs of the Chriſtian religion. By combining into one ſyſtem all the important tenets, both theological and philoſophical, which were at that time received, either in the Pagan or the Chriſtian ſchools, they hoped to confirm the Heathens in their attachment to their old ſuperſtitions, and to reconcile the Chriſtians to Paganiſm. With this view they endeavoured to conceal the abſurdities of the ancient religion, by caſting over its fables the veil of allegory, and thus repreſenting them as founded upon important truths. The numerous train of heathen divinities they repreſented as emanations from the Supreme Deity, through whom he himſelf was worſhipped. They attempted to incorporate with their own dogmas ſeveral of the peculiar doctrines received among Chriſtians, and on many occaſions imitated the language of the Chriſtian fathers. In order to counteract the credit which Chriſtianity derived from the exalted character of its founder, and the purity of manners that diſtinguiſhed his followers, theſe philoſophers inculcated and practiſed rigorous abſtinence, and paſſed whole days and nights in contemplation and devotion. In order to ſubvert or diminiſh the authority which the Chriſtian religion derived from miracles, they pretended to a power of performing ſupernatural operations, and maintained, that the miracles of Chriſt were wrought by the ſame magical, or theurgic, powers which they themſelves poſſeſſed. Moreover, for ſupporting the credit of Paganiſm againſt that of Chriſtianity, they obtruded upon the world many ſpurious books, under the names of Hermes, Orpheus, and other illuſtrious ancients.

The Eclectic ſect, thus raiſed upon the foundations of ſuperſtition, enthuſiaſm, and impoſture, was the occaſion of much confuſion and miſchief both to the Chriſtian religion and to philoſophy. In the infancy of the Alexandrian ſchool, many Chriſtians were ſo far deluded by the pretenſions of this ſect, as to imagine that a coalition might be advantageouſly formed between its ſyſtem and that of Chriſtianity. The conſequence, however, was, that Pagan ideas and opinions were gradually blended with the pure and ſimple doctrine of the goſpel; the fanatical philoſophy of Ammonius corrupted the pure religion of Chriſt; and his church became a field of contention and a nurſery of error. A coalition of ſyſtems was no leſs injurious to philoſophy. For a further delineation of the Eclectic doctrine in metaphyſics, theology, and morals, we ſhall refer to the biographical articles *Plotinus*, *Jamblichus*, and *Porphyry*. See alſo PLATONISM and ALEXANDRIA. And for a more diffuſe detail, we refer to Brucker's Hiſt. of Philoſ. by Enfield, vol. ii. and Moſheim's Eccl. Hiſt. vol. i.

ECLECTICS were alſo a certain ſet of phyſicians among the ancients, of whom Archigenes, under Trajan, was the chief, who ſelected from the opinions of all the other ſects, that which appeared to them beſt, and moſt rational; hence they were called eclectics, and their preſcriptions medicina eclectica.

ECLEGMA, or ECLIGMA, Εκλειγμα, or *Eclectos*, in *Medicine*, a pectoral remedy, of the conſiſtence of a thick ſyrup; called, alſo, *lohoch*, *linctus*, and *lambative*. The word is Greek, formed of εκ, and λειχειν, *to lick*, becauſe the patient is to take it by licking it off the end of a liquorice ſtick dipt therein; in order that, being taken thus by little and little, it may remain the longer in the paſſage, and moiſten the breaſt the better.

There are eclegmas of the ſyrups of poppy, others of lentils, others of ſquills, &c. Their intention is to heal or eaſe the lungs, in coughs, peripneumonies, &c. They are uſually compoſed of oils, incorporated with ſyrups.

ECLIPSAREON, in *Aſtronomy*, is an inſtrument invented by Mr. Ferguſon for exhibiting the time, quantity, duration, and progreſs of ſolar eclipſes, at all parts of the earth. This machine conſiſts of a terreſtrial globe, A, (*Plate* X. *Aſtronomy*, *fig.* 74.) turned, by a winch, M, round its axis B, inclining 23½°, and carrying an index round the hour-circle D; a circular plate E, on which the months and days of the year are inſerted, and which ſupports the globe in ſuch a manner, that when the given day of the month is turned to the annual index G, the axis has the ſame poſition with the earth's axis at that time; a crooked wire F, which points to the middle of the earth's enlightened diſc, and ſhews to what place of the earth the ſun is vertical at any given time; a penumbra, or thin circular plate of braſs I, divided into 12 digits, by 12 concentric circles, and ſo proportioned to the ſize of the globe, that its ſhadow, formed by the ſun, or a candle, placed at a convenient diſtance, with its rays tranſmitted through a convex lens, to make them fall parallel on the globe, may cover thoſe parts of the globe, which the ſhadow and penumbra of the moon cover on the earth; an upright frame H H H H, on the ſides of which are ſcales of the moon's latitude, with two ſliders K and K fitted to them by means of which the centre of the penumbra may be always adjuſted to the moon's latitude; a ſolar horizon C, dividing the enlightened from the darkened hemiſphere, and ſhewing the places where the general eclipſe begins and ends with the riſing or ſetting ſun; and a handle M, which turns the globe round its axis by wheel work, and moves the penumbra acroſs the frames by threads over the pulleys L, L, L, with a velocity duly proportioned to that of the moon's ſhadow over the earth, as the earth turns round its axis.

If the moon's latitude at any conjunction exceeds the number of diviſions on the ſcales, there can be no eclipſe; if not, the ſun will be eclipſed to ſome parts of the earth; the appearances of which may be repreſented by the machine, either with the light of the ſun, or of a candle. For this purpoſe, let the indexes of the ſliders K, K, point to the moon's latitude, the plate E be turned till the day of the given new moon comes to G and the penumbra be moved till its centre comes to the perpendicular thread in the middle of the frame, which thread repreſents the axis of the ecliptic; then turn the handle till the meridian of London on the globe comes under the point of the wire F, and turn the hour circle D, till XII at noon comes to its index; and turn the handle till the hour index points to the time of new moon in the circle D, and then ſcrew faſt the collar N. Laſtly, elevate the machine, till the ſun ſhines through the ſight-holes in the ſmall upright plates O, O, on the pedeſtal; or, place a candle before the machine, at the diſtance of about four yards, ſo that the ſhadow of the interſection of the croſs thread in the middle of the frame may fall preciſely on that part of the globe to which the wire F points; with a pair of compaſſes take the diſtance between the centre of the penumbra, and the interſection of the threads, and ſet the candle higher or lower, according to that diſtance; and place a large convex lens between the machine and candle, ſo that the candle may be in the focus of the lens; and thus the machine is rectified for uſe.

Let the candle be turned backward till the penumbra almoſt touches the ſide H F of the frame, and then, turning it forward, the following phenomena may be obſerved. 1. Where the eaſtern edge of the ſhadow of the penumbral plate, I, firſt touches the globe at the ſolar horizon, thoſe who inhabit the correſponding part of the earth ſee the eclipſe begin on the uppermoſt edge of the ſun, juſt at the time of its riſing. 2. In that place where the penumbra's centre firſt touches the globe, the inhabitants have the ſun riſing upon them centrally eclipſed. 3. When the whole penumbra juſt falls upon the globe, its weſtern edge at the ſolar horizon touches and leaves the place where the eclipſe ends at ſun-riſe on his lowermoſt edge. 4. By continued turning, the croſs lines in the centre of the penumbra will go over all thoſe places on the globe where the ſun is centrally eclipſed. 5. When the eaſtern edge of the ſhadow touches any place of the globe, the eclipſe begins there; when the vertical line in the penumbra comes to any place, then is the greateſt obſcuration at that place; and when the weſtern edge of the penumbra leaves the place, the eclipſe ends there, and the times are ſhewn on the hour-circle; and from the beginning to the end, the ſhadows of the concentric penumbral circles ſhew the number of digits eclipſed at all the intermediate times. 6. When the eaſtern edge of the penumbra leaves the globe at the ſolar horizon C, the inhabitants ſee the ſun beginning to be eclipſed on its lowermoſt edge at its ſetting. 7. Where the penumbra's centre leaves the globe, the inhabitants ſee the ſun centrally eclipſed; and laſtly, where the penumbra is wholly departing from the globe, the inhabitants ſee the eclipſe ending on the uppermoſt part of the ſun's edge, at the time of its diſappearing in the horizon.

This inſtrument will likewiſe ſerve for exhibiting the times of ſun-riſing and ſetting, and of morning and evening twilight, as well as the places to which the ſun is vertical on any day, by ſetting the day on the plate E to the index G, turning the handle till the meridian of the place comes under the point of the crooked wire F, and bringing XII on the hour-circle D to the index: then if the globe be turned, till the place touches the eaſtern edge of the horizon C, the index ſhews the time of ſun-ſetting; and when the place comes out from below the other edge of C, the index ſhews the time when evening twilight ends; and morning twilight and ſun-riſing are ſhewn in the ſame manner on the other ſide of the globe. And the places under the point of the wire F are thoſe to which the ſun paſſes vertically on that day. Ferguſon's Aſtronomy, p. 298, &c. 4to. edit. or Phil. Tranſ. vol. xlviii. p. 520.

ECLIPSE, in *Aſtronomy*, the diſappearance of a heavenly body, cauſed either by the interpoſition of an opake body between it and the obſerver, or by the loſs of the reflected light of the ſun.

To the firſt claſs belong ſolar eclipſes, and occultations of the fixed ſtars by the moon or planets; to the ſecond, lunar eclipſes, and eclipſes of the ſatellites of Jupiter.

The phenomena of eclipſes, conſidered with a view to illuſtrate the general principles of the ſcience, are very unimportant: they are merely accidental occurrences, totally unconnected with any theory, and add but little to our knowledge of the great mechaniſm of nature. But they are of conſiderable practical utility: they ſerve to correct and increaſe the perfection of our ſolar and lunar tables; and they are highly uſeful to geography, becauſe they afford a ſure and accurate method of determining the relative ſituation of the diſtant parts of the globe.

Such is the ſtate of the ſcience of aſtronomy at preſent, that it is not by being able previouſly to announce all the circumſtances that will attend theſe phenomena, that the purpoſe of general utility is promoted; but the obſerving them with accuracy when they do occur, and applying the reſults correctly to future inveſtigation. But as the public ſtill take ſome intereſt in theſe predictions, and conſider them as a kind of teſt of the proficiency of the ſcience, the doctrine of eclipſes continues to form a very important part of every treatiſe of aſtronomy. It is impoſſible to produce a ſtronger inſtance of the ultimate triumph of truth over error and ſuperſtition, than the view we are at preſent permitted to take of the ſubject of our preſent inveſtigation.

The time has not always been when an eclipſe was conſidered only as a ſubject of calculation for an aſtronomer, and an object but of ſlight curioſity even to the public. It was an event that once poſſeſſed a great ſhare in the general intereſts of the moral world. It would be but a melancholy taſk to dwell on the hiſtory of ignorance and ſuperſtition. If there are few inſtances in which it has been more profound than in the opinions that have been entertained relative to eclipſes, it muſt be allowed that no ſuperſtition was ever more excuſable in its origin, or more innocent in its effects.

Aſtronomers more eſpecially ſhould regard theſe errors with indulgence, ſince the ſcience is indebted to them for its earlieſt foundation. In all the early nations of antiquity, the ſcience ſeems originally to have been cultivated only with a view of predicting theſe phenomena.

That knowledge of cauſe and effect, which teaches us to aſſign the various occurrences of the moral and phyſical world to their appropriate claſſes, can only be obtained by the long and refined civilization of many ſucceſſive ages.

Should we be ſurpriſed then to find that, in the infant ſtate of the world, moral and phyſical events ſhould have been improperly aſſociated together? Rather let us admire the ſucceſsful ſtruggles that the human race have gradually made to emancipate themſelves from error; and, by comparing the little that remains with that which once exiſted, indulge the hope that even that little will in time yield to the ſuperior power of truth and reaſon.

Aſtronomy bears the ſame relation to aſtrology that chemiſtry does to alchemy: it is the wiſe offspring of a fooliſh parent. The early aſtronomers, like the early alchemiſts, in common with the reſt of mankind, firſt deceived themſelves; and intereſted motives afterwards induced them to connive at the deception of others.

To what degree of accuracy the ancients arrived in the art of predicting eclipſes, is a queſtion on which writers materially differ. Bailly, in all his aſtronomical writings, endeavours to prove that the early aſtronomers were in poſſeſſion of accurate methods of calculating eclipſes, and that theſe were derived from antediluvian tradition. This theory ſuppoſes that the world once exiſted in a ſtate very different from the preſent; that it was nearly deſtroyed by ſome great and ſudden calamity, in which almoſt the whole human race were involved; that only a few individuals eſcaped this dreadful cataſtrophe, who, thus reduced to a deſolate ſtate of exiſtence, had to invent again all the arts of life. But he ſuppoſes, that in this apparent ſtate of barbariſm, traces are ſtill to be found of the former ſtate of civilization and knowledge. This theory is ſurely little better than a dream: we can ſcarcely ſuppoſe that in a moment of ſuch general conſternation, the object of general ſolicitude ſhould be to ſave a table of logarithms, or a compendious method of calculating an eclipſe; beſides, the whole ſyſtem is founded, or at leaſt ſupported, on a miſtake relative to the preſent and former ſtate of the Indian aſtronomy.

The following extract from Baillie's ancient aſtronomy, contraſted with the more careful and recent inveſtigations of our own countrymen in India, will be ſufficient to convince the reader on what a ſlight foundation this viſionary theory reſts for ſupport.

“ That which does moſt honour to the aſtronomy of the Indians, is their method of calculating eclipſes. They perform this with great celerity and preciſion.

“ The Brahmins ſeem to be machines mounted to calculate eclipſes. Their rules are in verſe, which they recite during the computation. They make uſe of cowries, a ſpecies of ſhell, which is uſed for money in India.

“ This method of calculation has the advantage of being eaſy and expeditious; but the ſteps cannot be retraced: they are deſtroyed as the computation advances; and if an error ſhould occur, the whole muſt be recommenced.

“ Their proceedings ſeem to poſſeſs an extraordinary ſimplicity. The theory of the moon, the moſt complicated of our modern theories, does not with them require a tedious or embarraſſing calculation. They find the diameters of the ſun and moon by a very ſimple proceſs, which we ſhall inſert here as a curious example of theſe extraordinary rules. They aſſume the apparent diurnal motion of the moon, and divide it by 25. The reſult of the diviſion, multiplied by 60 and divided by 25, gives the actual diameter of the moon. They calculate the diameter of the ſun, by multiplying its real diurnal motion by 5, and dividing it by 9. It is impoſſible to avoid thinking that theſe tables or rules of the Brahmins belong to ſome learned theory, the principles of which are now concealed under a blind routine, which by conſiderable ſkill is at preſent rendered ſimple and eaſy.

"What is moſt aſtoniſhing is, that theſe tables of the Brahmins are perhaps of 5000 or 6000 years antiquity.

"Notwithſtanding thoſe who occupy themſelves with aſtronomy, that is to ſay, the Brahmins, may have a correct notion of the new and full moon, the people, plunged into the moſt profound ignorance, ſtill explain its phaſes their own way. They pretend that the moon is filled with ambroſia, and that the gods take their repaſts from it, which is the cauſe of the diminution of its light. The regularity of the return of theſe phaſes announces that the proviſion is carefully renewed, and that the gods have very regular appetites."

Mr. Davis, to whom we are indebted for a moſt intelligent and accurate account of the method by which the Hindu aſtronomers calculate eclipſes, is of opinion that the Hindu ſcience is as well known now as it ever was among them, though perhaps not ſo generally, by reaſon of the little encouragement men of ſcience meet with, compared with what they formerly did, under their native princes. The ſame writer is of opinion, that the Pandits, learned in the Jyótiſh Sáſtra, have truer notions of the form of the earth, and of the economy of the univerſe, than are aſcribed to the Hindus in general; and that they muſt reject the ridiculous belief of the common Brahmins, that eclipſes are occaſioned by the intervention of the monſter Rahu, with many other particulars equally unſcientific and abſurd. But as this belief is founded on implicit and poſitive declarations, contained in the Vedas and Puranas, the divine authority of which writings no devout Hindu can diſpute, the aſtronomers have, ſome of them, cautiouſly explained ſuch paſſages in thoſe writings as diſagree with the principles of their own ſcience; and where reconciliation was impoſſible, have apologized as well as they could for propoſitions neceſſarily eſtabliſhed in the practice of it, by obſerving that certain things, as ſtated in other Saſtras, "might have been ſo formerly, and may be ſo ſtill; but for aſtronomical purpoſes, aſtronomical rules muſt be followed." Others, with a bolder ſpirit, attacked and refuted unphiloſophical opinions. Bhaſcara argues, that it is more reaſonable to ſuppoſe the earth ſelf-balanced in infinite ſpace, than that it ſhould be ſupported by a ſeries of animals, with nothing aſſignable for the laſt to reſt upon. And Neraſinha, in his commentary, ſhews that by Rahu and Cetu, the head and tail of the monſter, in the ſenſe they generally bear, could only be meant the poſition of the moon's nodes, and the quantity of her latitude, on which eclipſes do certainly depend: but he does not therefore deny the reality of Rahu and Cetu; on the contrary, he ſays, that their actual exiſtence and preſence in eclipſes ought to be believed, and may be maintained as an article of faith, without any prejudice to aſtronomy.

Thus it appears, that though the hiſtory of eclipſes, like that of every part of the aſtronomy of the ancients, is involved in conſiderable obſcurity, there is no reaſon to ſuppoſe it of antediluvian origin. The firſt eclipſes, particularly of the ſun, if total or conſiderable, muſt have excited extreme terror; and many ages muſt have paſſed away, before mankind could have been led to the diſcovery of their cauſe. The nature of the ſolar eclipſe was probably the firſt that was underſtood, and that of the moon a ſubſequent diſcovery. To watch theſe phenomena, to diſcover the cauſe why they did not happen every month, and to mark down the circumſtances under which they appeared, in order to reduce them to ſome form for future prediction, ſeems to have been the only object of the aſtronomy of many of the early nations. The Chaldæans are ſaid to have watched the heavens without ceaſing; and their aſtronomers relieved each other, like centinels, that no eclipſes might eſcape them. In following this ſyſtem, they became acquainted with certain uſeful periods, which in time brought about a repetition of the ſame phenomena: but further than this their knowledge never extended. Of the nice modifications which were required to correct this method, they ſeem to have been entirely ignorant. Solar eclipſes ſeem to have been neglected, as too abſtruſe and irregular to have been reduced to any given law; and we find that Hipparchus, who aſſiduouſly collected the moſt ancient eclipſes he could depend on, from the records of the Chaldæan aſtronomy, was obliged to confine himſelf to lunar eclipſes alone. This circumſtance would lead us to ſuſpect that there was but little reliance to be placed on the ſuppoſed predictions of ancient eclipſes, which are ſaid to have happened on remarkable occaſions. The prediction of an eclipſe by Thales (ſaid to have taken place during a battle between the Lydians and the Medes) was moſt probably made long after the event. Perhaps we might carry our ſcepticiſm ſtill farther, and doubt the exiſtence of any eclipſe at all: for when once great events were ſuppoſed to accompany eclipſes, tradition would eaſily ſupply eclipſes to accompany great events.

To underſtand the doctrine of eclipſes, it is neceſſary to have a clear idea of the nature of the ſolar and lunar orbit, and of their apparent points of interſection, called the *nodes*. Though the moon's orbit is infinitely nearer to us than the apparent ſolar orbit, yet its projection, or perſpective repreſentation of it on the great concave ſurface of the heavens, is a great circle of the ſphere. If the lunar orbit was in the ſame plane as the ſolar orbit, it would have the ſame repreſentative circle in the heavens, namely, the ecliptic; but the lunar orbit is inclined to the apparent orbit of the ſun, in an angle of about 5°; and though theſe orbits can really have no common points of contact, from their great diſtance from each other, yet the great circles which repreſent them in the heavens interſect each other in two oppoſite points, which are called the nodes.

New moon is defined to be that ſituation of the moon, when it has exactly the ſame longitude as the ſun. This phaſe may take place at any part of the lunar orbit, either in the nodes or at any diſtance from them. In the firſt caſe, ſhe will appear to paſs over the diſc of the ſun; but if at the conjunction, or time of new moon, ſhe ſhould be at ſome diſtance from the node, as is uſually the caſe, ſhe will be inviſible to us, being wholly enveloped in the rays of the ſun; but were ſhe viſible at this time, we ſhould ſee her directly under or over the ſun; and the diſtance would be the greater, the farther the moon was from the node: but this diſtance never could much exceed 5°, or the angle expreſſing the inclination of the two orbits.

Full moon is that poſition of the moon, when her longitude differs 12 ſigns, or exactly half a circle from that of the ſun; that is, its longitude is the ſame as the longitude of the centre of the earth's ſhadow, if we ſuppoſe it extended till it meet the ecliptic. This phaſe of the moon may take place likewiſe in any part of her orbit; ſhe may therefore be above, below, or in the centre of the earth's ſhadow; in which latter caſe, being deprived of the light of the ſun by the interpoſition of the earth, ſhe will be eclipſed. From this general illuſtration, we ſhall now proceed to inveſtigate theſe phenomena more minutely, beginning with lunar eclipſes, which are much the eaſieſt to underſtand. The calculations that are incident to ſolar eclipſes do not involve any of the higher branches of mathematics: the principles on which they depend are very ſimple, but the difficulty ariſes from the great number of conſiderations which ariſe, and which cauſe no ſmall perplexity even to the experienced aſtronomer.

Of an Eclipſe of the Moon.

The earth being an opake body enlightened by the ſun, it neceſſarily projects a ſhadow into the regions of ſpace in a contrary direction; when it ſo happens that the moon, in the courſe of her revolution about the earth, falls into this ſhadow, ſhe loſes the ſun's light, by which alone ſhe is viſible, and appears to us *eclipſed*.

Let us ſuppoſe two ſtraight lines drawn from the oppoſite parts of the ſolar diſc, tangents to the ſurface of the earth, as A B, *a b*, (*fig.* 75.) theſe lines will repreſent the limits of the ſhadow, and as the ſun is much larger than the earth, theſe lines will meet at a point, and croſs each other behind the earth, and the ſhadow will thus take the form of a circular cone. When the moon enters this ſhadow, and a part of its diſc is ſtill enlightened by the ſun, this part is not terminated by a ſtraight line; it has the form of a luminous creſcent, the concave part being turned towards the ſhade. The ſame circumſtance happens when the moon begins to quit the ſhadow.

When the moon approaches the terreſtrial ſhadow, ſhe does not loſe her light ſuddenly, but it gradually becomes more and more faint, till the obſcurity arrives at its greateſt intenſity.

To comprehend this phenomenon, we have only to attend to the figure, and obſerve that an opake body may be ſo placed between an object and the ſun, as only to intercept a part of his light (ſuppoſe the object at M), it will then be leſs illuminated than if it received the whole of the light, but more ſo than if it was placed at *m* in total obſcurity. This intermediate ſtate, comprehended in the angular ſpace E B C on one ſide the *umbra*, and F B C on the other, is called the *penumbra*. This is the effect which is obſerved to take place on the entrance of the moon into the terreſtrial ſhadow.

To find the limits of this penumbra, let two lines be drawn, as A *e*, *a* E, touching the ſurfaces of the ſun and the earth, ſo as to croſs at a point *c* between them, the angles E B C, *e b c*, will determine the ſpace occupied by the penumbra, for at a point ſituated without this ſpace, the whole diſc of the ſun will be viſible, but to a point M within it, only a part A *l* of the ſun's diſc will be viſible, and the viſible portion will diminiſh from the line E B to the line C B, when it will entirely diſappear; conſequently the penumbra will gradually increaſe from its firſt limit E B till its ſecond B C, when it will be united with the umbra.

When the moon enters compleatly into the ſhadow of the earth, we do not quite loſe ſight of it; its ſurface is ſtill faintly illuminated with a reddiſh light, ſomething ſimilar to that reflected by clouds after the ſetting of the ſun; this ariſes from the ſolar rays that have been refracted by our atmoſphere, and afterwards inflected behind the earth. For thoſe rays which are not enough refracted to reach the ſurface of the earth, continue their courſe through the atmoſphere, and if not entirely abſorbed by it, are inflected towards a point, in the ſame manner as by a convex lens. The light thus reflected behind the earth is very conſiderable; conſidering only one luminous point of the ſolar diſc, it can only project one ray to every point into the ſurrounding ſpace, but by the medium of the terreſtrial atmoſphere, a cone of luminous points is collected behind the earth, and an object placed in the focus of this cone would be more ſtrongly illuminated than by the direct light of the ſun. Every point of the ſun producing a ſimilar effect, the length and extenſion of the terreſtrial ſhadow are much diminiſhed, and if the atmoſphere did not abſorb a very great proportion of the ſun's rays, the light reflected from the diſc of the moon in a lunar eclipſe would exceed that of the full moon. We may next conſider the meaſures of theſe appearances more preciſely, and the circumſtances which muſt occur to produce them.

The firſt thing to determine in this inveſtigation is the length of the conical ſhadow projected behind the earth, to find if it always extends to the orbit of the moon, omitting the effect of the atmoſphere of the earth.

Let S be the centre of the ſun, T that of the earth, ſuppoſed ſpherical, A B a tangent to the earth and ſun forming the limit of the perfect umbra, S T the axis of the cone, and T C the prolongation of this cone, which it is required to determine. If the ſtraight line A T be drawn to the centre of the earth, the angle S T A will be the apparent diameter of the ſun, the angle T A B will be its horizontal parallax, and as the firſt of theſe is the exterior angle of the triangle T A C, the angle T C B will be equal to the angle S T A — T A B, or the ſemi-diameter of the ſun minus its horizontal parallax. The length T C may now be eaſily determined, for in the right-angled triangle C B T, the angle C and ſide T B are both known. Therefore the length of the conical ſhadow varies with the apparent diameter of the ſun, and conſequently with its diſtance from the earth. The diſtance of the centre of the earth from the ſummit of the cone is as follows. It is expreſſed in terms of the terreſtrial radius.

☉'s Perigee	- - -	212.873
☉'s Mean diſtance	- -	216.237
☉'s Apogee	- - -	220.207

For if D be the apparent diameter of the ſun, E the horizontal parallax, R the radius of the earth, $C T = R . \frac{1}{\text{ſin.}\left(\frac{D}{2} - E\right)}$

As the angle $\frac{D}{2} - E$ is always very ſmall, we may ſubſtitute its ſine, for theſe calculations do not admit of extreme preciſion: but then we muſt ſubſtitute for radius the number of ſeconds it contains, namely, 206264.″8; we ſhall then have the diſtance of the ſummit of the cone from the centre of the earth, $C T = R . \frac{206264.8}{\frac{D}{2} - E}$. If for D we take its three values from the tables when the ſun is perigee, mean diſtance, and apogee, we ſhall obtain the quantities as given above.

By inſpection of theſe values it appears, that the cone becomes longer as the diſtance of the ſun increaſes.

The greateſt diſtance of the moon from the earth does not exceed 63,941 radii of the earth, (ſee Distance,) which is much leſs than the preceding quantities, ſo that the earth's ſhadow always extends much farther into ſpace than the orbit of the moon, conſequently if this orbit was in the plane of the ecliptic, there would be every month an eclipſe of the moon.

To calculate the magnitude and duration of an eclipſe, it is neceſſary to know the diameter of the terreſtrial ſhadow at the place where it is traverſed by the lunar orbit. Let L *l* be this orbit, ſuppoſed circular, the angle L T C will meaſure the apparent ſemi-diameter of the ſhadow ſeen from the earth, and will be equal to the difference of the angles T L B, T C L. But the firſt of theſe angles is the horizontal parallax of the moon, and the ſecond is equal to the ſemi-diameter of the ſun minus its horizontal parallax, as we have already demonſtrated. Theſe angles being known, give the angle L T C, or the ſemi-diameter of the ſhadow.

To find it, we muſt add the parallax of the ſun to the parallax of the moon, and take from their ſum the ſemi-diameter of the ſun; that is, the ſemi-diameter of the ſhadow is always equal $P + p - \frac{D}{2}$.

By calculating its value from the known parallax of the moon at its greateſt, leaſt, and mean diſtances, we obtain the following table.

Table of the ſemi-diameter of the terreſtrial ſhadow at the diſtance of the Moon.

Sun's perigee.	Moon's apogee -	37′	37″
	Moon in mean diſtance	40	40
	Moon's perigee -	45	15
Sun in its mean diſtance.	Moon's apogee -	37	53
	Moon in mean diſtance	40	56½
	Moon's perigee -	45	31
Sun's apogee.	Moon's apogee -	38	9
	Moon in mean diſtance	41	12
	Moon in perigee -	45	46

The greateſt apparent diameter of the moon not exceeding 33′ 3.1″, we ſee that it may always be contained in the terreſtrial ſhadow, which conſiderably exceeds it. Therefore, every time that the moon paſſes through the centre of this ſhadow, it will be totally eclipſed.

The time that the moon will remain in the ſhadow depends on the difference between her diameter and that of the ſhadow. To compute this time, we muſt calculate this difference, and determine from the horary motion of the moon the time ſhe will employ to deſcribe it.

Hitherto, we have only conſidered the dimenſions of the umbra; the limits of the penumbra are next to be determined.

Let A *b* (*fig.* 76.) be a ſtraight line, at the ſame time a tangent to the earth and the ſun, L *l* repreſenting the lunar orbit, the angle *l* T C will be the diſtance of the penumbra to the axis C T, but this angle being exterior to the triangle *c* T *l* is equal to the ſum of the two interior, and oppoſite T *lc*, *lc* T.

The firſt of theſe is the horizontal parallax of the moon, the ſecond equal to *c* A T + *c* T A, or the ſemi-diameter of the ſun *plus* its horizontal parallax, therefore the angle C T *l* is equal to the ſum of the parallaxes of the ſun and moon + the ſemi-diameter of the ſun.

The magnitude of the penumbra is found by ſubtracting the ſemi-diameter of the umbra from the above quantity. But this ſemi-diameter is equal to the ſum of the parallaxes of the ſun and moon *minus* the ſemi-diameter of the ſun; conſequently the diameter of the penumbra is equal to the diameter of the ſun. We muſt next conſider what alterations will be produced in theſe reſults by the effect of the earth's atmoſphere.

The umbra, as determined above, has for its limit the radius A B, which touches the correſponding ſurfaces of the earth and ſun; C is then the ſummit of the umbra. But if we take into conſideration the effect of the atmoſphere of the earth, the ray of light A B will be refracted at the point B, and continuing its path will converge to ſome point nearer the earth than the point C. A ſpectator placed beyond this limit, would, by the effect of refraction, not only ſee the luminous border of the ſun's diſc, but a luminous zone of it; by receding farther from the earth the diſc of the ſun tranſmitted through the atmoſphere will be viſible in the form of a luminous ring, receding ſtill farther, the rays emerging from the centre of the ſun will no longer touch the ſurface of the earth, but paſs higher up in the atmoſphere; and laſtly, by increaſing ſtill more the diſtance, the exterior limb of the ſun will begin to be diſengaged from the terreſtrial atmoſphere, and will appear directly and without refraction.

To determine theſe different limits, imagine a ray of light S B, (*fig.* 77.) proceeding from the limb of the ſun, and juſt touching the ſurface of the earth at B, the curve deſcribed by this ray about the earth will be ſymmetrical on each ſide of B, that is, if S *o* be its direction when it enters the atmoſphere, *o* L will be its direction when it paſſes out of it, and the angles B T I, B *b* I, formed with the tangent T *t*, will be equal to each other; but the angle B T I, or D T S, is very nearly equal to D B S, or the horizontal refraction, becauſe the point I is very little elevated above B. The angle B + I is likewiſe very nearly equal to the horizontal refraction, conſequently the angle S I A, which expreſſes the inflexion of the ray, is equal to B T I + B *t* I, or to double the horizontal refraction.

The effect of the atmoſphere, therefore, is to augment by this quantity the apparent ſemi-diameter of the ſun: hence, in computing the diſtance of the ſummit of the umbra from the centre of the earth, the ſemi-diameter of the ſun muſt be increaſed by double the horizontal refraction, and with this correction alone, the ſame formulæ may be employed that have been demonſtrated above. If inſtead of conſidering the ray of light S B as coming from the exterior limb of the ſun, it be ſuppoſed to proceed from any point whatever of the diſc, at a given diſtance from the centre; ſubſtituting this diſtance for the ſemi-diameter of the ſun, we ſhall have the diſtance from the earth at which this point begins to appear, and thus may be found the ſucceſſive zones which will begin to be viſible at every correſponding diſtance.

If the horizontal refraction be called *r*, the ſame notation being continued as above, the diſtance of the ſummit of the ſhadow from the centre of the earth C T will be equal $\frac{R}{\frac{D}{2} + 2r - L}$, and the ſemi-diameter of the ſhadow $P + p - D - 2r$. If now $\frac{D}{2}$ be ſuppoſed to expreſs the diſtance of any given point in the diſc from the centre, we may find by the firſt formula the diſtance at which the given point will begin to appear on the edge of the terreſtrial ſurface. Making $D = 0$ we ſhall have the diſtance at which the ſun begins to be entirely viſible, ſurrounding the earth like a ring. On this principle Du Sejour has computed the following table.

	Sun's Perigee.	Mean Diſtance.	Sun's Apogee.
Limb of the ſun beginning to appear - - -	42,228	42,013	41,842
¼ the diſc of the ſun at the circumference of the earth -	46,674	46,502	46,408
½ of the diſc ☉ at the circumference of the earth -	52,236	52,236	52,236
¾ of the diſc ☉ at the circumference of the earth -	59,316	59,820	60,317
The whole diſc of the ☉ ſurrounding the earth like a ring	68,283	69,125	69,645

The leaſt diſtance of the moon being 57,660, and the greateſt 63,664, in the moſt unfavourable circumſtances, even at the centre of the ſhadow, a ſpectator on the ſurface of the moon would ſtill ſee half the diſc of the ſun through the atmoſphere of the earth.

This ſufficiently explains, why, in a total eclipſe of the moon, her diſc is ſtill enlightened enough to be viſible, and we muſt attribute to the thickneſs of our atmoſphere, and to the vapours it contains, the cauſe of the great diminution of light which ſometimes makes the moon almoſt entirely diſappear.

It was, perhaps, an effect of this kind which Sauſſure obſerved on the *Col du Geant*, when he ſaw, during ſummer nights, the horizon ſurrounded by a kind of luminous ring, the ſmall depreſſion of the ſun below the horizon might compenſate the ſmallneſs of the diſtance from the earth at which the ſpectator was placed; and this conſideration agrees very well with the phenomena of twilight. See Crepusculum, and Twilight.

In the above explanations the moon has been ſuppoſed exactly placed in the axis of the terreſtrial ſhadow, and ſhe would be ſo placed in every oppoſition if her orbit coincided with the plane of the ecliptic, but ſince the moon is ſometimes elevated above, and ſometimes depreſſed below this plane, it may happen that it will only enter partially into the ſhadow of the earth, or juſt touch it with her limb, or even paſs without touching it. In the firſt caſe, the eclipſe is *partial*, in the ſecond, it takes the name of *an appulſe*; a *total eclipſe* is when the moon is entirely plunged in the ſhadow, and the eclipſe is *central* when the centre of the moon coincides with the axis of the conical ſhadow.

Central eclipſes can only happen when the moon, at the moment of oppoſition, is in the plane of the ecliptic, and conſequently in one of her nodes.

For a total eclipſe, it is ſufficient that the ſemi-diameter of the ſhadow exceeds the latitude of the moon, augmented by her apparent ſemi-diameter.

That there may be a partial eclipſe, it is ſufficient that the ſemi-diameter of the ſhadow exceeds the latitude of the moon, diminiſhed by her apparent ſemi-diameter. If theſe two quantities are equal, the moon will touch the ſhadow, and there will only be an appulſe; if the ſecond ſurpaſſes the firſt, there will be no eclipſe.

The latitude of the moon depends on its diſtance from the nodes of its orbit; it augments as its diſtance from theſe points increaſes; the diſtance from the node may, therefore, be calculated, at which an eclipſe becomes impoſſible: this is called the *ecliptic limit*. To do this, we muſt ſelect the moſt favourable circumſtances, or thoſe which give the diameter of the moon, and the terreſtrial ſhadow, the greateſt poſſible values; the ſum of theſe two quantities will give the greateſt poſſible latitude at which the moon can be eclipſed. Having found this latitude, we may determine the diſtance from the node which correſponds to it; this is done by the ſolution of a right-angled ſpherical triangle, formed by the lunar orbit, the ecliptic, and the circle of latitude; in this triangle one of the ſides is the latitude above found, the angle is the obliquity of the orbit, which we muſt take at its leaſt value; the ſide oppoſite the right angle is the greateſt diſtance from the node. Since theſe reſpective poſitions of the moon and ſun are connected together, by the law of their motions, it is not eaſy to determine the preciſe inſtant in which the re-union of all theſe circumſtances ſhall be the moſt favourable to produce an eclipſe, and it can only be effected by comparing together a great number of ſimultaneous poſitions of the two bodies. According to Delambre (who has taken into the account the effect of the atmoſpherical refraction), there cannot happen an eclipſe of the moon when the diſtance from the node ſurpaſſes 13° 40′, and there certainly will be an eclipſe when the diſtance is leſs than 7° 47′. Between theſe limits, the exiſtence of the eclipſe will depend on the particular poſitions of the ſun and moon, and to decide the queſtion we muſt have recourſe to exact calculation in which theſe circumſtances enter, but the preceding reſults are always extremely uſeful, becauſe they ſhew at once a number of oppoſitions in which no eclipſe can happen, ſo that it only remains to calculate the others to find what ſpecies of eclipſe (if any) will take place.

Of an Eclipſe of the Sun.

An eclipſe of the ſun is produced by the interpoſition of the moon between that luminary and the earth, for which reaſon it can never happen at any other time than at the conjunctions or new moons. Notwithſtanding the moon is incomparably leſs than the ſun, yet from its nearneſs to us it ſo happens that its apparent diameter differs very little from that of the ſun, and even ſometimes exceeds it. Suppoſe an obſerver ſituated in the continuation of a ſtraight line that unites the centres of the ſun and moon, he will ſee the former of theſe bodies eclipſed. If the apparent diameter of the moon ſurpaſſes that of the ſun, the eclipſe will be total, and the obſerver will be entirely plunged in the cone of ſhade which is projected behind the moon: if the diameters are equal, the point of the cone will terminate at the earth's ſurface, and there will be a momentary total eclipſe. If the diameter of the moon be leſs than that of the ſun, the obſerver will ſee a zone of the ſun ſurrounding the moon like a ring, and the eclipſe will be central and annular. And laſtly, if the obſerver on the earth's ſurface is not exactly in the line joining the centres, the eclipſe may be partial, that is, a part of the ſolar diſc may be hid, while the remaining part continues perfectly viſible. Total eclipſes, which are rare, are remarkable for the darkneſs which accompanies them, and which they ſpread over different parts of the ſurface of the earth, in the ſame manner as the ſhadow of a cloud carried by the winds, ſweeps over the mountains and the plains, depriving them for ſome inſtants of the light of the ſun. This total darkneſs, under favourable circumſtances, may laſt about five minutes.

The ſmalleſt apparent diameter of the ſun is 31′ 30″; the diameter of the moon in its mean diſtance is 31′ 25″, that is, leſs than that of the ſun; there cannot, therefore, be a total eclipſe when the moon is beyond the mean diſtance. Eclipſes of the ſun are likewiſe modified by the height of the moon above the horizon, which increaſes her diameter. (See Diameter.) This change, combined with the effect of parallax, may ſo much augment or diminiſh the apparent diſtance of the moon from the ſun, that an eclipſe may be ſeen by one obſerver at the earth's ſurface, at the ſame time that no ſuch phenomenon happens to another. For example, if the horizontal ſemi-diameters of the earth and moon differ very little from each other, an eclipſe may be annular to thoſe countries who obſerve it in the morning or evening, and central to thoſe who obſerve it at noon, where the ſun and moon are elevated above the horizon. In this, eclipſes of the ſun differ from thoſe of the moon; the latter are the ſame to all places where they are viſible, but the former are ſo modified by the poſition of the obſerver, by the different diſtances of the ſun and moon from the earth, and from the different diſtances of the moon from the node, that they are ſubject to extreme variations; and from the number of elements on which they depend, the calculation of their appearances is very difficult. The diameter of the moon, obſerved in a ſolar eclipſe, appears ſomething leſs than at other times:

this is the effect of the irradiation, the luminous circle that ſurrounds the lunar diſc diminiſhes a little its apparent magnitude; the exact quantity of this irradiation is not yet preciſely aſcertained.

To calculate the Phaſes of an Eclipſe of the Moon.

The firſt thing to be done, is to find the time of the mean oppoſition, to get which from the tables of epacts, amongſt the tables of the moon's motion, take out the epact for the year and month, and ſubtract the ſum from $29^d\ 12^h\ 44'\ 3''$, one ſynodic revolution of the moon, or two, if neceſſary, ſo that the remainder may be leſs than a revolution, and that remainder gives the time of the mean conjunction. If to this we add $14^d\ 18^h\ 22'\ 1''.4$, half a revolution, it gives the time of the next mean oppoſition; or if we ſubtract, it gives the time of the preceding mean oppoſition. If it be leap year, in January and February ſubtract a day from the ſum of the epacts before you make the ſubtraction. When the day of the mean conjunction is O, it denotes the laſt day of the preceding month.

Example. To find the time of the mean new and full moons in February 1795.

Epact 1795 - -	9^d	11^h	$6'$	$11''$
February - -	1	11	15	57
	10	22	22	14
	29	12	44	3
Mean new moon -	18	14	21	49
	14	18	22	1.4
Mean full moon -	3	19	59	47.6

To determine whether an eclipſe may happen at oppoſition, find the mean longitude of the earth at the time of mean oppoſition, and alſo the longitude of the moon's node. Then, according to M. Caſſini, if the difference between the mean longitudes of the earth and the moon's node be leſs than 7° 30′, there *muſt* be an eclipſe; if it be greater than 14° 30′, there *cannot* be an eclipſe; but between 7° 30′ and 14° 30′, there *may*, or may *not* be an eclipſe.

M. Delambre makes theſe limits 7° 47′ and 13° 21′.

Example. To find whether there will be an eclipſe at the full moon, on February 3d, 1795.

Sun's mean longitude at $3^d\ 19^h$ $59'\ 47.''6$ - - - -	10^s	13°	27′	20.″8
Mean longitude of the earth -	4	13	27	20.8
Longitude of the moon's node -	4	8	1	48.5
Difference - - - -	0	5	25	32.3

Hence there muſt be an eclipſe.

Examine thus all the new and full moons for a month before and a month after the time at which the ſun comes to the place of the nodes of the lunar orbit, and you will be ſure not to miſs any eclipſes. Or, having the eclipſes for the laſt eighteen years, if you add to the times of the middle of theſe eclipſes $18^y\ 10^d$, or $11^d\ 7^h\ 3\frac{3}{4}'$, it will give the times when you may expect the eclipſes will return. To the time of mean oppoſition, compute the true longitudes of the ſun and moon, and the moon's true latitude, and find from the tables of their motions the horary motions of the ſun and moon in longitude, and the difference (d) of their horary motions is the relative horary motion of the moon in reſpect to the ſun, or the motion with which the moon approaches to, or recedes from, the ſun. Find alſo the moon's horary motions in latitude, and ſuppoſe at the time (t) of mean oppoſition, the moon is at the diſtance (m) from oppoſition. Then $d : m :: 1^h :$ the time (w) between t and the oppoſition, which added to or ſubtracted from the time t, according as the moon is not yet got into oppoſition, or is beyond it, gives the time of the ecliptic oppoſition.

To find the place of the moon in oppoſition, let n be the moon's horary motion in longitude: then $1^h : w :: n :$ the increaſe of the moon's longitude in the time w; which applied to the moon's longitude at the time of the mean oppoſition, gives the true longitude of the moon at the time of the ecliptic oppoſition. The oppoſite to that muſt be the true longitude of the ſun. Find alſo the moon's true latitude at the time of oppoſition, by ſaying $1^h : w ::$ the horary motion in latitude : the motion in the time w, which, applied to the moon's latitude at the time of the mean oppoſition, gives the true latitude at the time of the true oppoſition. In like manner, you may compute the true time of the ecliptic conjunction, and the places of the ſun and moon for that time, when you calculate a ſolar eclipſe. With the ſun's horary motion in longitude, and the moon's in longitude and latitude, find the inclination of the relative orbit, and the horary motion upon it.

To do this, let L M (*fig.* 78.) be the horary motion of the moon in longitude, S M that of the ſun; draw M O perpendicular to L M, and equal to the moon's horary motion in latitude. Take $Sb = Ma$ and parallel to it, and join L a, L b; then L a is the moon's true orbit, and L b its relative orbit in reſpect to the ſun. Hence, L S (the difference of the horary motions in longitude,) : S b (the moon's horary motion in latitude) :: radius : tan. b L S, the inclination of the relative orbit, and coſ. b L S : radius :: L S : Lb, the horary motion in the relative orbit. By logarithms the calculations are thus:

$$\text{Log. } Sb + 10 - \text{log. } LS = \text{log. tan. } bLS,$$
$$\text{Log. } LS + 10 - \text{log. coſ. } bLS = \text{log. } Lb.$$

M. De La Lande obſerves, that if we add 8″ to the difference of the horary motions in longitude, it will give the horary motion in the relative orbit: for in a right-angled triangle, of which the baſe is the difference of the horary motions in longitude, (which is about half a degree,) and the angle at the baſe about $5\frac{2}{3}$ of a degree; the difference between the baſe and the hypothenuſe will always be about 8″.

At the time of oppoſition, find from the tables the moon's horizontal parallax, its ſemi-diameter and the ſemi-diameter of the ſun, the horizontal parallax of which we may here take = 9″.

To find the ſemi-diameter of the earth's ſhadow at the moon, ſeen from the earth. Let A B be the diameter of the ſun, T R the diameter of the earth, O and C their centres; draw A T, B R, to meet at I, and join O C I. Let F G H be the diameter of the earth's ſhadow at the diſtance of the moon, and join O T, C F. Now the angle $FCG = CFA - CIA$, but $CIA = OTA - TOC$; therefore $FCG = CFA - OTA + TOC$; that is, *the angle, under which the ſemi-diameter of the earth's ſhadow appears at the moon, is equal to the ſum of the horizontal parallaxes of the ſun and moon, diminiſhed by the apparent ſemi-diameter of the ſun.*

In eclipſes of the moon, the ſhadow is found to be a little greater than this rule gives it, owing to the atmoſphere of the earth. This augmentation of the ſemi-diameter is, according to M. Caſſini, 20″; according to M. Monnier, 30″; and according to M. de la Hire, 60″. Mayer thinks the correction is about $\frac{1}{60}$th of the ſemi-diameter of the ſhadow; or, that you may add as many ſeconds as the ſemi-diameter contains minutes. Some computers always add 50″; but this muſt be ſubject to ſome uncertainty.

As the angle CIT ($= OTA - TOC$) is known, we have ſin. TIC : coſ. TIC :: TC : CI, the length of the earth's ſhadow.

If we take the angle $ATO = 16' 3''$, the mean ſemi-diameter of the ſun, $TOC = 9''$, the horizontal parallax of the ſun, we have $CIT = 15' 54''$: hence, ſin. 15′ 54″ : coſ. 15′ 54″, or 216.2 :: TC : $CI = 216.2\ TC$.

Let PQ (*fig* 97.) repreſent the ſection of the earth's ſhadow at the moon, CN the ecliptic, NL the moon's orbit. Draw Cn perpendicular to CN, and Cm perpendicular to NL; and let the moon at m juſt touch the earth's ſhadow at r externally, ſo that Cm may be the ſum of the radii of the moon and earth's ſhadow. Then to determine when this happens, we may take the angle at $N = 5° 17'$, which is very nearly its value in all eclipſes; the inclination of the lunar orbit being at that time always greateſt, as will afterwards be ſhewn. Hence, ſin. 5° 17′ : rad. :: ſin. CM : ſin. CN. Now the greateſt value of Cm is about 1° 3′ 30″; hence the correſponding value of $CN = 11° 34'$. When therefore CN is greater than that quantity, there can be no eclipſe. According to M. Caſſini, if the latitude, Cn, of the moon, at the time of the ecliptic conjunction, exceed the ſum of the ſemi-diameters of the earth's ſhadow and moon by 18″, there will be no eclipſe; but if it do not exceed that ſum by 16″, there will be an eclipſe. If $Cm = Cr - rm$, or the limbs touch internally, the eclipſe will be juſt total: hence, if the diſtance of the moon's node from the place of the earth be leſs than the computed value of CN in this caſe, there muſt be a total eclipſe of ſome duration. If, therefore, it was before doubtful, and it now appears there will be an eclipſe, proceed as follows to compute it:

Let APB be that half of the earth's ſhadow where the moon paſſes through, NL the relative orbit of the moon; one figure repreſenting a partial eclipſe, the other a total one. Draw Cmr perpendicular to NL, and let z be the centre of the moon at the beginning of the eclipſe, m at the middle, x at the end; v at the beginning of total darkneſs, w at the end. Alſo, let AB be the ecliptic, and Cn perpendicular to it. Now, in the right-angled triangle Cmn, we know Cn the latitude of the moon at the time of the ecliptic conjunction, and the angle Cnm the complement of the angle which the relative orbit of the moon makes with the ecliptic: hence, radius : coſ. Cmn :: Cn : nm, which we call the reduction; and radius : ſin. Cnm :: Cn : Cm. By logarithms, the calculations are thus:

$$\text{Log. coſ. } Cnm + \text{log. } Cn - 10 = \text{log. } nm.$$
$$\text{Log. ſin. } Cnm + \text{log. } Cn - 10 = \text{log. } Cm.$$

The horary motion of the moon upon its relative orbit being known, we know the time of deſcribing mn, by ſaying, $h : mn :: 1^h$: the time of deſcribing mn. The computation of this is moſt readily performed by logiſtic logarithms.

Hence, knowing the time of the ecliptic conjunction at n, we know the time of the middle of the eclipſe at m. Next, in the right-angled triangle CMz, we know Cm and Cz, the ſum of the ſemi-diameters of the earth's ſhadow and the moon, to find mz, which is done thus by logarithms. As $mz = \sqrt{\overline{Cz}^2 - \overline{Cm}^2} = \sqrt{\overline{Cz + Cm} \,.\, \overline{Cz - Cm}}$, the log. of $mz = \frac{1}{2} \,.\, \text{log. } \overline{Cz + Cm} + \text{log. } \overline{Cz - Cm}$.

Hence, the horary motion of the moon being known, we know the time of deſcribing zm, which *ſubtracted* from the time at m, gives the time of the beginning; *added*, gives the time of the end. In the ſame manner, in the right-angled triangle Cmv, we know Cm and Cv, the difference of the ſemi-diameter of the earth's ſhadow and moon: hence, by logarithms, the. log of $mv = \frac{1}{2} \,.\, \text{log.} \overline{Cv + Cm} + \text{log. } \overline{Cv - Cm}$, from whence, as before, we know the time of deſcribing mv, which *ſubtracted* from the time at m, gives the time of the beginning of total darkneſs; and *added*, gives the end. The magnitude of the eclipſe at the middle is repreſented by tr, which is the greateſt diſtance of the moon within the earth's ſhadow; and this is meaſured in terms of the diameter of the moon conceived to be divided into 12 equal parts, called digits or parts deficient; to find which, we know Cm, the difference between which and Cr gives mr, which added to mt, or if m fall out of the ſhadow, take the difference between mr and mt, and we get tr. Hence, to find the number of digits eclipſed, ſay $mt : tr$ :: 6 digits, or 360′ (it being uſual to divide a digit into 60 equal parts, and call them minutes) : the digits eclipſed. If the latitude of the moon be north, we uſe the upper ſemi-circle; if ſouth, we take the lower.

If the earth had no atmoſphere, when the moon was totally eclipſed, it would be inviſible; but we have ſhewn, that by the refraction of the atmoſphere, ſome rays will be brought to fall upon the earth's ſurface; upon which account, the moon will be viſible at that time, and appear of a duſky red colour. M. Maraldi has obſerved, that in general the earth's umbra at a certain diſtance is divided by a kind of penumbra, from the refraction of the atmoſphere.

This will account for the circumſtance of the moon being more viſible in ſome total eclipſes than in others. It is ſaid, that in the total eclipſes in 1601, 1620, and 1642, the moon entirely diſappeared. An eclipſe ot the moon, ariſing from its real deprivation of light, it muſt appear to begin at the ſame inſtant of time to every place on that hemiſphere of the earth which is next the moon.

Hence it affords a very ready method of finding the difference of longitudes of places on the earth.

The moon enters the penumbra of the earth before it comes to the umbra, and therefore it gradually loſes its light; and the penumbra is ſo dark juſt at the umbra, that it is difficult to aſcertain the exact time when the moon's limb touches the umbra, or when the eclipſe begins.

When the moon has entered into the umbra, the ſhadow upon its diſc is tolerably well defined; and you may determine, to a conſiderable degree of accuracy, the time when any ſpot enters into the umbra. Hence, the beginning and end of a lunar eclipſe are not ſo proper to determine the longitude from, as the times at which the umbra touches any of theſe ſpots.

Example 1.—A computation of a partial eclipſe of the moon, on February 3, 1795. For the meridian of the Royal Obſervatory at Greenwich.

The time of the full moon is $3^d\ 19^h\ 59'\ 47''.6$. It appears by the rule already given, that there will be an eclipſe.

By computation, the mean time of the ecliptic oppoſition is at $12^h\ 46'\ 18''$; from which ſubtract the equation of time, 14′ 20″, and we have $12^h\ 31'\ 58''$, the apparent time at Greenwich.

To this time compute the moon's place in the ecliptic, and it will be found $4^s\ 15°\ 15'\ 57''$, the oppoſite point to which is $10^s\ 15°\ 15'\ 57''$, the place of the ſun. Compute alſo the moon's latitude C *n*, and it will be found 37′ 39″ N. aſcending.

By the tables, the horary motion of the moon in latitude is 2′ 57″, the horary motion of the ſun is 2′ 32″, and of the moon 32′ 9″ in longitude; hence the horary motion of the moon from the ſun in longitude is 29′ 37″, conſequently, the horary motion of the moon from the ſun on the relative orbit is 29′ 45″; alſo the inclination of the relative orbit is 5° 41′ 27″. The reduction *n m* is 3′ 44″, reduce this into time by logiſtic logarithms, and the operation is thus:

3′ 44″	1.2061
29 45	0.3047
7 32 time of deſcribing *m n*.	0.9014

The neareſt approach C *m* of the centres is 37′ 28″. From 12^{h} 31′ 58″, ſubtract 7′ 32″, and it leaves 12^{h} 24′ 36″, the middle of the eclipſe.

By the tables, the horizontal parallax of the ſun is 0′ 9″, and of the moon 56′ 30″. Alſo, the apparent ſemi-diameter of the ſun is 16′ 16″, and of the moon 15′ 24″. Hence hor. par. ☉ + hor. par. ☾ — ſemi diam. ☉ + 50″ = 41′ 13″, the ſemi-diameter of the earth's ſhadow increaſed by 50″ for refraction.

Hence, ſemid. ☾ + ſemid. ⊖'s ſhadow	56′ 37″ = 3397″	
Neareſt approach of centres	37 28 = 2248	
Sum	5645 — log.	3.751664
Diff.	1149 — log.	3.060320
		2)6.811984
Log. of 2546″.8 = 42′ 26″.8 mot. of half duration		3.405992

Reduce this into time by the logiſtic logarithms.

29′ 45″	0.3047
42 27	0.1503
1^{h} 25′ 37″ half duration	0.8456

Subtract this from and add it to 12^{h} 24′ 26″, and we get 10^{h} 58′ 49″ for the beginning, and 13^{h} 50′ 3″ for the end. From C *r* = 41′ 13″, ſubtract C *m* = 37′ 28″, and we get *m r* = 3′ 45″; hence *m r* + *m t* = *r t* = 19′ 9″ the parts deficient, conſequently 15′ 24″ : 19′ 9″ :: 6^{d}, or 360′, : 7^{d} 27′ 36″ the digits eclipſed.

By logiſtic logarithms the calculation is thus:

19′ 9″ log. + 1	1.4960
15 24	0.5906
7^{d} 27′ 36″	0.9054

Hence the times of this eclipſe are Feb. 3, 1795.

The beginning at	10^{h} 58′ 49″	Apparent time at Greenwich.
Middle	12 24 26	
End	13 50 3	
Duration	2 51 12	
Digits eclipſed	7^{d} 27′ 36″	

on the moon's ſouth limb, as repreſented in *fig.* 80, which was conſtructed for this eclipſe.

Example 2.—*A computation of a total eclipſe of the moon on December 3d*, 1797, *for the meridian of the Royal Obſervatory at Greenwich.*

It appears that there will be an eclipſe at this full moon. By computation, the mean time of the ecliptic oppoſition is 3^{d} 16^{h} 16′ 46″, to which add 9′ 18″, the equation of time, and you get 3^{d} 16^{h} 26′ 4″ for the apparent time.

To this time compute the moon's place in the ecliptic, and it will be found to be 2^{s} 12° 35′ 19″, conſequently the ſun's place is 8^{s} 12° 35′ 19″. Compute alſo the moon's latitude C *n*, and it will be found 4′ 55″ S. decreaſing.

By the tables the horary motion of the moon in latitude is 3′ 15″, the horary motion of the ſun is 2′ 32″, and of the moon 35′ 14″ in longitude, hence the horary motion of the moon from the ſun in longitude is 32′ 42″, conſequently, the horary motion of the moon from the ſun on the relative orbit is 32′ 50″; alſo, the inclination of the relative orbit is 5° 40′ 34″.

The reduction *n m* is 0′ 29″; reduce this into time by the logiſtic logarithms, and the operation is thus:

32′ 50″	0.2618
0 29	2.0939
0 53 time of deſcribing *m n*	1.8321

The neareſt approach C *m* of the centres is 4′ 54″.

To 16^{h} 26′ 4″ add 53″, and it gives 16^{h} 26′ 57″ for the middle of the eclipſe. By the tables, the horizontal parallax of the ſun is 0′ 9″, and of the moon 59′ 9″. Alſo the apparent ſemid. of the ſun is 16′ 17″, and of the moon 16′ 6″. Hence hor. par. ☉ + hor. par. ☽ — ſemid. ☉ + 50″ = 43′ 51″, the ſemi-diameter of the earth's ſhadow increaſed by 50″ for refraction. And as C *r* (= 43′ 51″) is greater than C *m* + *m s* (= 21′) the eclipſe muſt be total.

Semid. ☾ + ſemid. ⊖'s ſhadow	59′ 57″ = 3597	
Neareſt app. of centres	4 54 = 294	
Sum	3891 + log.	3.5900612
Difference	3303 — log.	3.5189086
		2)7.1089698
Log. of 3585″ = 59′ 45″ mot. of half duration		3.5544849

Reduce this into time by the logiſtic logarithms; but becauſe the fourth term, in this caſe, would come out a greater quantity than that to which the table extends, we will take the half of 59′ 45″, and then double the concluſion:

32′ 50″	0.2618
29 52.5	0.30285
54 34.5	0.04105

Hence 1^{h} 49′ 11″ is the half duration; which ſubtracted from and added to 16^{h} 26′ 57″, gives 14^{h} 37′ 46″ for the beginning, and 18^{h} 16′ 8″ for the end. We find the time of half the duration of total darkneſs thus:

Semid. ⊖'s ſhadow — ſemid. ☾	27′ 45″ = 1665″	
Neareſt app. of the centres	4 54 = 294	
Sum	1959 — log.	3.2920344
Difference	1371 — log.	3.1370375
		2)6.4290719
Log. of 1639″ = 27′ 19″ mot. of ½ dur. of total darkneſs		3.2145359

Reduce this into time by the logiſtic logarithms.

52′ 50″		0.2618
27 19		0.3417
49 55	half duration of total darkneſs	0.0799

Subtract this from and add it to 16ʰ 26′ 57″, and it gives 15ʰ 37′ 2″ for the beginning of total darkneſs, and 17ʰ 16′ 52″ for the end.

From $Cr = 43' 51''$, ſubtract $Cm = 4' 54''$, and we get $mr = 38' 57''$, to which add $tm = 16' 6''$, and we get $tr = 55' 3''$ the parts deficient. Hence 16′ 6″ : 55′ 3″ :: 6ᵈ, or 360′, : 20ᵈ 31′ the digits eclipſed.

The operation by logiſtic logarithms is thus:

55′ 3″ log. + 1	1.0374
16 6	0.5713
20ᵈ 31 0	0.4661

Hence the times of this eclipſe are December 3d, 1797.

The beginning at	14ʰ 37′ 46″	Apparent time at Greenwich.
Total darkneſs begins	15 37 2	
Middle	16 26 57	
Total darkneſs ends	17 16 52	
End of the eclipſe	18 16 8	
Duration of total darkneſs	1ʰ 39′ 50″	
Duration of the whole eclipſe	3 38 22	
Digits eclipſed	20ᵈ 31′ 0″	

If the time correſponding to the difference between the meridian at Greenwich and that of any other place be applied to the times here found, it will give the times at that place.

In this preſent year, 1809, there occurs but one viſible eclipſe, and that is of the moon, 29th April. The computation of its elements is as follows.

To compute the partial eclipſe of the moon, which will happen 29th April, 1809.

Ecliptic oppoſition happens 12ʰ 41′. The moon's motion in longitude for the preceding 12 hours was 7° 29′ 26″, and for the ſucceeding 12 hours 7° 31′ 47″. The mean 7° 30′ 36″, which divided by 12, gives 37′ 33″ for the moon's horary motion in longitude. If we take from this the ſun's horary motion, 2′ 26″, it will leave 35′ 7″ for the horary motion of the moon from the ſun, and which augmented by 8″ is 35′ 15″, which is the relative horary motion of the moon.

The horary motion of the moon in latitude is 3′ 27″. To find the inclination of the ☽'s orbit,

Log. 207″ = hor. mot. ☽ in lat. = 2.3159703
Co. log. 2115″ = hor. mot. ☽ in long. = 6.6746895
5° 35′ 20″ = 8.9906598

And 84 24 40 = its complement = Cnm.

To find the reduction nm. The latitude ☽ = 33′ 50″. Rad. : coſ. 84° 24′ 40″ :: 33′ 50″ = 20′ 30″ : mn.

Log. 2030 = 3.3074960
Coſ. 84° 24′ 40″ = 8.9885139
197″ = 2.2960099 = 3′ 17″.

This muſt be reduced into time by logiſtic logarithms thus:

3′ 17″	1.2618
35 15	0.2310
5 36 (time of deſcribing mn)	1.0308

From	12ʰ 41′ 00″	
Take	5. 36	
	12 35 24	middle of the eclipſe.

Hor. par. ☉	0ʰ 00′ 08″
Hor. par. ☽	61 10
	61 18
Semi-diameter ☉	15 54
	45 24
Add for refraction	50
Semi-diameter ſhadow	46 14

The neareſt approach of the centres $mC = 33' 35''$.
Semid. ☽ + ſemid. of ⊖ ſhadow = 62′ 54″ = 3774″
Neareſt approach of centres 33 35 = 2015

Sum - Log. 3.7626035 = 5789
Diff. - Log. 3.2452658 = 1759
7.0078693
3191″ = 53′ 11″ = 3.5039346 = motion in half duration.

Logiſtic log. 0ʰ 35′ 15″	0.2310
1 53 11	.0524
1 30 31	0.8214

Middle of eclipſe being	12ʰ 35′ 24″
Half duration	1 30 31
Beginning	11 4 53
End	14 5 55

From $Cr = Cm$ + ſemid. ☽ = 33′ 55″ + 16′ 40″ = 50′ 35″
Take Cm = ☽'s ſhadow = 46 14
Remainder = the uneclipſed part 4 21

16′ 40″ : dig. 6 :: 4′ 21″ : digits uneclipſed.
Or, 16 40 : 6 :: 12′ 20″ = 16′ 40″ − 4′ 20″
60 60
1000 740
6
4,440
60
26,400

Digits eclipſed 10ᵈ 26′ = 6ᵈ + 4ᵈ 26′.

Graphical Method of computing the above Eclipſe for April 29, 1809.

With a convenient ſcale of minutes and ſeconds, (which, for practical purpoſes, may be taken from a common ruler, divided into inches and tenths,) take A C = ſemi diameter of the umbra = $46' 14''$, and with this radius deſcribe the circle A B D. Draw C n perpendicular to A B, and make it equal to the latitude of the moon = $33' 50''$. Make ∠ C n N = complement of the angle which the relative orbit of the moon makes with the ecliptic = $84° 24' 40''$, and produce N n to L. With a radius equal to the ſum of the ſemi-diameters of the moon and the earth's ſhadow = $62' 54''$, ſet off C z, C x; and let fall the perpendicular C n; and with the centres x, m, z, and with a radius equal to the ſemi-diameter of the moon = $16' 40''$, deſcribe the circles repreſenting the moon. To find the beginning, middle, and end, the point n, $12^h 41'$, the time of the ecliptic conjunction muſt be marked, and ſet off from n, both ways, an extent equal to the horary motion of the moon upon N L. This interval ſhould be divided into as many equal parts as it will conveniently admit of, and theſe diviſions continued to x and z. The times correſponding to the points x, m, and z, ſhew the beginning, middle, and end of the eclipſe. And if $t r$ be meaſured upon the ſcale, it will ſhew the digits eclipſed.

This method will give the time ſufficiently near, if it is only required to predict the eclipſe, as the time may be depended on to a minute, if the radius C B is ſix or ſeven inches. The ſame method may be employed if the eclipſe is total.

The latter part of this method may be more eaſily underſtood, by referring to the plate where the whole operation is repreſented with its correſponding ſcale. See *Pl.* XI. *fig.* 81.

To calculate an Eclipſe of the Sun.

The calculation of eclipſes of the ſun, for any particular place, is much longer and more difficult than that of lunar eclipſes, on account of the conſiderations of parallax which neceſſarily enter into them. The parallax differs for every part of the earth; ſo that an eclipſe of the ſun would have a different appearance to different countries. An eclipſe of a minute of a degree, and continuing for 20′ of time, may occur at a ſpot 60 miles diſtant from a place where no eclipſe is viſible. On the contrary, an eclipſe of the moon would appear of the ſame magnitude to all the places where it is viſible; for the moon, really loſing its light, is dark to the whole world.

If we were placed on a point at the ſurface of the moon, when it is eclipſed, and we wiſhed to calculate the manner in which this eclipſe would appear in this point, determined from the moon, we ſhould equally fall into the difficulty of parallax; for the eclipſe, which would then be an eclipſe of the ſun, taking place ſucceſſively and differently at the different points of the lunar ſurface, the parallax muſt be calculated for that part of the moon where the ſpectator is ſituated.

There is a great variety of methods that have been deviſed by different aſtronomers for calculating eclipſes of the ſun; but as they all, more or leſs, involve the principle of projection, as a preparatory ſtep, it will be neceſſary to deſcribe the method by which this projection is uſually effected. One of the beſt projections deviſed for this purpoſe, was firſt given by our great aſtronomer, Flamſtead, and is thus deſcribed by Mr. Vince:

On the Projection for the Conſtruction of Solar Eclipſes.

As the ecliptic is inclined to the equator, and cuts it in two oppoſite points, the ſun keeps continually approaching to one pole, and receding from the other by turns, and therefore to a ſpectator at the ſun, the poles muſt appear and diſappear by turns. When the ſun is on the north ſide of the equator, the north pole muſt appear; and when on the ſouth ſide, the ſouth pole. When the ſun is in the equator, the plane of illumination is perpendicular to the equator, and, conſequently, the poles will lie in the circumference of the circle of illumination; when the ſun comes to the tropic, the pole will appear in the middle of its path over the circle of illumination; and when the ſun comes to the next equinox, the pole will appear on the other ſide of the circle of illumination. When the ſun gets on the other ſide of the equator, this pole will diſappear, and the other will appear in like manner. Hence, to a ſpectator at the ſun, the apparent motion of the pole P (*fig.* 82.) is the ſame as if the axis P p of the earth had an annual conical motion P r Q s, $p n q m$, about an axis G O F, perpendicular to the ecliptic E O C, the angle P O G being equal to the greateſt declination of the ſun. As theſe circles, P r Q s, $p n q m$, are parallel to the ecliptic, their planes will paſs through the ſun, and therefore to a ſpectator at the ſun, the apparent motion of the poles will be in the ſtraight lines P Q, $p q$; and as P moves as faſt in the circle P r Q s as the ſun does in the ecliptic, if P be the place of the pole at the equinox, and we take the arc P v equal to the ſun's diſtance from that equinox, and draw $v o$ perpendicular to P Q, o will be the apparent place of the pole at that time. It is manifeſt that P v may be ſet off upon any circle deſcribed on P Q. Hence, alſo, the angle which the axis v O w makes with the plane of illumination muſt be equal to the declination of the ſun. As this apparent motion of the pole over the enlightened diſc of the earth is cauſed by the motion of the earth in its orbit, the motion of the pole over the diſc will be in a direction contrary to the diurnal motion of the diſc; if, therefore, P be the poſition of the pole at the vernal equinox, and P r Q be its motion over the diſc of the earth to the next equinox, the diurnal motion of the diſc will be made in the contrary direction.

When the ſun, and conſequently the ſpectator, who is ſuppoſed to be at the ſun, is in the equator, the ſpectator being in the plane of the equator, and, as to ſenſe, in the plane of all the circles parallel to it, they will all appear to be projected upon the circle of illumination into right lines parallel to each other. But when the ſun, and conſequently the ſpectator, is out of the equator, the equator, and all the circles parallel to it, being ſeen obliquely, will appear to be projected into ellipſes upon the plane of illumination, as the eye may be conſidered at an infinite diſtance; and as the eye has the ſame relative ſituation to all theſe circles, the ellipſes muſt be all ſimilar. When the ſun is on the north ſide of the equator, that part of the ellipſe which is the projection of that part of the circle which lies between the north pole and equator on the enlightened hemiſphere will be concave to the pole; but when the ſun is on the other ſide of the equator, that part will be convex. That is, let P (*fig.* 83.) be the north pole on the enlightened hemiſphere, the ſun being on the north ſide of the equator, and $v x y z$, $a m b n$, the ellipſes into which the equator and any parallel to it are projected; then $a m b$ is that part of the ellipſe which the place on this parallel deſcribes in the day, and the other part $b n a$ is that which is deſcribed in the night; and the place is at m at 12 at noon, and at n at 12 at midnight. In this caſe, the other pole p muſt be conſidered as being on the other, or dark ſide of the earth. But if P be ſuppoſed on the dark ſide, and conſequently p on the light ſide, or if the ſun be on the ſouth ſide of the equator, n will be 12 at noon, and m will be 12 at midnight. For if P p (*fig.* 84.) be the axis, L N the plane upon which the circle $a b$ is to be projected, E the ſun on that ſide next to the north pole; then, drawing $E\,a\,m$, $E\,n\,b$, the point a anſwering to noon, the ſun being on the meridian, is projected at m, and the point b, anſwering to midnight, is projected at n; but when the ſun is on the other ſide of $n\,b$, as at e, a is projected to n' and b to m'; therefore n' repreſents noon and m' midnight. On account of the great diſtance of the ſun, compared with the radius of the earth, the lines $E\,a$, $E\,b$, and $e\,a$, $e\,b$ may be conſidered as parallel, and therefore the circle $a\,b$ is orthographically projected upon the plane $L\,N$ into an ellipſe, whoſe minor axis is $m\,n$, or $m'\,n'$.

The next thing to be done is to determine the magnitude of the ellipſe into which the circle ab is projected, and its poſition upon the plane of illumination. Let $P\,p$ (*fig.* 85.) repreſent the axis of the earth, $a\,s\,b\,t$ a circle of latitude to any place, $L\,P\,N\,p$ the meridian paſſing through the ſun, and $L\,O\,N$ the plane upon which the projection is made; then the angle $L\,O\,P$ is equal to the ſun's declination; draw $a\,m$, $b\,n$, $v\,r$, perpendicular to $L\,O$, and $m\,n$ is the minor axis of the ellipſe; let $v\,s$ be that radius of the circle $a\,b$ which is parallel to the plane of projection, and it will be projected into a line equal to itſelf, and conſequently it will be the major axis: hence $2\,v\,s$, or $2\,v\,a$, or 2 coſ. lat. is the major axis of the ellipſe; but $m\,n$ (the projection of $a\,b$ upon $L\,N$) : $a\,b$ :: ſin. $m\,a\,b$, or $P\,O\,L$ the dec. : radius; that is, the axis major : axis minor :: rad. : ſin. declination. And to find the diſtance $O\,r$ from the centre of projection to the centre of the ellipſe, we have, rad. $= 1$: coſ. $v\,O\,r$ the dec. :: $v\,O : O\,r = v\,O \times$ coſ. dec. $=$ ſin. lat. $\times$ coſ. dec. But the radius of the projection is the horizontal parallax of the moon, diminiſhed by the horizontal parallax of the ſun; the radius, therefore, thus expreſſed, being multiplied by the quantities, whoſe values are expreſſed when radius is ſuppoſed to be unity, give the value in terms of that radius; hence, if hor. par. ☽ — hor. par. ⊙ $= h$, then $h \times$ coſ. lat. $=$ the ſemi-axis major of the ellipſe; $h \times$ coſ. lat. $\times$ ſin. dec. $=$ the ſemi-axis minor; and $O\,r = h \times$ ſin. lat. $\times$ coſ. dec. Thus we have gotten the dimenſions and poſition of the ellipſe in terms of the radius of projection. Hence we have the following conſtruction for the apparent ellipſe deſcribed by any place on the earth's ſurface to a ſpectator at the ſun.

Let $G\,C\,F\,E$ (*fig.* 86.) be that half of the earth which is illuminated, $E\,C$ the plane of the ecliptic, $G\,O\,F$ perpendicular to it; take $G\,Q = G\,V$ equal to the ſun's greateſt declination, join $Q\,V$, and on it deſcribe the ſemi-circle $V\,K\,Q$, and take $V\,h$ equal to the ſun's diſtance from the vernal equinox correſponding to the pole at V, and draw $h\,P$ perpendicular to $V\,Q$, and P is the place of the pole, which we will ſuppoſe to be on the enlightened diſc of the earth. Put $c =$ coſ. $V\,h$, $n =$ ſin. $V\,G$, $m =$ its coſine, to radius unity; then

$$\begin{array}{l} P\,c : c\,V :: c : 1 \\ c\,V : O\,G :: n : 1 \\ \hline \therefore P\,c : O\,G\ (= h) :: c \times n : 1; \end{array}$$

hence $P\,c = h \times c \times n$.

Alſo, $h \times m = O\,c$; hence $h \times m : h \times c \times n$ :: rad. : tan. $P\,O\,c = \dfrac{c \times n}{m} = c \times \tan.\ 23^{\circ}\ 28' = 0.4341208 \times c$. Draw $P\,O\,p$, and upon $O\,P$ take $O\,r = h \times$ ſin. lat. $\times$ coſ. dec.; draw $b\,r\,a$ perpendicular to $O\,P$, and take $r\,a = r\,b = h \times$ coſ. lat. and $r\,m = r\,n = h \times$ coſ. lat $\times$ ſin. dec. and deſcribe an ellipſe $a\,m\,b\,n$, and it will repreſent the apparent diurnal path of the place to a ſpectator at the ſun, for the given declination of the ſun. If x and z be the points where the ellipſe touches the circle $G\,C\,F\,E$, the part $x\,a\,m\,b\,z$ will be on the illuminated part of the earth, and therefore viſible to a ſpectator at the ſun, and the part $z\,n\,x$ on the dark part, P being the north pole. and the ſun's declination north; but if the declination be ſouth, $x\,n\,z$ will be the part on the illuminated ſide of the earth, and $z\,b\,m\,a\,x$ on the dark part. Let the declination be north, and a the weſt ſide of the diſc; then, to find where the given place on the earth's ſurface, is at any time, we may obſerve, that the place deſcribing the circle which is projected into the ellipſe $a\,m\,b\,n$ moves uniformly in that circle, from the uniform motion of the earth about its axis; let, therefore, $a\,y\,b$ be a circle; then, if every ordinate de diminiſhed in the ratio of $y\,r : m\,r$, the circle will be projected into the ellipſe $a\,m\,b$; this ſemi-circle may, therefore, repreſent the half of the diurnal motion of the given place, ſo far as it is neceſſary to obtain the correſponding poſitions of the place in the ellipſe. For, divide the ſemi-circle $a\,y\,b$ into 12 equal parts from a, at 7, 8, 9, 10, 11, 12, 1, 2, 3, 4, 5, 6, repreſenting the poſitions of the given place from a at ſix o'clock in the morning, to b at ſix in the evening, and theſe figures will repreſent the poſitions of the given place at the reſpective hours denoted by the figures; and if the dotted lines be drawn perpendicular to $a\,b$, the correſponding points denoted by the ſame figures will repreſent the poſitions of the place in the ellipſe. This ellipſe may be very accurately deſcribed, by diminiſhing each ordinate of the circle perpendicular to $a\,b$ in the ratio of $y\,r$ to $m\,r$, by taking a proper number of ordinates, and then deſcribing a curve through all the points; and if theſe lines be continued to the other half of the ellipſe, the hours, as there marked, will correſpond to the poſitions of the given place. If each diviſion of the ſemi-circle be divided into 10 equal parts, and ordinates be drawn to $a\,b$, the ellipſe will be divided into every ſix minutes; and if the ſcale be large enough, and theſe diviſions on the ellipſe be ſubdivided into ſix equal parts, the ellipſe will be divided into minutes, for there will be no occaſion to uſe the circle for this laſt ſubdiviſion. Thus, we can always find the apparent poſition of any place on the earth's ſurface to a ſpectator at the ſun.

Draw $11\,w$ and $11\,d$ perpendicular to $r\,y$; then $11\,w = 11\,d$ is the ſine of 15° to the radius $r\,a$; and, by the principles of projection, $y\,r : m\,r :: y\,d : m\,w$, therefore, as $y\,d$ is the verſed ſine of 15° to the radius $y\,r$, $m\,w$ muſt be the verſed ſine of 15° to the radius $m\,r$; hence, if we take the ſine and verſed ſine of 15° to radius unity, and multiply them into $r\,a$ and $r\,m$ reſpectively, they will give the values of $11\,w$ and $m\,w$; and if $r\,m$ be multiplied into the coſine of 15°, it gives $r\,w$. The ſame for any other angle.

It has been proved above, that $O\,r = h \times$ ſin. lat. $\times$ coſ. dec. and $r\,a = h \times$ coſ. lat.; hence, $O\,r : r\,a$ :: ſin. lat. $\times$ coſ. dec. : coſ. lat.; conſequently, $O\,r = r\,a \times \dfrac{\text{ſin. lat.} \times \text{coſ. dec.}}{\text{coſ. lat.}}$ $= r\,a \times$ tan. lat. $\times$ coſ. dec.; therefore, if $r\,a$ and coſ. dec. be conſtant, $O\,r$ varies as tan. lat. Alſo, the radius of projection muſt vary inverſely as the coſine of the latitude.

Having determined the ſituation of the ellipſe for any one latitude, in reſpect to the centre of projection, as the ellipſes for all latitudes are ſimilar, if the declination be given, we may make uſe of the ſame ellipſe for all latitudes, only by altering $O\,r$ in a proper ratio; for, if $r\,a$ and the declination remain conſtant, $r\,O$ varies as the tangent of latitude. Hence, take $r\,O : r\,O'$ as the tangent of the latitude for which the projection was made : tangent of any other latitude, and O' will be the centre of projection, whoſe radius is alſo known; and $a\,m\,b\,n$ is the ellipſe for that latitude.

Let *e* be any poſition of the given place, and join *e* O; then the angle under which E O appears at the ſun is the ſun's horizontal parallax; alſo the angle under which *e* O appears at the ſun muſt be the parallax in altitude at the point *e*, for the ſun being vertical to O, the arc correſponding to *e* O is the zenith diſtance of the ſun at the given place, and *e* O is the ſine of that arc from the nature of the projection; but the hor. parallax : parallax at any altitude : : rad. : ſine of the zenith diſtance : : O E : O *e*; hence if O E repreſent the horizontal parallax, O *e* will repreſent the parallax in altitude at *e*. Alſo as *e* repreſents the zenith of the given place, *e* O repreſents the vertical circle paſſing through the ſun. The uſe of this projection is to conſtruct the phaſes and times of a ſolar eclipſe, as we ſhall now proceed to explain.

Let S (*fig* 87.) be the centre of the ſun, *xw* the enlightened hemiſphere of the earth, which we muſt conceive to be perpendicular to S C; draw S D, S V, tangents to two oppoſite points of the earth, and let *a m b n* be the apparent ellipſe deſcribed by any point *m* on the earth's ſurface; let O C be the diſtance of the moon from the earth, and *v d*. *a′m′b′n′* be the projection of V D, *a m b n* upon a plane at the moon perpendicular to S O, to an eye at S, and *a′m′b′n′* will be the apparent motion of the centre of the ſun at S to the ſpectator deſcribing *a m b n*. The curve *a′m′b′n′* may be conſidered as an ellipſe; for the angle D S C being only $8\frac{3}{4}''$, D S, C S may be reckoned as parallel, and therefore the projection of D V upon a plane parallel to it may be conſidered as an orthographic projection, and conſequently the two figures may in all reſpects be conſidered as ſimilar. Let L M be the orbit of the moon; then if we know at any time the point of the ellipſe *a m b n* where the ſpectator is, we know the correſponding point where the centre of the ſun is in the ellipſe *a′m′b′n′*; if therefore we determine at the ſame time the point where the moon is in its orbit L M, we ſhall know the apparent ſituation of the moon in reſpect to the ſun. Hence if we find two points, one in the ellipſe *a′m′b′n′* where the centre of the ſun is, and another in L M where the centre of the moon is at the ſame time, and about theſe centres, with radii equal to the apparent ſemi-diameters of the ſun and moon, we deſcribe two circles, they will repreſent the apparent ſituations of the two diſcs. If that of the moon fall upon the ſun, it ſhews how much the ſun is eclipſed at that inſtant. Now the angle $O V v = C O V - O S V$, that is, the radius of projection is equal to the difference of the horizontal parallaxes of the moon and ſun. The projection O *e′* of C *e* is the parallax in altitude of the moon from the ſun, ſuppoſing the moon to be at the ſame altitude as the ſun; for the radius O *v* repreſents the difference of the horizontal parallaxes of the ſun and moon, or the horizontal parallax of the moon from the ſun; and as the parallax of each varies as the ſine of the apparent zenith diſtance; the diſtance, the difference of the parallaxes muſt vary as the ſine of their common apparent zenith diſtance; hence O *v* : O *e′* : : difference of the horizontal parallaxes : difference of the parallaxes at their common apparent altitude; therefore, if O *v* repreſent the third term, O *e′* will repreſent the fourth. In an eclipſe of the ſun, therefore, this will be nearly true, but not accurately ſo, except when the ſun and moon are at the ſame altitude. The place of the pole of the earth is here ſuppoſed to be fixed during the time of the eclipſe, and conſequently the earth is ſuppoſed to be immoveable for that time; the ſun's declination is alſo ſuppoſed to be conſtant for the ſame time; but as theſe circumſtances do not take place, the projected path of the ſpectator will not be accurately an ellipſe. M. de la Caille obſerves, that in this projection, all the errors ariſing from the finite diſtances of the ſun and moon are ſuppoſed to be compenſated, by making the ſemi-diameter of the projection equal to the difference of their horizontal parallaxes; whereas only a part of the lines ſhould be diminiſhed in that ratio. The ſun alſo not being at an infinite diſtance, the projection will not be an accurate ellipſe. The ſpheroidical figure of the earth is alſo here not conſidered. All theſe circumſtances tend to render the method of determining the phaſes of an eclipſe by this conſtruction ſubject to a certain degree of inaccuracy; but if the conſtruction be made upon a large ſcale, it will be ſufficiently accurate, when we only want to predict an eclipſe. If S be a fixed ſtar, the ſame conſtruction will give the time of its occultation by the moon. In this caſe, as the fixed ſtar has no parallax, the radius of projection is equal to the horizontal parallax of the moon.

To calculate an Eclipſe of the Sun for any particular Place:

Having determined that there will be an eclipſe ſomewhere upon the earth, compute, by the aſtronomical tables, the true longitudes of the ſun and moon, and the moon's true latitude, at the time of mean conjunction; find alſo the horary motions of the ſun and moon in longitude, and the moon's horary motion in latitude; and compute the time of the ecliptic conjunction of the ſun and moon, in the ſame manner as the time of the ecliptic oppoſition was computed. At the time of the ecliptic conjunction, compute the ſun's and moon's longitude, and the moon's latitude; find alſo the equatorial horizontal parallax of the moon from the tables of the moon's motion, and reduce it to the horizontal parallax for the given latitude, from which ſubtract the ſun's horizontal parallax, and you get the horizontal parallax of the moon from the ſun; reduce alſo the apparent latitude of the place on the ſpheroid to the latitude on a ſphere.

To this reduced latitude of the place, and the correſponding horizontal parallax of the moon from the ſun, (which we here uſe inſtead of the horizontal parallax of the moon, as we want to find what effect the parallax has in altering their apparent relative ſituations,) at the time of the ecliptic conjunction, compute the moon's parallax in latitude and longitude from the ſun; the parallax in latitude applied to the true latitude gives the apparent latitude (L) of the moon from the ſun; and the parallax in longitude ſhews the apparent difference (D) of the longitudes of the ſun and moon.

Let S be the ſun, (*fig.* 88.) E C the ecliptic; take S M = D, draw M N perpendicular to M S, and take it = L, then N is the apparent place of the moon, and $S N = \sqrt{D^2 + L^2}$ is the apparent diſtance of the moon from the ſun.

If the moon be to the eaſt of the nonageſimal degree, the parallax increaſes the longitude; if to the weſt, it diminiſhes it, hence if the true longitudes of the ſun and moon be equal, in the former caſe the apparent place will lie from S towards E, and in the latter towards C. To ſome time, as an hour, after the true conjunction if the apparent place be towards C, or if the moon be to the weſt of the nonageſimal degree; or before the true conjunction if the apparent place be towards E, or if the moon be to the eaſt of the nonageſimal degree, find the ſun's and moon's true longitude, and the moon's true latitude, from their horary motions; and at the ſame time compute the moon's parallax in latitude and longitude from the ſun; apply the parallax in latitude to the true latitude, and it gives the apparent latitude (*l*) of the moon from the ſun: take the difference of the ſun's and moon's true longitude, and apply the parallax in longitude, and it gives the apparent diſtance (*d*) of the moon from the ſun in longitude. From S ſet off S P = *d*, and to E C erect the perpendicular P Q equal to *l*, and Q is the apparent place of the moon at one hour from the true conjunction; and $S Q = \sqrt{d^2 + l^2}$ is the apparent diſtance of the moon from the ſun; draw the ſtraight line NQ, and it will repreſent the relative apparent path of the moon, conſidered as a ſtraight line, in general it being very nearly ſo; its value alſo repreſents the relative horary motion of the moon in the apparent orbit, the relative horary motion in longitude being MP.

The difference between the moon's apparent diſtance in longitude from the ſun at the time of the true ecliptic conjunction, and at the interval of an hour, gives the apparent horary motion (r) in longitude of the moon from the ſun; the difference (D) between the true longitude at the ecliptic conjunction, and the moon's apparent longitude is the apparent diſtance of the moon from the ſun in longitude at the true time of the ecliptic conjunction; hence $r : D :: 1$ hour : the time from the true to the apparent conjunction, conſequently we know the time of the apparent conjunction. To find whether this time is accurate, we may compute (from the horary motions of the ſun and moon) their true longitudes, and the moon's parallax in longitude from the ſun, and apply it to the true longitude and it gives the apparent longitude, and if this be the ſame as the ſun's longitude, the time of the apparent conjunction is truly found; if they be not the ſame, find from thence the true time, as before. To the true time of the apparent conjunction, find the moon's true latitude from its horary motion, and compute the parallax in latitude, and you get the apparent latitude at the time of the apparent conjunction. Draw SA perpendicular to CE and equal to this apparent latitude; then the point A will probably not fall in NQ; firſt let it fall in QN, to which draw SB perpendicular, and NR parallel to PM. Then knowing NR (= PM), and QR (= QP ~ MN), we have

$$NR : RQ :: \text{rad.} : \text{tan. } QNR, \text{ or } ASB$$
$$\text{Sin. } QNR : \text{rad.} :: QR : QN$$

The time of deſcribing NQ in the apparent orbit being equal to the time from M to P in longitude, NQ is the horary motion in the apparent orbit.

$$\text{Rad.} : \text{ſin. } ASB :: AS : AB.$$
$$\text{Rad.} : \text{coſ. } ASB :: AS : SB.$$

At the apparent conjunction the moon appears at A, which time is known; when the moon appears at B, it is at its neareſt diſtance from the ſun, and conſequently the time is that of the greateſt obſcuration, (uſually called the time of the middle,) provided there is an eclipſe, which will always be the caſe when SB is leſs than the ſum of the apparent ſemi-diameters of the ſun and moon. If therefore it appears that there will be an eclipſe, we proceed thus to find its quantity, and the beginning and end. As we may conſider the motion to be uniform, QN : AB :: the time of deſcribing NQ : the time of deſcribing AB, which added to or ſubtracted from the time at A, (according as the apparent latitude is decreaſing or increaſing,) gives the time of the greateſt obſcuration. Or inſtead of taking QN, and the time of deſcribing it, we may take An and the correſponding time, which will be more accurate.

From the ſum of the apparent ſemi-diameters of the ſun and moon ſubtract BS, and the remainder ſhews how much of the ſun is covered by the moon, or the parts deficient; hence, ſemid. ⊙ : parts deficient :: 6 digits : the digits eclipſed. If SB be leſs than the *difference* of the ſemi-diameters of the ſun and moon, and the moon's ſemi-diameter be the *greater*, the eclipſe will be *total;* but if it be the *leſs*, the eclipſe will be *annular*, the ſun appearing all round the moon; if B and S coincide, the eclipſe will be *central.*

Let A fall out of QN; and to increaſe the accuracy, near to the apparent conjunction, that is, within 10 or 15 minutes, calculate the apparent longitude mS of the moon from the ſun, and the apparent latitude mn; draw nr parallel to Sm; and in the triangle Anr, find the angle Anr which is equal to ASB, and compute SB, AB as before. But except in caſes where very great accuracy is required, this is unneceſſary. If NQ were a perfect ſtraight line, the firſt operation would give the correct values of AB, BS. Kepler, in an eclipſe in 1598, found a curvature of more than 3′ in three hours, becauſe the moon was very near the nonageſimal. In the eclipſe in 1764, M. de la Lande found a curvature of 26″, but he does not ſay in what time. It is owing to this circumſtance, that is, the curvature of NQ, that it is neceſſary to find another point near to A, in order to determine accurately the values of AB, SB. Having determined the value of SB, and the time of the greateſt obſcuration, we thus find the beginning and end.

Produce, if neceſſary, QN, and take SV, SW equal to the ſum of the apparent ſemi-diameters of the ſun and moon, at the beginning and end reſpectively; then $BV = \sqrt{SV^2 - SB^2}$ (B being now ſuppoſed in QN), and $BW = \sqrt{SW^2 - SB^2}$; then to find the times of deſcribing theſe ſpaces, ſay, as the hourly motion of the moon in the apparent orbit, or NQ, : BV :: 1 hour : the time of deſcribing VB; and NQ : BW :: 1 hour : the time of deſcribing BW, which times reſpectively ſubtracted from and added to the time of the greateſt obſcuration, give nearly the times of the beginning and end. But if accuracy be required, this method will not do; for it ſuppoſes VW to be a ſtraight line, which ſuppoſition will cauſe errors, too conſiderable in general to be neglected, and will never do where great accuracy is required. It may, however, always ſerve as a rule to aſſume the time of the beginning and end. Hence it follows, that the time of the greateſt obſcuration at B, is not neceſſarily equi-diſtant from the beginning and end.

If the eclipſe be total, take Sv, Sw equal to the difference of the ſemi-diameters of the ſun and moon, and then $Bv = Bw = \sqrt{Sv^2 - SB^2}$, from whence we may find the times of deſcribing Bv, Bw, as before, which we may conſider as equal, and which applied to the time of the greateſt obſcuration at B, give the time of the beginning and end of the total darkneſs.

To find more accurately the time of the beginning and end of the eclipſe, we muſt proceed thus (*fig.* 89.) At the eſtimated time of the beginning, find, from the horary motions, and the computed parallaxes, the apparent latitude MN of the moon, and its apparent longitude MS from the ſun, and we have $SN = \sqrt{SM^2 + MN^2}$, and if this be equal to the apparent ſemid. ☾ + ſemid. ⊙ (which ſum call S) the eſtimated time is the time of the beginning; but if SN be not equal to S, aſſume (as the error directs) another time at a ſmall interval from it, *before*, if SN be *leſs* than S, but *after*, if it be *greater;* to that time compute again the moon's apparent latitude mn, and apparent longitude Sm from the ſun, and find $Sn = \sqrt{Sm^2 + mn^2}$; and if this be not equal to S, proceed thus; as the difference of Sn and SN : the difference of Sn and SL (= S) :: the above aſſumed interval of time, or time of the motion through Nn, : the time through nL, which added to or ſubtracted from the time at n, according as Sn is greater or leſs than SL, gives the time of the beginning. The reaſon of this operation is, that as Nn, nL are very ſmall, they will be very nearly proportional to the differences of SN, Sn, and Sn, SL. But as the variation of the apparent diſtance of the ſun from the moon is not exactly in proportion to the variation of the differences of the apparent longitudes and latitudes, in caſes where the utmoſt accuracy is required, the time of the beginning thus found (if it appear to be not correct) may be corrected, by aſſuming it for a third time, and proceeding as before. This correction, however, will never be neceſſary, except where extreme accuracy is required in order to deduce ſome conſequences from it. But the time thus found is to be conſidered as accurate, only ſo far as the tables of the ſun and moon can be depended upon for their accuracy; and the beſt lunar tables are ſubject to an error of 30″ in longitude, which, in this eclipſe, would make an error of about a minute an half in the time of the beginning and end. Hence accurate obſervations of an eclipſe, compared with the computed time, furniſhes the means of correcting the lunar tables, as will be afterwards explained. In the ſame manner, the end of the eclipſe may be computed.

Example.--To compute the Times of the Solar Eclipſe on April 3, 1791; *for the Royal Obſervatory at Greenwich.*

The time of the mean conjunction is April 3, $2^h\ 58'\ 15''$ mean time, at which time we find

Mean long. of the ſun	0^s	11°	$51'$	$16''$
Long. of the the moon's deſc. node	0	22	14	44
Mean long. of ☉ from ☾'s node	0	10	23	28

Hence there muſt be an eclipſe ſomewhere upon the earth.

To the mean time of the new moon, compute the ſun's and moon's true longitudes, and they will be found to be $0^s\ 13^\circ\ 47'\ 43''$, and $0^s\ 14^\circ\ 49'\ 24''$; compute alſo the moon's true latitude, and it will be found to be 38′ 49″ N. deſcending. At the ſame time, the ſun's horary motion is found to be 2′ 28″, the moon's horary motion in longitude is 30′ 12″, and in latitude 2′ 46″ decreaſing; hence the moon's horary motion in longitude from the ſun is 27′ 44″.

By proceeding as before directed, we find the mean time of the ecliptic conjunction of the ſun and moon to be $3^d\ 0^h\ 44'\ 48''$, from which ſubtract 3′ 18″ the equation of time, and it gives the apparent time $3^d\ 0^h\ 41'\ 30''$; at which time, the ſun's and moon's longitude in the ecliptic is $0^s\ 13^\circ\ 42'\ 14''$; and the moon's true latitude is 44′ 59″ N. deſcending. The horizontal parallax of the moon is 54′ 46″, and of the ſun, 9″; hence the horizontal parallax of the moon from the ſun is 54′ 37″; therefore the moon's parallax in longitude from the ſun is − 20′ 56″, and its parallax in latitude from the ſun is − 33′ 44″; hence − 20′ 56″ is the apparent diſtance of the moon from the ſun in longitude; alſo the apparent latitude from the ſun is 11′ 15″ north.

As the moon is to the weſt of the nonageſimal degree, aſſume 1 hour after, or $3^d\ 1^h\ 41'\ 30''$, at which time (from the horary motions of the ſun and moon) the ſun's true longitude is found to be $0^s\ 13^\circ\ 44'\ 42''$, the moon's true longitude on the ecliptic $0^s\ 14^\circ\ 12'\ 26''$, and true latitude 42′ 13″ north deſcending. The moon's parallax in latitude is − 30′ 41″; hence the moon's apparent latitude is 11′ 32″; alſo its parallax in longitude from the ſun is − 28′ 50″; but the moon's true longitude exceeds the ſun's by $0^\circ\ 27'\ 44''$; therefore the apparent diſtance of the moon from the ſun in longitude is − 1′ 6″. Hence,

Moon's apparent diſt. in long. at $0^h 41' 30'' = -20' 56''$
at 1 41 30 = − 1 6

Apparent hor. mot. ☾ from ☉ in long. 19 50 = MP.

Hence 19′ 50″ : 20′ 56″ :: 1 hour : $1^h\ 3'\ 20''$, which added to the time of the true conjunction $0^h\ 41'\ 30''$, gives $1^h\ 44'\ 50''$, the time of the apparent conjunction. Alſo the apparent horary motion in latitude is 17″ = RQ; hence QN is very nearly equal to MP.

At this time (from the horary motions) the ſun's true longitude is found to be $0^s\ 13^\circ\ 44'\ 50''$, the moon's $0^s\ 14^\circ\ 14'\ 7''$, and the moon's true latitude 42′ 4″; hence the moon's true longitude is greater than the ſun's by 29′ 17″. The moon's parallax in latitude from the ſun is − 30′ 32″, and in longitude − 29′ 15″; hence the moon's apparent latitude is 11′ 32″ north; alſo the apparent longitude from the ſun is 29′ 17″ − 29′ 15″ = 2″, which is what the moon's apparent longitude exceeds the ſun's true longitude.

This difference ſhews the apparent conjunction, found above, to be very nearly true; and to get it accurate, ſay, 19′ 50″ : 2″ :: 1 hour : 6″, which (as the moon's apparent longitude is the greater) ſubtracted from $1^h\ 44'\ 50''$ gives $1^h\ 44'\ 44''$, the true time of the apparent conjunction, at which time the moon's apparent longitude is $0^s\ 13^\circ\ 44'\ 50''$, the ſame as the ſun's true longitude, that not having ſenſibly varied in 6″ of time. The apparent latitude is 11′ 32″.25. Now at $1^h\ 41'\ 30''$ the moon's apparent diſtance in longitude from the ſun has been ſhewn to be 1′ 6″; and at $1^h\ 44'\ 44''$ the longitude of the ſun, and the moon's apparent longitude are equal; therefore in 3′ 14″ the apparent motion of the moon from the ſun was 1′ 6″ = 66″; let this = S*m*, or *nr*; alſo at $1^h\ 41'\ 30''$, the apparent latitude *mn* = 11′ 32″, and at $1^h\ 44'\ 44''$ it was 11′ 32″.25 = SA; therefore A*r* = 0″.25. Hence,

$$66'' : 0''.25 :: \text{rad.} : \text{tan. } Anr, \text{ or } SAB = 13'\ 1''.$$

As the angle A*nr* is ſo very ſmall, we may take A*n* = *rn* = 66″ without any ſenſible error; and for the ſame reaſon SB may be taken = SA = 11′ 32″.

$$\text{Rad.} : \text{ſin. } 13'\ 1'' :: 11'\ 32'' : AB = 2''.6$$

Hence A*n* = 66″ : AB = 2″.6 :: 3′ 14″ : 8″ the time through BA, which taken from $1^h\ 44'\ 44''$ gives $1^h\ 44'\ 36''$ the time of the greateſt obſcuration at B.

The moon's horizontal ſemi-diameter is 14′ 56″, and its altitude at the time of the greateſt obſcuration (determined by a globe, which is ſufficiently near for this purpoſe) is about 38°; hence the augmentation of the diameter is 9″, conſequently the apparent ſemi-diameter of the moon is 15′ 5″, which added to 15′ 59″ the ſun's ſemi-diamer, gives 31′ 4″, from which ſubtract SB = 11′ 32″, and the remainder is 19′ 32″ the parts deficient; hence 15′ 59″ : 19′ 31″ :: 6 digits : $7^d\ 19'\ 57''$ the digits eclipſed at the time of the greateſt obſcuration.

To find the time of the beginning, we muſt firſt get the time nearly. The value of SB = 11′ 32″ = 692″; and as the apparent ſemi-diameter of the moon is now 15′ 6″, we have SV = 31′ 5″ = 1865″; hence BV = 1732″. Now as MP is, in this caſe, nearly equal to QN, we may, for the purpoſe we here want it, aſſume the apparent horary motion of the moon from the ſun in the apparent orbit equal to that in longitude, which is 19′ 50″ = 1190″; hence 1190″ : 1732″ :: 1 hour : $1^h\ 27'\ 20''$, which ſubtracted from $1^h\ 44'\ 36''$ (the time at B) gives $0^h\ 17'\ 16''$ the time of the beginning, nearly. Let us therefore aſſume the beginning at $0^h\ 17'$, at which time we find (from the horary motions of the ſun and moon) the ſun's true longitude to be $0^s\ 13^\circ\ 41'\ 15''$, and the moon's $0^s\ 13^\circ\ 29'\ 55''$, whoſe difference is 11′ 20″ their true diſtance in longitude; but the moon's parallax in longitude is − 17′ 45″; hence their apparent diſtance in longitude is 29′ 5″ = 1745″. At the ſame time the moon's true latitude is 46′ 7″, and its parallax in latitude − 35′ 10″; hence the apparent latitude of the moon from the ſun is 10′ 57″; therefore $SN = \sqrt{1745^2 + 657^2} = 1864'' = 31'\ 4''$, which being leſs than 31′ 5″ ſhews that the eclipſe is begun.

Let us next aſſume $0^h\ 16'$; and by proceeding in the ſame manner, we find S*n* = 1883″ = 31′ 23″; therefore the eclipſe is not begun.

Hence $31' 23'' - 31' 4'' = 19'' : 31' 5'' - 31' 4'' = 1'' ::$ 1 minute : $3''$, which ſubtracted from $0^h\ 17'$, gives $0^h\ 16'\ 57''$ for the beginning of the eclipſe.

If to $1^h\ 44'\ 36''$ we add $1^h\ 27'\ 20''$, we have $3^h\ 11'\ 56''$; we will therefore aſſume $3^h\ 12'$ for the end; and by proceeding as before, we find the apparent diſtance of the moon from the ſun in longitude to be $30'\ 37''$, and the moon's apparent latitude $10'\ 48''$; hence the moon's apparent diſtance from the ſun is $\sqrt{1837^2 + 648^2} = 1948'' = 32'\ 28''$; but the ſum of the apparent ſemi-diameters of the ſun and moon is now $31'\ 2''$; conſequently the eclipſe is ended.

Let us next aſſume the time $3^h\ 6'$, and the apparent diſtance of the moon from the ſun in longitude is $28'\ 28''$, and in latitude $10'\ 55''$; hence the moon's apparent diſtance from the ſun is $\sqrt{1708^2 + 655^2} = 1829'' = 30'\ 29''$, therefore the eclipſe is not ended.

Hence $32'\ 28'' - 30'\ 29'' = 1'\ 59'' : 31'\ 2'' - 30'\ 29'' = 33'' :: 6' : 1'\ 39''$, which added to $3^h\ 6'$, gives $3^h\ 7'\ 39''$ for the end.

Hence at the Royal Obſervatory at Greenwich, the tables give the time of the eclipſe on April 3, 1791,

Beginning	-	$0^h\ 16'\ 57''$	apparent time.
Greateſt obſcuration		1 44 36	
End	-	3 7 39	
Digits eclipſed	-	$7^d\ 19'\ 57''$	

If it be required to compute the eclipſe for any other place, inſtead of the latitude of Greenwich, uſe the latitude of the place; and reduce the apparent time at Greenwich to the apparent time at the place, according to the difference of the meridians.

To find what point of the ſun's limb will firſt be touched by the moon, let P (*fig.* 90.) be the pole of the ecliptic E S, Z the zenith, S, M, the centres of the ſun and moon when their limbs are in contact at *a*, and draw M D perpendicular to E S. P Z is the altitude of the nonageſimal degree, and S P Z is the ſun's diſtance from that point, both which are found in the computation of the parallax; alſo M D is the apparent latitude of the moon; hence,

Rad. : tan. P Z :: ſin. S P Z : tan. P S Z
Tan. S M : rad. :: tan. D S : coſ. D S M

If L be the longitude of the nonageſimal degree, then $ZSD = 90^\circ - PSZ$; when the ſun's longitude is between L and $L + 180^\circ$; otherwiſe, $ZSD = 90^\circ + PSZ$; and $ZSD \pm MSD$ (according as the moon's viſible latitude is ſouth or north) gives Z S M, the diſtance of the point of the limb of the ſun firſt touched by the moon from the higheſt point of the ſun's diſc.

In this eclipſe, $PZ = 50^\circ\ 7'$, and $SPZ = 25^\circ\ 16'$; hence $PSZ = 27^\circ\ 3'$, which, in this caſe, added to 90°, gives $117^\circ\ 3' = ZSD$; alſo $DSM = 20^\circ\ 42'$, which, (as the moon's apparent latitude is north) ſubtracted from $117^\circ\ 3'$, gives $ZSM = 96^\circ\ 21'$, the moon's diſtance from the zenith of the ſun at the beginning of the eclipſe. In like manner, the diſtance at the middle and end of the eclipſe may be found, and thence the apparent path of the moon over the ſun's diſc in reſpect to the horizon may be deſcribed.

In the computation of this eclipſe, the moon's true latitude and longitude was at firſt computed from the tables, and afterwards determined from the horary motions; but as the horary motions may be ſubject to a ſmall variation in the duration of an eclipſe, in caſes where the utmoſt accuracy is required, the true latitude and longitude ſhould be computed every time from the tables; in ſuch caſes, the decimals of the ſeconds ſhould alſo be taken into conſideration, which in this example were omitted. When we want only to predict an eclipſe, the method here practiſed will always be ſufficiently accurate, the error being always very ſmall, compared with the error to which the tables are ſubject, which may, at its maximum, be $30''$ in longitude. We have followed the ſame method in computing the occultation of a fixed ſtar by the moon; that computation, therefore, may, if neceſſary, be rendered more correct in the ſame manner.

To conſtruct a Solar Eclipſe by the Principles of Projection.

According to this projection, the apparent ellipſe deſcribed by any point on the earth's ſurface, to any eye at the centre of the ſun, is projected upon a plane at the moon perpendicular to a line joining the earth and ſun; and the point of the ellipſe of projection, correſponding to any point of the other ellipſe where the ſpectator is, is the point where the centre of the ſun appears to the ſpectator. The centre of projection is in the ecliptic. If the lunar orbit be properly laid down and divided, ſhewing where the centre of the moon is at any time, we ſhall then have the relative ſituation of the centres of the ſun and moon at any time ſeen from the given place of the ſpectator. From theſe principles of projection, we thus conſtruct the ſolar eclipſe which we have here calculated; aſſuming ſuch elements as are neceſſary, from that calculation.

Take a radius O E (*fig.* 91.) equal to $54'\ 37''$, the difference of the ſun's and moon's horizontal parallaxes, and divide it into minutes, and deſcribe the ſemi-circle E G C repreſenting half the cricle of projection, E O C repreſenting the ecliptic, to which draw O G perpendicular. Find P, the projected north pole; from the ſcale O E, take $Or = 54'\ 37'' \times$ ſin. lat. × coſ. dec. and in a line perpendicular to Or ſet off both ways $r6 = h \times$ coſ. lat. and $rm = rn = h \times$ coſ. lat. × ſin. dec. and deſcribe the ellipſe $m6n6$, and divide it into hours; and then ſubdivide thoſe hours which you will want to make uſe of, as far as you conveniently can for the ſize of the figure. From the ſcale take Ov equal $44'\ 59''$, the moon's true latitude north deſcending at the time of the ecliptic conjunction, and draw LvM, making an angle with Ov equal to $84^\circ\ 18'$, the complement of the angle which the relative orbit makes with the ecliptic, on the *left* ſide, if the latitude be north or ſouth *decreaſing*, and on the *right*, if *increaſing;* in this example it is on the left ſide; and LvM will repreſent the moon's relative orbit. Mark upon the moon's orbit, at the point v, $41'\ 30''$, that being the time after 12 o'clock at which the true ecliptic conjunction happens; and with an extent $= 27'\ 52''$, the horary motion of the moon from the ſun in its relative orbit, ſet off the hours each way from v, and ſubdivide them into minutes, or as far as the ſize of the figure will permit. Now to find the time of the middle of the eclipſe, take the compaſs, and find, by trial, what two correſponding times, as at z and x, upon the ellipſe and moon's orbit, are neareſt together, which will give the time of the *greateſt obſcuration,* becauſe the centres of the ſun and moon are then at the leaſt diſtance. To find the time of the beginning, take, with the compaſs, from the ſcale, an extent equal to $31'\ 5''$, the ſum of the ſemi diameters of the ſun and moon, and by trial find two correſponding times, as at s and t, at that diſtance, and it gives the time of the *beginning;* and if you find two correſponding times, as at y and w, at the diſtance $31'\ 2''$, the ſum of the ſemi-diameters at the end, it gives the time of the *end;* or you may omit the variation of the diameter of the moon in the interval. For the beginning muſt be when the centres of the ſun and moon arrive at the diſtance of the ſum of their ſemi-diameters; and the end muſt be when they have receded till they have got to that diſtance. To find the digits eclipſed at the greateſt obſcuration, take eu from the ſcale, and ſay, $ze : eu :: 6$ digits : the digits eclipſed. To find the digits eclipſed at any other time, take, with the compaſs, the interval at that time on the ellipſe and on the moon's orbit, and apply it to the ſcale, and then ſay, $z\,e$: that diſtance :: 6 digits : the digits eclipſed.

If by taking the interval of two correſponding times, it appears that it is always greater than the ſum of the ſemi-diameters of the ſun and moon, it ſhews that there will be no eclipſe at that place.

From this conſtruction, the poſition of the moon in reſpect to the zenith of the ſun's diſc may be found, and thence the apparent path of the moon over the ſun in reſpect to the horizon. For a line drawn from O (*fig.* 92.) to any point of the ellipſe, where the ſpectator is, being vertical, from the principles of the projection, the angles $O\,t\,s$, $O\,z\,x$, $O\,w\,y$, ſhew the angular diſtance about the centre of the ſun from its vertex, to the centre of the moon at the beginning, middle, and end of the eclipſe. Hence, let C be the centre of the ſun $Z\,b\,d\,a$, Z its zenith; and make the angles $Z\,C\,P$, $Z\,C\,Q\,d$, $Z\,C\,R = O\,t\,s$, $O\,z\,x$, $O\,w\,y$ reſpectively; take $C\,P$, $C\,R$ equal to the ſum of the ſemi-diameters of the ſun and moon, $d\,C\,s =$ the digits eclipſed, and $S\,Q = a\,P$, and with the centres P, Q, R, and radii $P\,a = Q\,s = R\,b$ equal to the ſemi-diameter of the moon deſcribe three circles, and they will repreſent the ſituation of the moon at the beginning, middle, and end of the eclipſe, in reſpect to the vertex Z of the ſun, and conſequently in reſpect to the horizon; hence, if we deſcribe a circle through P, Q, R, and with the ſame radius deſcribe $r\,s\,t$ parallel to it, it muſt very nearly repreſent the boundary of the eclipſe, or of the extreme part of the moon's limb as it paſſes over the ſun, in reſpect to the horizon.

The eclipſe may alſo be thus calculated from the projection. Aſſume the time at t of beginning, as determined by the conſtruction; draw $t\,c$ perpendicular to $O\,P$, and join $O\,t$, $O\,s$. The time from t to m being given, convert it into degrees a°; then ſin. $a^\circ \times r\,b = t\,c$, and coſ. $a^\circ \times r\,m = r\,c$, but $O\,r$ is known, hence $O\,c$ is known; therefore, in the right-angled triangle $O\,c\,t$, we know $O\,c$, $c\,t$, to find $c\,O\,t$, and $O\,t$; but $P\,O\,v$ is given, therefore, $c\,O\,t \underset{\sim}{+} P\,O\,v = t\,O\,v$ is known; alſo $O\,v$ and the angle $O\,v\,s$ are known by the conſtruction; and the time from s to v being given, and alſo the moon's relative horary motion in L M, we know $v\,s$; hence, in the triangle $O\,v\,s$, we know $O\,v$, $v\,s$ and the angle $O\,v\,s$ to find $O\,s$, and the angle $v\,O\,s$; hence, we find $t\,O\,s = t\,O\,v \underset{\sim}{+} v\,O\,s$; and laſtly, in the triangle $t\,O\,s$, we know $t\,O$, $O\,s$ and the angle $t\,O\,s$, to find $t\,s$, and if this be equal to the ſum of the ſemi-diameters of the ſun and moon, the aſſumed time is true; if it be not equal to the ſum, aſſume another time for the beginning, and find another value of $t\,s$. In like manner we may find the end. But this method is not ſubject to the ſame accuracy as the method of calculation which we have already given.

Sir I. Newton ſuppoſes that the aberration of rays in the focus of a teleſcope makes the image appear greater than it ought; and hence different teleſcopes will give different meaſures of the ſun's diameter, and conſequently make the eclipſe appear to begin at different times. That teleſcope which gives the diameter the leaſt, is the moſt perfect inſtrument. The excellent tranſit teleſcope at Greenwich makes the diameter of the ſun leſs by 6″ than that given by Mayer in his tables, as Dr. Maſkelyne has found by his obſervations. The diameter of the ſun aſſumed in theſe calculations has, therefore, been taken 6″ leſs than that which Mayer determined. M. du Sejour ſuppoſes that the rays of light coming from the ſun are inflected as they paſs by the moon, which he attributes to the refraction which they ſuffer in paſſing through the moon's atmoſphere; on this account the apparent contact of the limbs will not take place ſo ſoon as it otherwiſe would; this would be the ſame as a diminution of the moon's diameter: which of theſe hypotheſes ought to be admitted, M. du Sejour endeavoured to determine from the obſervations of Mr. Short, on the ſolar eclipſe, April 1, 1764, upon the diſtance of the horns of the moon, but he could deduce nothing ſatisfactory from thence. He ſuppoſed the inflection 3″.291, and the diameter of the moon to be diminiſhed by the ſame quantity, and calculated upon each ſuppoſition a great many diſtances of the horns, and compared them with the obſerved diſtances; but he could not decide between the two hypotheſes. An inflection of 1″.8 and a diminution of 1″.5 of the ſemi-diameter, he found would ſatisfy ſome obſervations, and he ſeemed to think this concluſion moſt likely to be neareſt the truth; but he came at laſt to no determination upon the ſubject. All the requiſite obſervations ſeem not to be capable of being made to that degree of accuracy which is neceſſary to ſettle ſo nice a matter. M. du Sejour, therefore, propoſed the following method to determine whether the rays of light paſſing by the limb of the moon ſuffer any deviation. Take a teleſcope mounted upon a polar axis, with a wire micrometer annexed to it. When two ſtars come into the field of view together, and one of them is to be eclipſed by the moon, open the wires and bring one ſtar upon one of the wires, and the other ſtar upon the other, and thus follow the ſtars until one of them be eclipſed, and at the inſtant before it diſappears, obſerve whether its diſtance from the other ſtar is changed, that is, whether it be off the wire, the other ſtar remaining upon its wire; if this be found to be the caſe, the rays muſt have ſuffered a deviation. (Traité Analytique, p. 420.) We do not find that an obſervation of this kind has been ever made.

To trace out the Path on the Surface of the Earth, where the Eclipſe will be central, or for any Number of Digits.

Let E A C D (*fig.* 93.) be the enlightened hemiſphere of the earth, O the centre of the diſc, or that point to which the ſun is vertical; E O C the plane of the ecliptic, O G perpendicular to it; P the north pole; join P O, and let L M repreſent the path of the centre of the penumbra, conceived to be upon the plane into which the diſc would be orthographically projected; then, from the nature of that projection, the angles at O upon the ſurface will be equal to the angles into which they are projected. Now, the place upon which the centre of the moon is projected, is manifeſtly that point on the earth where the eclipſe is central, becauſe the projection is made by lines drawn to the centre of the ſun. Let Z be the projected centre of the moon at any time, or the real centre of the penumbra, and P B any given meridian. Now, we know $O\,v$ the moon's latitude at the time of conjunction, and the angle $O\,v\,Z$; and as the time, when the centre of the penumbra is at Z, is given, the time through $Z\,v$ is known, and the relative horary motion of the moon being known, $v\,Z$ will be known; hence we can find Z O, and the angle $Z\,O\,v$; find the angle $P\,O\,v$, and we ſhall have the angle P O Z. Now conſider P O and Z O as two circles upon the earth's ſurface, then the angle P O Z between them is equal to the angle P O Z of projection, and therefore known; alſo the arc P O is the complement of the ſun's declination; and to find the arc Z O, we muſt conſider Z O in the projection to be the ſign of the arc projected; hence the arc Z O is that whoſe ſine is to radius as O Z to O A, therefore we know the ſine of the arc Z O, and conſequently we get Z O itſelf; hence, in the ſpherical triangle O P Z, we know P O, O Z, and the angle P O Z, to find P Z the complement of the latitude of the place where the eclipſe is central Find alſo the angle

OPZ; then the time at the meridian PB being known, the angle OPB (the ſun's diſtance from the meridian) is known; hence we know the angle BPZ, the longitude of the point Z from the meridian PB; therefore the latitude and longitude of Z being known, the point Z is determined where the eclipſe was central at the given time. Make this calculation for every quarter or half hour, for all the time the penumbra is deſcribing de, and you will trace out upon the ſurface of the earth the path of the centre of the penumbra, or that tract where the eclipſe is central. If we bring Z to d, we get the place where the ſun riſes centrally eclipſed; and if Z be brought to e, we ſhall find where the ſun ſets centrally eclipſed. If Z coincide with r, we get the place where the ſun is centrally eclipſed upon the meridian. Let y be the centre of the penumbra when it firſt touches the earth, and x the centre when it leaves the earth, and draw Ow perpendicular to LM. Then, knowing Ov and the angle Ovw, we can find Ow and vOw; alſo Oy = ſemid. ⊖ + ſemid. penumb. known; hence, in the right-angled triangle yOw, we get the angle yOw, and therefore we know yOv; and POv being already found, we know bOP; hence, in the triangle bOP, we know bO $(= 90^\circ)$, PO, and the angle POb; hence we find Pb the complement of the latitude of b; find alſo OPb, and we get bPB the longitude of b, from the given meridian PB; thus we get the place b where the eclipſe firſt begins at the ſun riſing. In like manner we get the place a where the eclipſe laſt ends at ſun ſetting.

Example.—In the ſolar eclipſe, which we have here computed, let it be required to find that place upon the earth's ſurface where the ſun is centrally eclipſed at one o'clock, apparent time at Greenwich. In this caſe, $Ov = 44' 59''$, and the angle $OvZ = 5^\circ 42'$, and as the time at v is $41' 30''$, and the centre of the penumbra is at Z at one o'clock, the time through $vZ = 19' 30''$, which gives $vZ = 9' 3''$; hence $ZO = 35' 59''$, the angle $OZv = 81^\circ 22'$, and $ZOv = 13^\circ 56'$. Now, the radius $OG = 54' 56''$; hence the arc OZ upon the ſurface (correſponding to its projection $= 35' 59''$) $= 41^\circ 4'$; alſo $PO = 84^\circ 30'$, and $POv = 23^\circ 22'$; hence $POZ = 9^\circ 26'$; conſequently $PZ = 45^\circ 43'$, the complement of which is $44^\circ 17'$, the latitude of the place; alſo $ZPO = 8^\circ 51'$; but at one o'clock, apparent time at Greenwich, its meridian BP makes an angle of 15° with PO, Greenwich being upon that meridian at 12 o'clock; hence $BPZ = 23^\circ 51'$ the longitude of the place, weſt from Greenwich. In like manner may any of the other phenomena be calculated.

Draw OW (*fig.* 94.) perpendicular to LM, and take $vc = ve$ equal to the ſum of the ſemi-diameters of the ſun and moon, and draw dcf, xey parallel to LM; then df and xy will mark out the boundaries of the eclipſe, or the places where the limbs of the ſun and moon juſt appear in contact. So that if we take the moon at any place Z, and draw Zr perpendicular to df, and compute the latitude and longitude of the point r in the ſame manner as we did that of Z in the laſt article, it will give the place where the limbs of the ſun and moon appear in contact outwardly. If we take Zr on the other ſide of LM, we ſhall, on that ſide, get the place where they appear in contact. If we do this for every quarter or half hour, we ſhall trace the path over the ſurface of the earth where the limbs of the ſun and moon appear in contact, or the boundaries of the eclipſe; thus, we can lay down upon the earth's ſurface that tract over which the penumbra paſſes. If cv be divided into twelve equal parts, and ck be taken equal to three of them, for inſtance, and tks be drawn parallel to LM, and the place of r' be computed, it gives the place where the ſun will be three digits eclipſed; and in like manner as before may the tract on the earth's ſurface be marked out where the ſun will appear three digits eclipſed; in the ſame manner, we may trace out the path for any number of digits. If $va = vb$, and ab be the difference between the apparent diameters of the ſun and moon, and waz, gbh be drawn parallel to LM; then, if the diameter of the moon be greater than that of the ſun, the ſpace between wz and gh is the limit for the total eclipſe; but if the diameter of the ſun be the greater, it will be the limit of the annular eclipſe. This method of delineating the lines of the phaſes upon the earth's ſurface ſuppoſes that the apparent neareſt diſtance of the centres of the ſun and moon, or of the correſponding horns upon the relative orbit of the moon and upon the eclipſe, is in a line perpendicular to the moon's relative orbit; but this is not accurately true, and therefore the delineation cannot be accurate. This line will have different poſitions at different places for the ſame phaſe. M. du Sejour propoſes, therefore, to take the mean angle. He found an error of $3^\circ 33'.5$ in longitude, and of $35' 49''$ in time of the contact, for the latitude of $16^\circ 57'$, by ſuppoſing it to happen upon a perpendicular to the relative orbit.

M. de la Lande has given the following graphical method. Draw LM on a ſeparate piece of paper, and divide it, ſo that by moving it you may bring any hour to v. Then if, for inſtance, the orbit be moved to the right till the time of falling on v be one hour later than that for which the conſtruction was firſt made, it is in a proper poſition for a place 15° to the eaſt of that place. Let pq be any parallel of latitude, and divide it into hours, &c. then move the orbit LM until, with an extent of compaſs equal to the ſum of the ſemi-diameters of the ſun and moon, you can make the points fall on the ſame hour both on pq and LM, and at the ſame time that it ſhall be the ſhorteſt diſtance between any two correſponding hours on pq and LM; then the difference of the hours ſhewn at v in conſequence of the removing of the orbit ſhews the longitude of the place from that for which the projection was made, and the parallel pq ſhews the latitude; therefore the place on the earth's ſurface is determined where the limbs juſt come into contact, and alſo the time. This we may repeat for as many parallels of latitude as we pleaſe, and thus trace out the curve on the ſurface of the earth where the limbs juſt come into contact. In like manner, if we take an extent of compaſs $\frac{1}{12}$th of the ſun's diameter leſs, we may trace out the path where the ſun is one digit eclipſed; and ſo for any other phaſe.

But the general phenomena may be much more eaſily, and with ſufficient accuracy, determined by a common globe thus. Bring the ſun's place S to the brazen meridian PV, (*fig.* 95.) ſet the hour index to 12, and bring the ſun to the zenith; and from that point on the globe, extend a thread SW perpendicular to the ecliptic EC. Upon a ſmall ſtraight rod LM let there be a moveable circle $adbm$, whoſe centre r is in the middle of the rod, and let its radius be to the radius of the globe as the ſemi-diameter of the penumbra is to the horizontal parallax of the moon. Let there be two moveable upright pieces attached to the horizon of the globe, and capable of being fixed at any two points; at a diſtance Sv equal to the moon's latitude at the time of the ecliptic conjunction, let the rod LM cut the thread in a plane touching the globe at S, and making an angle MvS equal to the angle which the relative orbit makes with a perpendicular to the ecliptic, as before directed; and in this ſituation let the rod be fixed to the above-mentioned pieces, attached to the horizon; let alſo LM be divided into time, the time at the point v being that of the ecliptic conjunction; and let the horizon of the globe be fixed exactly parallel to the horizon ; and upon a fine thread $a b$ ſuſpend a ſmall conical weight, with an acute vertex ; every thing being thus prepared, we proceed thus ; firſt premiſing, that the circle T E V C (coinciding with the horizon of the globe) contains all the places where the ſun is in the horizon, the weſtern hemiſphere containing thoſe where the ſun is riſing, and the eaſtern where the ſun is ſetting.

Carry the centre of the penumbra to r where you find, by ſuſpending the line from its periphery, that its projection would juſt touch the earth at t; then turn the globe till the index ſhews the ſame hour as the point r, and the point t at that time is the place firſt touched by the penumbra, and the eclipſe there begins at ſun-riſe. Carry the centre of the penumbra to s, a quarter of an hour forwards, for inſtance, and ſet the globe again to that time ; and with the line find the points x, w, where the projection of the circumference of the penumbra would interſect the circle T C V E, and x, w, are two other points where the eclipſe begins at ſun-riſe. By proceeding thus through the weſtern part, we may find as many points as we pleaſe, where the eclipſe begins at ſun-riſe, and by drawing a curve through them, we get the tract on the earth's ſurface, where the eclipſe begins at the riſing of the ſun. But when x comes into the eaſtern part, we get the places where the eclipſe begins at ſun-ſet ; conſequently the curve paſſing through them is a continuation of the curve which paſſes through all the places where the eclipſe begins at ſun-riſing, provided the whole of the penumbra does not fall upon the earth at the middle of the eclipſe ; that is, if O be the middle of the general eclipſe, and O T be perpendicular to L M in the projection, when O T is leſs than the radius (R) of the penumbra. If O T = R, the curves touch, and if O T be greater than R, they are ſeparated ; becauſe the penumbra then paſſes over a part of the earth after it leaves the weſtern ſide before it comes to the eaſtern, and therefore in that interval the ſun is not eclipſed to any part of the circumference T E V C.

Draw $b r a$ perpendicular to L M, and $a c$ parallel to it ; and when w comes to c, the interſection manifeſtly begins to go back ; and the part $a d b$ will then cut T C V, and therefore the interſections will ſhew the points in the horizon where the eclipſe ends at ſun-ſet; for the velocity of the penumbra being greater than that of the earth about its axis, the penumbra muſt leave the point which it then touches. And for this reaſon the eclipſe begins where $b t a$ cuts T C V. Hence, as c is a point where the eclipſe ceaſes to begin at ſun-riſe and begins to end at ſun-ſet, the curve ſhewing the places when the eclipſe begins at ſun-riſing is continued into the curve, which ſhews the places where the eclipſe ends at ſun-riſing ; and as x and w meet again on the eaſtern ſide of the earth, the curves there meet again. When, therefore, O T is leſs than R, (*fig.* 96.) we have a curve. The velocity of the parts of the earth, from its rotation, being greateſt towards the equator, the ovals will be more open towards A and B than towards C.

If O T = R, (*fig.* 97.) the two ovals touch ; but that neareſt the pole is double.

If O T be greater than R, (*fig.* 98.) the two ovals will be detached ; but if the perpendicular D z, on L M (in the projection,) be leſs than R, the oval neareſt the pole will be double. Two curves A B, C D, touching the ovals, and formed by the projection of a and b, will ſhew where the limbs of the ſun and moon were in contact.

If L M fall beyond the earth, or if O lie on the other ſide of T, the curve will be like *fig.* 95, until D z be greater than R, in which caſe the curve becomes a ſimple oval ; and when O T = R, the oval vaniſhes. Theſe circumſtances, which were given by M. Delambre, appear from this method of delineation.

The projection of $b a$ will give the middle of the eclipſe. The weſtern part of T C V, which is cut by $b a$ in the projection, is the point where the eclipſe is in the middle at ſun-riſe ; and where the eaſtern part of the horizon is cut by it, it ſhews the point where the middle of the eclipſe is at ſun-ſet. When a comes to c, the globe being adjuſted to that time, c is a point of the former kind, but here the eclipſe is only for a moment, or rather there is no eclipſe, the moon's limb only touching that of the ſun. As the umbra advances, $a b$ will cut T C V at ſome other point, as w ; to the time denoted by the centre r, adjuſt the globe, and w is the place upon the earth where the middle of the eclipſe is at ſun-riſing. And thus we may find any number of ſuch places, and draw a curve, as B D A, (*fig.* 96.) paſſing through all the places where the middle of the eclipſe is at the riſing of the ſun. As the line, in this caſe, muſt be ſuſpended from $b a$, it will be more convenient to have the penumbra divided into two parts through $a b$, ſo that they may be ſeparated.

To trace out the centre of the penumbra over the earth, bring, by the line, the centre to coincide in the projection with T C V at e, (*fig.* 95.) and adjuſt the globe to that time, and e will be the place where the centre of the umbra firſt touches the earth. Carry on the penumbra, a quarter of an hour for inſtance, and adjuſt the globe to the time, and project the centre upon the earth, and it gives the point where the eclipſe is central at that time. Find thus as many points as you pleaſe, and draw a curve through them all, and you get the path of the centre of the penumbra over the earth, ſhewing all thoſe places where the eclipſe was central.

If the penumbra be formed by 12 equi-diſtant concentric wires, the phenomena of any one of the digits may be traced out in the ſame manner ; that is, we can find, for inſtance, all the places where the ſun is three digits eclipſed at its riſing and ſetting, and the tract where the ſun is three digits for the time of the eclipſe. The globe here uſed ſhould be one which has the hours marked on the equator.

The method of tracing out the different curves was, we believe, firſt given by M. de la Caille in his Aſtronomy. M. du Sejour has given an analytical method of laying down the curves in his Traité Analytique. But theſe are matters rather of curioſity than of any real uſe in aſtronomy. If we place the circle E T C V perpendicular to the horizon, and vertical to S, a ſtrong lamp be fixed in the principal focus of a double convex lens, ſo that the rays may be thrown parallel upon the globe and perpendicular to E T C V, the ſhadow of the penumbra will give the points of projection required, inſtead of the plumb line. Thus we make a common globe anſwer the purpoſe of an eclipſareon, invented by Mr. Ferguſon, and deſcribed in his Aſtronomy. See Eclipsareon.

As the analytic method of making aſtronomical calculations is by many preferred to any other, we ſubjoin the following formula, which will be found one of the moſt convenient that has been yet invented.

Let all the points to be conſidered be referred to three axes, perpendicular to each other, according to the method in uſe among modern geometricians.

Let a line, paſſing from the centre of the earth to that of the eclipſed planet, be taken for the axis of the y's ; a line perpendicular to the firſt, in the plane of the ecliptic, for the axis of the x's, and a third line perpendicular to the two others for that of the z's. The poſitive y's will be directed towards the planet, the poſitive x's to the left, following the order of the ſigns, and the poſitive z's, above the plane of the ecliptic, towards the north pole.

Following the example of Dionis du Sejour, a plane perpendicular to the axis of y, ſhould be made to paſs through the centre of the moon. This may be called the plane of projection, and the apparent ſituation of the centre of the planet, as ſeen from the place of the obſerver, is to be determined upon it. This being done, nothing can be more eaſy than to calculate the apparent diſtance of the centres, which is the laſt reſult of the problem.

1ſt. Let ϕ be the longitude of the planet, ψ its latitude, ϕ' the longitude of the moon, ψ' its latitude; X, Y, and Z, the co-ordinates. Taking the diſtance of the earth for unity, theſe equations will be eaſily found by a ſimple transformation of the co-ordinates.

$$X = \text{ſin.}\ (\phi' - \phi')\ \text{coſ.}\ \psi'.$$
$$Y = \text{ſin.}\ \psi',\ \text{ſin.}\ \psi + \text{coſ.}\ \psi',\ \text{coſ.}\ \psi\ \text{coſ.}\ (\phi' - \phi.)$$
$$Z = \text{ſin.}\ \psi',\ \text{coſ.}\ \psi - \text{coſ.}\ \psi',\ \text{ſin.}\ \psi\ \text{coſ.}\ (\phi' - \phi.)$$

It will be ſeen hereafter, that the value of Y is not required. With regard to the values of X and Z, they will aſſume this form:

$$X = \text{ſin.}\ (\phi' - \phi) - 2\ \text{ſin.}\ (\phi' - \phi)\ \text{ſin.}^2\ \tfrac{1}{2}\psi'.$$
$$Z = \text{ſin.}^2\ (\psi' - \psi) + 2\ \text{ſin.}^2 \left(\frac{\phi' - \phi}{2}\right) \text{ſin.}\ \psi\ \text{coſ.}\ \psi';$$

which may be afterwards reduced to this form, which will be found ſufficiently approximate:

$$X = (\phi' - \phi) - 2\ (\phi' - \phi)\ \text{ſin.}^2\ \tfrac{1}{2}\psi.$$
$$Z = (\psi' - \psi) + 2\ \text{ſin.}^2 \left(\frac{\phi' - \phi}{2}\right)\ \text{ſin.}\ \psi.$$

And as the terms of the ſecond order will be always very ſmall, they may be taken by inſpection in ſmall tables of equations, which are eaſily calculated. Thoſe which compoſe table 95, of the collection inſerted at the end of the firſt volume of De La Lande's Aſtronomy, and which are here given, may be employed; thus theſe quantities may be obtained by a very ſimple calculation, or almoſt without calculation.

2d. If we call ρ that radius of the earth which paſſes through the place of the obſerver, α, the angle which it makes with the plane of xz, β, the angle which its projection in the ſame plane makes with z; x, y, and z, the co-ordinates of the place of the obſerver, we ſhall have, by formulas well known,

$$x = \rho\ \text{coſ.}\ \alpha\ \text{ſin.}\ \beta.$$
$$z = \rho\ \text{coſ.}\ \alpha\ \text{coſ.}\ \beta.$$
$$y = \rho\ \text{ſin.}\ \alpha.$$

And it is not difficult to imagine, that of theſe two angles, α and β, the firſt expreſſes the height of the planet above the horizon, and the ſecond the parallactic angle made by the vertical and the circle of latitude.

3d. If we imagine a viſual ray paſſing from the eye of the obſerver to the centre of the planet, expreſſing by ξ and ζ the co-ordinates of the point where it meets the plane of projection, reſpectively parallel to the axes of the x's and z's, and by R the diſtance from the planet to the earth, we ſhall eaſily find

$$\xi = \frac{R - Y}{R - y}\,x.$$
$$\zeta = \frac{R - Y}{R - y}\,z.$$

But calling the horizontal parallax of the moon p, that of the planet π, it will be evident that

$$\rho = p$$
$$R = \frac{1}{\pi}.$$

Then ſubſtituting theſe values, as well as thoſe of x, y, and z, ſuppoſing afterwards $Y = 1$, and neglecting in the denominator the term π ſin. α as very ſmall, compared to unity, we ſhall find

$$\xi = (p - \pi)\ \text{coſ.}\ \alpha,\ \text{ſin.}\ \beta.$$
$$\zeta = (p - \pi)\ \text{coſ.}\ \alpha,\ \text{coſ.}\ \beta,$$ very ſimple expreſſions. If then the line, which joins the centre of the moon, and the apparent place of the centre of the planet upon the plane of projection, be called l, we ſhall have $l = \surd\,[(X - \xi)^2 + (Z - \zeta)^2]$.

Now this line may be conſidered as perpendicular to the viſual ray of the obſerver. On the other hand, the diſtance of the latter from the plane of projection is equal to $Y - y$. The expreſſion for the apparent diſtance of the centres then will be $\frac{l}{Y - y}$. Moreover, let D be the horizontal ſemi-diameter of the moon; $\frac{D}{Y - y}$ will be this ſemi-diameter, augmented for its altitude. Let Δ be the ſemi-diameter of the planet; the ſum of the apparent ſemi-diameter will be $\frac{D}{Y - y} + \Delta$.

But when this ſum becomes equal to the apparent diſtance, the eclipſe will be either at its beginning or end. At each of theſe two moments $\frac{l}{Y - y}$ will be equal $\frac{D}{Y - y} + \Delta$, or multiplying the whole by the denominator $Y - y$, ſuppoſing $Y = 1$, and ſubſtituting the value of y, we ſhall get $l = D + \Delta - p\,\Delta\ \text{ſin.}\ \alpha$. Now the term $p\ \Delta$ ſin. α never will exceed 15″; it may therefore be taken by inſpection of a table. Thus the whole is reduced to the calculation of the quantity L, which expreſſes the apparent diſtance of the centres meaſured on the plane of projection.

To explain better the advantage of this method, it is reduced to a ſpecies of table, which may be compared with that given by M. Cagnoli in his Trigonometry.

Let it be required whether at a given moment the eclipſe is commenced. Find for this moment

The longitude of the planet	ϕ
Its latitude	ψ
Its right aſcenſion	e
Its declination	n
Its angle of poſition	θ
Its horizontal parallax	π
Its horizontal ſemi-diameter	Δ
The longitude of the moon	ϕ'
Its latitude	ψ'
Its horizontal parallax	p
Its horizontal ſemi-diameter	D
The geocentric latitude of the obſerver's place	λ
The right aſcenſion of the middle of the heavens	m

Make $\text{ſin.}\ \alpha = \text{ſin.}\ \lambda\ \text{ſin.}\ \eta + \text{coſ.}\ \lambda\ \text{coſ.}\ \eta\ \text{coſ.}\ (m - e)$

$$\text{ſin.}\ S = \frac{\text{coſ.}\ \lambda\ \text{ſin.}\ (m - e)}{\text{coſ.}\ \alpha.}$$
$$\beta = S - \theta$$
$$\zeta = (p - \pi)\ \text{coſ.}\ \alpha\ \text{coſ.}\ \beta$$
$$\xi = \zeta\ \text{tang.}\ \beta$$
$$X = \phi' - \phi - 2\,(\phi' - \phi)\ \text{ſin.}^2 \tfrac{1}{2}\psi'$$
$$Z = \psi' - \psi + 2\ \text{ſin.}^2 \tfrac{1}{2}\ (\phi' - \phi)\ \text{ſin.}\ \psi.$$

(Terms of the ſecond order become equal to nothing in eclipſes of the ſun, and in other caſes may be taken by inſpection of the little tables.)

$$\text{Tang.}\ M = \frac{Z - \zeta}{X - \xi}$$
$$l = \frac{X - \zeta}{\text{coſ.}\ M}.$$ Let the ſum of the horizontal diameters be $D + \Delta$. In eclipſes of the ſun, ſubtract the ſmall quantity $p\Delta$ ſin. α, which we take by inſpection of a table, the remainder compared with the value of L will ſhew whether or not the eclipſe is already commenced.

TABLE to be uſed in calculating Solar Eclipſes.

Reduction to a great Circle which is to be ſubtracted from the Difference of Longitude of the Moon and the Sun, or a Star.

Diff. of Long.	Latitude of the Star which is in Conjunction.																
	0½°	1°	1½°	2°	2¼°	2½°	2¾°	3°	3¼°	3½°	3¾°	4°	4¼°	4½°	4¾°	5°	5¼°
′	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
2	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5
4	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0
6	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.4	1.5
8	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.5	1.6	1.8	2.0
10	0.0	0.1	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.3	1.5	1.7	1.8	2.1	2.3	2.5
12	0.0	0.1	0.2	0.4	0.6	0.7	0.8	1.0	1.2	1.3	1.5	1.8	2.0	2.2	2.5	2.7	3.0
14	0.0	0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.3	2.6	2.9	3.2	3.5
16	0.0	0.2	0.3	0.6	0.7	0.9	1.1	1.3	1.5	1.8	2.1	2.3	2.6	3.0	3.3	3.6	4.0
18	0.0	0.2	0.4	0.7	0.8	1.0	1.2	1.5	1.7	2.0	2.3	2.6	3.0	3.3	3.7	4.1	4.5
20	0.0	0.2	0.4	0.7	0.9	1.1	1.4	1.6	1.9	2.2	2.6	2.9	3.3	3.7	4.1	4.6	5.0
22	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.5	2.8	3.2	3.6	4.1	4.5	5.0	5.5
24	0.1	0.3	0.5	0.9	1.1	1.4	1.7	2.0	2.3	2.7	3.1	3.5	4.0	4.4	5.0	5.5	6.0
26	0.1	0.3	0.5	0.9	1.2	1.5	1.8	2.1	2.5	2.9	3.3	3.8	4.3	4.8	5.4	5.9	6.5
28	0.1	0.3	0.6	1.0	1.3	1.6	1.9	2.3	2.7	3.1	3.6	4.1	4.6	5.2	5.8	6.4	7.0
30	0.1	0.3	0.6	1.1	1.4	1.7	2.1	2.5	2.9	3.4	3.9	4.4	5.0	5.5	6.2	6.8	7.5
32	0.1	0.4	0.7	1.2	1.5	1.8	2.2	2.6	3.1	3.6	4.1	4.7	5.3	5.9	6.6	7.3	8.0
34	0.1	0.4	0.7	1.2	1.6	1.9	2.3	2.8	3.3	3.8	4.4	5.0	5.6	6.3	7.0	7.8	8.6
36	0.1	0.4	0.7	1.3	1.7	2.1	2.5	3.0	3.5	4.0	4.6	5.3	5.9	6.7	7.4	8.2	9.1
38	0.1	0.4	0.8	1.4	1.8	2.2	2.6	3.1	3.7	4.3	4.9	5.6	6.3	7.0	7.8	8.7	9.6
40	0.1	0.5	0.8	1.4	1.9	2.3	2.8	3.3	3.9	4.5	5.1	5.8	6.6	7.4	8.2	9.1	10.1
42	0.1	0.5	0.9	1.5	1.9	2.4	2.9	3.5	4.1	4.7	5.4	6.1	6.9	7.8	8.7	9.6	10.6
44	0.1	0.5	0.9	1.6	2.0	2.5	3.0	3.6	4.2	4.9	5.7	6.4	7.3	8.1	9.1	10.0	11.1
46	0.1	0.5	0.9	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	7.6	8.5	9.5	10.5	11.6
48	0.1	0.6	1.0	1.7	2.2	2.7	3.3	4.0	4.6	5.4	6.2	7.0	7.9	8.9	9.9	11.0	12.1
50	0.1	0.6	1.0	1.8	2.3	2.9	3.5	4.1	4.8	5.6	6.4	7.3	8.3	9.2	10.3	11.4	12.6
52	0.1	0.6	1.1	1.9	2.4	3.0	3.6	4.2	5.0	5.8	6.7	7.6	8.6	9.6	10.7	11.9	13.1
54	0.1	0.6	1.1	2.0	2.5	3.1	3.7	4.4	5.2	6.0	6.9	7.9	8.9	10.0	11.1	12.3	13.6
56	0.1	0.6	1.1	2.0	2.6	3.2	3.9	4.6	5.4	6.3	7.2	8.2	9.2	10.4	11.5	12.8	14.1
58	0.1	0.6	1.2	2.1	2.7	3.3	4.0	4.8	5.6	6.5	7.5	8.5	9.6	10.7	11.9	13.2	14.6
60	0.1	0.6	1.2	2.2	2.8	3.4	4.1	4.9	5.8	6.7	7.7	8.8	9.9	11.1	12.4	13.7	15.1

Quantities to be added to the true Latitude of the Moon in Eclipſes of the Sun or Stars.

True Lat.	Difference of Longitude between the Sun, and Moon, or Star.																
	10′	14′	18′	22′	26′	30′	34′	38′	42′	46′	50′	54′	58′	62′	66′	70′	74′
D.	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8
2	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.7	0.8	0.9	1.0	1.2	1.3	1.5	1.7
3	0.1	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.1	1.3	1.5	1.8	2.0	2.3	2.7	3.0	3.3
4	0.1	0.2	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.6	1.9	2.2	2.6	2.9	3.3	3.7	4.2

The greateſt number of eclipſes that can happen in one year is ſeven; in which caſe five are of the ſun and two of the moon, as in the year 1787: the leaſt number that can happen is two, and then they are each ſolar: this happened in 1767, 1781, 1785, and 1792: generally in the ſpace of 18 years there are 70 eclipſes, 29 of the moon, and 41 of the ſun. According to Caſſini no lunar eclipſe can happen farther than $14\frac{1}{2}^\circ$ from the node, and there will be an eclipſe if the diſtance is leſs that $7\frac{1}{2}^\circ$. Delambre makes the limit $13^\circ\ 21'$ and $7^\circ\ 47'$.

The obſcurity during a total eclipſe of the ſun is not quite equal to a very dark night, the ſtars of the ſecond magnitude, and a few perhaps of the third only appear, if the ſun is near the meridian, Venus and Mercury are ſeen near him in great ſplendour.

According to M. Sejour, the greateſt duration of a total eclipſe of the ſun is $7'\ 58''$, and $12'\ 24''$ of an annular eclipſe, but it is not in the places where the eclipſe is central that the duration is the longeſt.

A total eclipſe of the ſun is a very rare occurrence in a given place. Louis XV. was deſirous of knowing how many eclipſes would happen in a certain number of years, and it appeared that at Paris, between 1769 and 1900, there would be 59 viſible eclipſes, without one being total; and one only annular on the 9th Oct. 1847. Very conſiderable eclipſes will happen in England on Oct. 9, 1847; March 15, 1858; Aug. 19. 1887; April 17, 1912; April 8, 1921; Feb. 15, 1961; Aug. 11, 1999.

Since eclipſes depend on the poſition of the ſun and moon with reſpect to the nodes, it is obvious that when they are in the ſyzygies, and have the ſame ſituation with reſpect to the nodes, the eclipſes will return and appear as before. The ſpace of time after which the ſame eclipſes return again is called the period of eclipſes. Now as the nodes have a retrograde motion of $19\frac{1}{3}^\circ$ every year, they would paſs through all the points of the ecliptic in eighteen years and 225 days, and this would be the regular period of the return of eclipſes, if any complete number of lunations were performed in it without a fraction, but this is not the caſe. However, in 223 mean lunations after the ſun, moon, and nodes have been once in a line of conjunction, they return ſo nearly to the ſame ſtate again, that the ſame node which was in conjunction with the ſun and moon at the beginning of theſe lunations will be within $28'\ 12''$ of the line of conjunction, when the laſt of theſe lunations is completed; and in this period there will be a regular return of eclipſes, till it be repeated about 40 times, or about 720 years, when the time of the nodes will be $28' \times 40'$ from the conjunction, and will conſequently be beyond the ecliptic limits; this is called the Plinean period, or Chaldæan era. It contains, according to Dr. Halley, 18 Julian years, 11 days, 7 hours, 43 minutes, 20 ſeconds; or, according to Mr. Ferguſon. $18^y\ 11^d\ 7^h\ 42'\ 44''$. In an interval of $557^y\ 21^d\ 18^h\ 11'\ 51''$, in which there are exactly 6890 mean lunations, the conjunction or oppoſition coincides ſo nearly with the node, as not to be diſtant more than $11''$. If, therefore, to the mean time of any ſolar or lunar eclipſe, we add this period, and make the proper allowance for the intercalary days, we ſhall have the mean time of the return of the ſame eclipſe. This period is ſo very near, that in 6000 years it will vary no more from the truth, as to the reſtitution of eclipſes, than $8\frac{1}{4}$ minutes of a degree.

The curioſity of aſtronomers has been exceedingly gratified within theſe few years, by a number of very intereſting communications that have been given to the world relative to the ſtate of the Hindu aſtronomy, and particularly as to their methods of calculating eclipſes: it has been obſerved in the introductory part of this article, how entirely Bailly ſeems to have been miſtaken in his opinions on this ſubject.

Some difference of opinion ſtill exiſts among the learned as to the preciſe date of the Hindu tables, but all agree that they are very far from being founded on antediluvian tradition.

We are indebted to Mr. Davis for a moſt intelligent account of the method of calculating eclipſes. As it contains much novelty, and throws great light on the ſyſtem of that very ſingular race of mankind; we ſhall conclude this article by ſubjoining his account of it.

Hindu Computation of an Eclipſe.

Let it be premiſed that the poſition of the ſun, moon, and nodes, by calculation, will on the firſt of next Vaiſac'h be as here repreſented in the Hindu manner, excepting the characters of the ſigns.

By inſpection of the figure, (*Plate* XII. *fig.* 99.) and by conſidering the motion of the ſun, moon, and nodes, it appears that, when the ſun comes to the ſign Tula (Libra) correſponding with the month of Cartic, the deſcending node will have gone back to Aries; and that conſequently a *lunar* eclipſe may be expected to happen at the end of the *purnima tit'hi*, or time of full moon, in that month.

Firſt operation.—To find the number of mean ſolar days from the creation to ſome part of the *purnima tit'hi* in Cartic, of the 4891ſt year of the Cali Yug.

Years expired of the Calpa to the end of the Satya Yug, - - -	1970784000
Deduct the term of Brahma's employment in the creation, - - - -	17064000
From the creation, when the planetary motions began, to the end of the Satya Yug, - - - - - -	1953720000
Add the Treta Yug, - - - -	1296000
Dwaper Yug, - - -	864000
Preſent year of the Cali Yug, -	4890
From the creation to the next approaching Bengal year, - - -	1955884890
Or ſolar months, (× 12) - -	23470618680
Add ſeven months, - - -	72
	23470618680

As the ſolar months in a Yug, 51840000, are to the intercalary lunar months in that cycle, 1593336, ſo are the ſolar months 23470618687, to their correſponding intercalary lunar months 721384677; which added together, give 24192003364 lunations. This number multiplied by thirty, produces 725760100920 *tit'his*, or lunar days, from the creation to the new moon in Cartic; to which add fourteen *tit'his* for the ſame, to the *purnima tit'his* in that month 725760100934. Then, as the number of *tit'his* in a Yug, 1603000080, is to their difference exceeding the mean ſolar days in that cycle (called *eſchaya tit'his*) 25082252, ſo are 725760100934 *tit'his* to their exceſs in number over the ſolar days 11356017987, which ſubtracted, leaves 714404082947, as the number of mean ſolar days from the creation, or when the planetary motions began, to a point of time which will be midnight under the firſt meridian of Lanca, and near the time of full moon in Cartic. In the year of the Cali Yug 4891, correſponding with 1196 Bengal ſtyle, and with the month of October or November (hereafter to be determined) in the year of Chriſt 1789. The firſt day after the creation being *Ravi'var*, or Sunday, divide the number of days by ſeven for the day of the week, the remainder after the diviſion being two, marks the day *Soma-var*, or Monday.

Second operation.—For the mean longitude of the ſun, moon, and the aſcending node. Say, as the number of mean ſolar days in a Maha Yug is to the revolutions of any planet in that cycle, ſo are the days from the creation to even revolutions, which reject, and the fraction, if any, turned into ſines, &c. is the mean longitude required.

1ſt. *Of the Sun.*

Revolutions. Sincs. ° ′ ″ ‴

$$\frac{714404082947 \times 4320000}{1577917828} = (195584890)\quad 6\ 22\ 44\ 2\ 12$$

2d. *Of the Moon.*

$$\frac{714404082947 \times 57753336}{1577917828} = (26147888255)\quad 0\ 21\ 21\ 58\ 56$$

3d. *Of the Moon's Apogee.*

$$\frac{714404082947 \times 488203}{1577917828} = (221034460)\quad 11\ 5\ 31\ 13\ 35$$

Correction of the Bija add.

$$\frac{714404082947 \times 4}{1577917828} = (---)\quad 0\ 37\ 37\ 52\ 28$$

$$11\ 7\ 9\ 6\ 3$$

4th. *Of the Moon's Aſcending Node.*

$$\frac{714404082947 \times 232238}{1577917828} = (105147017)\quad 4\ 27\ 49\ 48\ -$$

Correction of the Bija add.

$$\frac{714404082947 \times 4}{1577917828} = (---)\quad 0\ 1\ 37\ 52\ 28$$

$$4\ 29\ 27\ 40\ 28$$

5th. *Of the Sun's Apogee.*

$$\frac{714404082947 \times 387}{1577917828}\quad (-\ 175\ -)\quad 2\ 17\ 17\ 15\ -$$

	Mean longitude for midnight under the meridian of Lanca.	Deduct for the longitude of Bhagalpur as * 80° 50′ of equator eaſt.	Mean longitude for midnight at Bhagalpur.
	s ° ′ ″ ‴	′ ″	
Of the Sun,	6 21 44 2 12	1 27	6 21 42 35 12
Moon,	— 21 21 58 56	19 34	— 21 2 25 —
Node,	4 29 27 40 28	— 4	4 29 27 36 —
Sun's Apogee,	2 17 17 15 —	inconſiderable	2 17 17 16 —
Moon's Apogee,	11 7 9 6 3	— 9	11 7 8 57 —

* This longitude, aſſigned to Bhagalpur, is erroneous; but the error does not in the leaſt affect the main object of the paper.

Third operation.—For the equated longitude of the ſun and moon, &c.

1ſt. *Of the Sun.*

The mean longitude of the ſun is $6^s\,21^\circ\,42'\,35''\,12'''$; of the apogee 2 17 17 15, the difference, or mean anamoly, $4^s\,4^\circ\,25'\,20''$; its complement to 6 ſines or diſtance from the perigee $1^s\,25^\circ\,34'\,40''$, the equation for which is required. This may either be taken from the foregoing table, tranſlated from Macaranda, or calculated in the manner explained as follows:

The ſine of $1^s\,25^\circ\,34'\,40''$ is $2835'\,31''$ and $\frac{2825'\,31'' \times 20'}{3438} = 14'\,30''$ to be ſubtracted from the paridhi degrees in ſama; $14^\circ - 14'\,30'' = 13^\circ\,53'\,30''$, the circumference of epicycle in this point of anomaly; and $\frac{13^\circ 43'\,30'' \times 2835'\,31''}{360^\circ} = 108'\,61''$ the ſine of the angle of equation, conſidered as equal to its arc, or $1^\circ\,48'\,6''$, to be deducted from the mean, for the true longitude; $6^s\,21^\circ\,42'\,35'' - 1^\circ\,48'\,6'' = 6^s\,19^\circ\,54'\,29''$ for midnight agreeing with mean time; but as, in this point of anomaly, the true or apparent midnight precedes that eſtimated for mean time, for which the computation has been made, a proportionable quantity muſt be deducted from the ſun's place, which is thus found: ſay, as the minutes contained in the ecliptic are to the ſun's mean motion in one day $59'\,8''$, ſo is the equation of his mean to his true place $180'\,6''$, to the equation of time required, $0'\,18''$ $\left(=\frac{59'8'' \times 108'6''}{21600}\right)$ and $6^s\,19^\circ\,54'\,29'' - 29'' - 18'' = 6^s\,19^\circ\,54'\,11''$ the ſun's true longitude for the apparent midnight.

For the ſun's true motion. The co-ſine of the ſun's diſtance from the perigee is $1941'0''1'''$, and $\frac{1941'0''1''' \times 13433}{360^\circ} = 74'$ the coſine of the epicycle, and $\frac{59'\,8'' \times 74}{3438} = 1'\,16''$ equation, to be added to the mean for the true motion, $59'\,8'' + 1'\,16'' = 60''\,24''$ *per* day, or $60''\,23'''$ *per* danda.

2d. *Of the Moon.*

The moon's mean longitude for the mean midnight is $0^s\,20^\circ\,2'\,25''$, which exceeds her mean longitude for the true midnight, but $\frac{108 \times 790\ 1\ 35}{21600} = 3'\,57''$, her motion in the difference of time between the mean and true midnight $0^s\,21^\circ\,2'\,25'' - 3'\,57'' = 0\ 20\ 58\ 28$ mean longitude, for which the anomaliſtic equation is to be found. Place of the apogee $11^s\,7^\circ\,8'\,55''$ and the moon's diſtance from it $1^s\,13^\circ\,49'\,33''$. The ſine of the latter, $2379'\,39''$. By the rule before explained $\frac{2379'\,39'' \times 20'}{3438} = 13'\,51''$, and $\frac{32^\circ - 13'\,51'' \times 2379'39''}{360} = 210'$ the ſine of the angle of equation equal to its arc, or $3^\circ\,30''$ to be ſubtracted, $0^\circ\,20'\,58''\,28''' - 3^\circ\,30' = 0^\circ\,17'\,28''\,28'''$ the moon's true place, agreeing with the true apparent midnight.

For the moon's true motion. The co-ſine of her diſtance from the apogee 2479 13. Circumference of the epicycle $31^\circ\,46'\,9''$, and $\frac{31^\circ 46'\,9'' \times 2479'13''}{360^\circ} = 218''\,47''$ co-ſine in the epicycle. The moon's mean motion from her apogee is $790'\,35'' - 6'\,41'' = 783'\,54''$, and $\frac{783'54'' \times 218'47''}{3838'} = 49'\,53''$ the equation of her mean to her true motion, to be ſubtracted, $790\ 35 - 49\ 53 = 740\ 42$ the moon's true motion *per* day, or $740''\,42'''$ *per* danda.

For the place of the moon's apogee reduced to the apparent midnight. The motion of the apogee is $6'\,41''$ *per* day, $\frac{108'6'' \times 6'11''}{21600'} = 2''$, $11^s\,7^\circ\,8'\,57'' - 2'' = 11^s\,7^\circ\,8'\,55''$ its place.

For the ſame of the node. Its motion *per* day is $3'\,11''$, and $\frac{108'\,6'' \times 3'\,11''}{21600} = 1''$, and $4^s\,29^\circ\,27'\,36'' - 1'' = 4^s\,29^\circ\,27'\,35''$ its place.

The true longitude and motion, therefore, for the apparent time of midnight at Bhagalpur, 714404082947 ſolar days after the creation, or commencement of the planetary motions, will be

	Longitude.				Motion per day.	
	s	°	'	"	'	"
Of the Sun,	6	19	54	11	60	24
Moon,	—	17	28	28	740	42
Sun's Apogee,	2	17	17	15	inconſiderable	
Moon's Apogee,	11	7	8	55	6	41
Moon's Node,	4	29	27	35	3	11

Second operation.—Having the longitude and motion as above, to determine the *tit'hi* and time remaining unexpired to the inſtant of oppoſition, or full moon.

The moon's longitude ſubtracted from the ſun's, leaves $5^s\,27^\circ\,34'\,17''$, or $10654'\,17''$, which, divided by $720'$ the minutes in a mean *tit'hi*, quotes fourteen even *tit'his* expired, and the fraction, or remainder $574'\,17''$, is the portion expired of the 15th, or *purnima tit'hi*, which ſubtracted from $720'$, leaves $145'\,43''$ remaining unexpired of the ſame; which, divided by the moon's motion *per* danda from the ſun, will give the time remaining unexpired from midnight to the inſtant of the full moon with as much preciſion as the Hindu aſtronomy requires. Deduct the ſun's motion $60''\,24'''$ *per* danda from the moon's $740''\,42'''$, the remainder $680''\,8'''$, is the moon's motion from the ſun; by this divide the part remaining unexpired of the *purnima tit'hi* $145'\,43''$.

$$\frac{145'\,43'' = 524580'''}{680''\,8''' = 40818'''} = \overset{\text{D.}}{12}\ \overset{\text{P.}}{51}$$

therefore 12 dandas, 51 palas after midnight will be the end of the *purnima tit'hi*, or inſtant of oppoſition of the ſun and moon.

Fifth operation.—Having the inſtant of oppoſition as above, to find the true longitude and motion of the ſun and moon, the latitude of the latter and the place of the node.

Add the mean motion of each for $12^d\,51^p$ to the mean place, found before for the true midnight; and for the mean places ſo found, compute again the anomaliſtic equations. This being but a repetition of operation the third is unneceſſary to be detailed. The ſeveral particulars are as follows:

	Mean longitude for midnight.				Mean longitude at full moon.				Equation.			True longitude at full moon.			
	s	°	'	"	s	°	'	"	°	'	"	s	°	'	"
Of the Sun,	6	21	42	17	6	21	54	17	1	47	50	6	20	7	7
Moon,	—	20	58	28	—	23	47	47	3	40	20	—	20	7	27
Moon's Apogee,	11	7	8	55	11	7	10	21	—	—	—	—	—	—	—
Moon's Node,	4	29	27	35	4	29	28	16	—	—	—	—	—	—	—

	Mean motion.		Equation.			True motion at full moon.	
	'	"		'	"	'	"
Of the Sun,	59	8	×	1	16	60	24
Moon,	790	35	−	47	28	743	7

Hence it appears that, at the oppoſition, the moon will be near her deſcending node; for, $4^s\,29^\circ\,28'\,17'' \times 6^s = 10^s\,29^\circ\,28'\,16''$, the place of the deſcending node in antecedentia, and $12^s - 10^s\,29^\circ\,28'\,16'' = 1^s\,0^\circ\,31'\,44''$ its longitude according to the order of the ſigns, and $1^s\,0^\circ\,31'\,44' - 20^\circ\,7'\,27'' = 10^\circ\,24'\,17''$ the moon's diſtance from her deſcending node, which, being within the limit of a lunar eclipſe, ſhews that the moon will be then eclipſed. For her latitude at this time, ſay, as radius is to the inclination of her orbit to the ecliptic, $4^\circ\,30'$ or $270'$, ſo is the ſine of her diſtance from the node $620'\,57''$, to her latitude of $48'\,45''$ $\left(= \frac{279'' \times 620'\,57''}{3438'}\right)$.

Sixth operation.—From the elements now found, to compute the diameter of the moon and ſhadow, and the duration of the eclipſe.

	Yojan.
The Sun's mean diameter is -	6500
Moon's - - -	480
Earth's - - -	1600
Sun's mean motion, -	59' 8"
Moon's, - - -	790 35
Sun's true motion, -	60 24
Moon's, - - -	743 7
Moon's latitude, -	48 45

As the moon's mean motion is to her mean diameter, ſo is her true motion to her true diameter for the time of oppoſition $\frac{743'\,7'' \times \overset{Y}{480}}{790.35} = 451\ 11$ Yojan, which, divided by 15 quotes $30'\,5''$ of a great circle.

As the ſun's mean motion is to his mean diameter, ſo is his true motion to his diameter at the inſtant of oppoſition $\frac{60'\,24'' \times \overset{Y}{6500}}{59'\,8''} = 6639\ 14$ Yojan.

As the moon's mean motion is to the earth's diameter, ſo is the moon's equated motion to the Suchi, or a fourth number, which muſt be taken as the earth's diameter, for the purpoſe of proportioning its ſhadow to the moon's diſtance and apparent diameter $\frac{1600 \times 743'\,7''}{790'\,35''} = 1503\ 56$ Yojan, the Suchi.

Equated diameter of the ſun,	6639 14
Of the earth, - - -	1503 56
Difference,	5039 14

As the ſun's mean diameter is to the moon's diameter, ſo is the difference above 5039 14, to a fourth number, which, deducted from the Suchi, or equated diameter of the earth, leaves the diameter of the earth's ſhadow at the moon, $\frac{\overset{Y}{480} \times \overset{Y}{5039\ 14}}{6500}$ $372\ 7$ and $1503\ 56 - 372\ 7 = 1131\ 49$ Yojan, which divided by fifteen, quotes $75'\,27''$ of a great circle for the ſame.

From the half ſum of the diameters of the moon and ſhadow $\frac{75'\,27'' \times 30'\,5''}{2} = 52'\,46''$ ſubtract the moon's latitude $48''\,45''$, the remainder is the Chch'anna, or portion of the moon's diameter eclipſed, $4'\,1''$ of a great circle, and by the nature of a right angled triangle, the ſquare root of the difference of the ſquares of the moon's latitude, and the half ſum of the diameters of the ſhadow and moon, will be the path of the moon's centre, from the beginning to the middle of the eclipſe.

The diameter of the ſhadow is,		75 27
Of the moon,	- - -	30 5
	Sum, -	105 32
	Half ſum,	52 46
The moon's latitude is,	-	48 45

$\sqrt{52\ 46^2 \times 48\ 45^2} = 20'\ 11''$, which divided by the moon's motion from the ſun, quotes the half duration of the eclipſe in dandas and palas, or Hindu mean ſolar hours, $\frac{20'\ 11''=1211''}{682''\ 43'''} = \overset{D}{1}\ \overset{P}{46}\ \overset{V}{25}$; which doubled, is $\overset{D}{3}\ \overset{P}{32}\ \overset{V}{50}$, the whole duration of the eclipſe; which will be partial, the moon's latitude being greater than the difference between the ſemi-diameters of the moon's diſc and the earth's ſhadow.

Seventh operation.—To find the poſition of the equinoctial colures, and thence the declination of the ſun, the length of day and night, and the time counted from ſun-riſe, or hour of the civil day when the eclipſe will happen.

1ſt. For the ayananſa or diſtance of the vernal equinox from the 1ſt of Meſha. $\frac{714404082947 \times 600}{1577917828} = \overset{\text{Periods.}}{(271650)}\ 8^s\ 4^\circ\ 31'\ 30''\ 52'''$ of which take the bhuja $8^s\ 4^\circ\ 31'\ 30''\ 52''' - 6^s$ or $2^s\ 4^\circ\ 31'\ 30''\ 52'''$ which multiply by three and divide by ten, $\frac{64^\circ\ 31'\ 30''\ 52''' \times 3}{10} = 19^\circ\ 21'\ 27''$ the ayananſa, which in the preſent age is added to the ſun's longitude, to find his diſtance from the vernal equinox. The ſun's equated longitude is $6^s\ 19^\circ\ 54''\ 11'''$, and $6^s\ 19^\circ\ 54'\ 11'' + 19^\circ\ 21'\ 27'' = 7^s\ 9^\circ\ 15'\ 38''$ his diſtance from the vernal equinox.

2d. For the declination, right aſcenſion, and aſcenſional difference. The ſun's place is $7^s\ 9^\circ\ 15'\ 38''$, and $1^s\ 9^\circ\ 15'\ 38''$, his diſtance from the autumnal equinox; the ſine of which is 2174′ 41″, and as radius is to the ſine of the greateſt declination 24°, termed the *paramapacramajya* 1397′, ſo is 2174′ 41 to the ſine of his declination 883′ 40″, the arc correſponding with which, in the canon of ſines, is 14° 53′, $\left(\frac{1297' \times 2174'\ 48''}{3483} = 883'\ 40''\right)$. The equinoctial ſhadow at Bhagalpur is $\overset{A}{5},\ \overset{V}{30}$, and, as the Gnomon of twelves angalas is to the equinoctial ſhadow, ſo is the ſine of the declination 883, 40, to the cſhitijya, $\frac{\overset{A}{5}\ \overset{V}{30} \times 883'\ 40''}{3438} = 405'\ 1''$. And as the co-ſine of the declination is to the radius, ſo is the cſhitijya to the ſine of the chara, or aſcenſional difference, $\frac{405\ 1 \times 3438}{3322\ 36} = 419'\ 4''$: its arc is 419′ 56″ the aſcenſional difference.

3d. For the length of the day and night.

The modern Hindus make their computations in mean ſolar time; the Surya Siddhanta directs, that they ſhould be made in ſidereal time. A ſidereal day contains ſixty dandas: each danda, ſixty viculas; and each vicula ſix reſpirations, in all 21600 reſpirations, anſwering to the minutes of the equator. A nacſhatra day is exceeded in length by the ſavan, or ſolar day, by reaſon of the ſun's proper motion in the ecliptic, the former meaſures time equably, but the latter varies in its length from the inequality of the ſun's motion, and the obliquity of the ecliptic. The ſun's equated motion for the middle of the eclipſe was found 60′ 24″; and the oblique aſcenſion for the eighth ſign from the vernal equinox, in which he will be found at that time, is taken from the foregoing table 343 palas, or 2085 reſpirations. As the number of minutes contained in one ſine 1800, is to the number of reſpirations, or the arc of the equator in minutes anſwering to the oblique aſcenſion of the ſine, the ſun is in 2085, as above, ſo is the equated motion 60′ 24″, to the exceſs in reſpirations of the ſavan or ſolar day over the nacſhatra or ſidereal day $\frac{2058' \times 60'\ 24''}{1800} = 69'\ 3''$; which, added to 21600′ gives the length of the ſolar day by civil account from ſun-riſe to ſun-riſe, ſidereal time 21669 3 reſpirations. From one fourth of this deduct the aſcenſional difference, the ſun being declined towards the ſouth pole, for the ſemidiurnal arc; and add it for the ſeminocturnal arc: the former is 4997′ 19″, and the latter 5837′ 11″; which may be reduced to dandas, or Hindu hours, by a diviſion of 360. Hence half the day is $\overset{D}{13}\ \overset{P}{52}\ \overset{V}{53}$, and half the night $\overset{D}{16}\ \overset{P}{12}\ \overset{V}{52}$. The whole day added to half the night ſhews the hour counted from the preceding ſun-riſe to midnight $\overset{D}{43}\ \overset{P}{58}\ \overset{V}{38}$, to which add the time at midnight unexpired of the *purnima tit'hi*, for the hour of the civil day correſponding with the middle of the eclipſe. The hour from midnight to the end of the *purnima tit'hi* is already found $\overset{D}{12}\ \overset{P}{51}$ in mean ſolar time, and to reduce it to ſidereal time, ſay, as 21600′ is to 21600′ × 59′ 8″, ſo is $\overset{D}{12}\ \overset{P}{51}$, to ſidereal hours $\overset{D}{12}\ \overset{P}{53}$, equal to $\overset{D}{2}\ \overset{P}{51}$ ſolar hours.

	D	V	P
From the preceding ſun-riſe to midnight is	43	59	—
At midnight will remain of the *purnima tit'hi*,	12	53	—
Hour of the civil day at the middle of the eclipſe, - - - - -	56	52	—
Deduct the half duration, - - - -	1	46	25
Beginning of the eclipſe, - - -	55	5	35
Add the whole duration, - - -	3	32	50
End of the eclipſe, - - - -	58	38	25

And the day and night containing together $\overset{D}{60}\ \overset{P}{11}\ \overset{V}{30}$; the eclipſe ſhould end $\overset{D}{1}\ \overset{P}{33}\ \overset{V}{5}$ before ſun-riſe, according to this calculation.

The firſt day of the creation, according to the Hindus, was *Ravi-var*, or Sunday: the number of days for which the above calculation has been made, is 714404082947, which, divided by ſeven, the number of days in a week, are 102057726135 weeks and two days; the aſtronomical day therefore of *Soma-var*, or Monday, will end at midnight preceding the eclipſe; but the *Soma-var* by civil computation will continue to the next enſuing ſun-riſe; and this *Soma-var*, by calculating the number of days elapſed from the inſtant the ſun entered the ſign Tula, to his advance of 19° 54′ on that ſign, will be found to fall on the 19th of the month Cartic, anſwering to the third of November.

The time of the full moon and the duration of the eclipſe, found by this computation, differ conſiderably from the Nautical Almanac. The Siddhanta Rahaſya and Grahalaghava, comparatively modern treatiſes, are nearer the truth, yet far from correct. The Hindus, in determining theſe phenomena, are ſatisfied when within a few minutes of the true time.

A comparative Statement of this Eclipſe as predicted in the Nautical Almanac, with computations of it made by different Hindu books. Thoſe marked (*) are made for different meridians, the laſt we believe for Tirhut.

Names.	Equated longitude for midnight at Bhagalpur, ſuppoſed in 8° 50′ E. from Lanca, and 88° E. from Greenwich.		
	The Sun.	The Moon.	The Node.
	s ° ′ ″	s ° ′ ″	
Surya Siddhanta	6 19 54 11	— 17 28 28	1 — 31 44
Tables of Macaranda	6 19 55 9	— 17 30 9	1 — 32 7
* Grahalaghava, Siddhanta Rahaſya	6 19 54 29	— 17 16 25	1 — 27 35.
	Add to each the aynananſa 19° 21′ 27″ for the longitude counted according to European aſtronomers from the equinoctial colure.		
	s ° ′ ″	s ° ′ ″	s ° ′ ″
Surya Siddhanta	7 9 15 38	1 6 49 55	1 19 53 11
Tables of Macaranda	7 9 16 36	1 6 51 36	1 19 53 54
* Grahalaghava, Siddhanta Rahaſya	7 9 15 56	1 6 37 52	1 19 49 2
Nautical Almanac	7 1 47 8	1 7 50 58	1 19 45 30

	From midnight to the middle of the Eclipſe.		Duration of the Eclipſe.	
	Hindu time.	Engliſh time.	Hindu time.	Engliſh time.
	D. V. P.	H. M. S.	D. P. V.	H. M S.
Surya Siddhanta	12 53 —	5 9 12	3 12 50	1 17 8
Tables of Macaranda			4 50 —	1 46 20
* Grahalaghava	*14 50 —	5 56 —	5 18 —	1 56 36
Siddhanta Rahaſya	13 53 —	5 33 —	4 58 —	1 49 16
* Grahana Mala, a Catalogue of Eclipſes	16 6 —	6 26 24	5 26 —	2 10 24
Nautical Almanac	16 — 37	6 24 5	5 22 2½	2 9 —

STRUYK's CATALOGUE OF ECLIPSES.

Bef. Chr.	Eclipſes of the Sun and Moon ſeen at		M. & D.	Middle H. M	Digits eclipſed	Aft. Chr.	Eclipſes of the Sun and Moon ſeen at		M. & D.	Middle H. M.	Digits eclipſed
721	Babylon	☽	March 19	10 34	Total	45	Rome	☼	July 31	22 1	5 17
720	Babylon	☽	March 8	11 56	1 5	46	Pekin	☼	July 21	22 25	2 10
720	Babylon	☽	Sept. 1	10 18	5 4	46	Rome	☽	Dec. 31	9 52	Total
621	Babylon	☽	April 21	18 22	2 30	49	Pekin	☼	May 20	7 16	10 8
523	Babylon	☽	July 16	12 47	7 24	53	Canton	☼	March 8	20 42	11 6
502	Babylon	☽	Nov. 19	12 21	1 52	55	Pekin	☼	July 12	21 50	6 40
491	Babylon	☽	April 25	12 12	1 41	56	Canton	☼	Dec. 25	0 28	9 20
431	Athens	☼	Auguſt 3	6 35	11 0	59	Rome	☼	April 30	3 8	10 38
425	Athens	☽	October 9	6 45	Total	60	Canton	☼	October 13	3 31	10 30
424	Athens	☼	March 20	20 17	9 0	65	Canton	☼	Dec. 15	21 50	10 23
413	Athens	☽	Auguſt 27	10 15	Total	69	Rome	☽	October 18	10 43	10 49
406	Athens	☽	April 15	8 50	Total	70	Canton	☼	Sept. 22	21 13	8 26
404	Athens.	☼	Sept. 2	21 12	8 40	71	Rome	☽	March 4	8 32	6 0
403	Pekin	☼	Auguſt 28	5 55	10 40	95	Epheſus	☼	May 21	—	1 0
394	Gnide	☼	Auguſt 13	22 17	11 0	125	Alexandria	☽	April 5	9 16	1 44
383	Athens	☽	Dec. 22	19 6	2 1	133	Alexandria	☽	May 6	11 44	Total
382	Athens	☽	June 18	8 54	6 15	134	Alexandria	☽	October 20	11 5	10 19
382	Athens	☽	Dec. 12	10 21	Total	136	Alexandria	☽	March 5	15 56	5 17
364	Thebes	☼	July 12	23 51	6 10	237	Bologna	☼	April 12	—	Total
357	Syracuſe	☼	Feb. 28	22 —	3 33	238	Rome	☼	April 1	20 20	8 45
357	Zant	☽	Auguſt 29	7 29	4 21	290	Carthage	☼	May 15	3 20	11 20
340	Zant	☼	Sept. 14	18 —	9 0	304	Rome	☽	Auguſt 31	9 36	Total
331	Arbela	☽	Sept. 20	10 9	Total	316	Conſtantinople	☼	Dec. 30	19 53	2 18
310	Sicily Iſland	☼	Auguſt 14	20 5	10 22	334	Toledo	☼	July 17	at noon	Central
219	Mæſia	☽	March 19	14 5	Total	348	Conſtantinople	☼	October 8	19 24	8 0
218	Pergamos	☽	Sept. 1	riſing	Total	360	Iſpahan	☼	Auguſt 27	18 0	Central
217	Sardinia	☼	Feb. 11	1 57	9 6	364	Alexandria	☽	Nov. 25	15 24	Total
203	Fruſini	☼	May 6	2 52	5 40	401	Rome	☽	June 11	—	Total
202	Cumis	☼	October 18	22 24	1 0	401	Rome	☽	Dec. 6	12 15	Total
201	Athens	☽	Sept. 22	7 14	8 58	402	Rome	☽	June 1	8 43	10 2
200	Athens	☽	March 19	13 9	Total	402	Rome	☼	Nov. 10	20 33	10 30
200	Athens	☽	Sept. 11	14 48	Total	447	Compoſtello	☼	Dec. 23	0 46	1 —
198	Rome	☼	Auguſt 6	—	—	451	Compoſtello	☽	April 1	6 34	19 52
190	Rome	☼	March 13	18 —	11 0	451	Compoſtello	☽	Sept. 26	6 30	0 2
188	Rome	☼	July 16	20 38	10 48	458	Chaves	☼	May 27	23 16	18 53
174	Athens	☽	April, 30	14 33	7 1	461	Compoſtello	☽	March 1	13 2	11 11
168	Macedonia	☽	June 21	8 2	Total	464	Chaves	☼	July 19	19 1	10 15
141	Rhodes	☽	Jan. 27	10 8	3 26	484	Conſtantinople	☼	Jan. 13	19 53	10 0
104	Rome	☼	July 18	22 0	11 52	486	Conſtantinople	☼	May 19	1 10	5 15
63	Rome	☽	October 27	6 22	Total	497	Conſtantinople	☼	April 18	6 5	17 57
60	Gibraltar	☼	March 16	ſetting	Central	512	Conſtantinople	☼	June 28	23 8	1 50
54	Canton	☼	May 9	3 41	Total	538	England	☼	Feb. 14	19 —	8 23
51	Rome	☼	March 7	2 12	9 0	540	London	☼	June 19	20 15	8 —
48	Rome	☽	Jan. 18	10 0	Total	577	Tours	☽	Dec. 10	17 28	6 46
45	Rome	☽	Nov. 6	14 —	Total	581	Paris	☽	April 4	13 33	6 42
36	Rome	☼	May 19	3 52	6 47	582	Paris	☽	Sept. 17	12 41	Total
31	Rome	☼	Auguſt 20	ſetting	Gr.Ecl	590	Paris	☽	October 18	6 30	9 25
29	Canton	☼	Jan. 5	4 2	11 0	592	Conſtantinople	☼	March 18	22 6	10 0
28	Pekin	☼	June 18	23 48	Total	603	Paris	☼	Auguſt 12	3 3	11 20
26	Canton	☼	October 23	4 16	11 15	622	Conſtantinople	☽	Feb. 1	11 28	Total
24	Pekin	☼	April 7	4 11	2 0	644	Paris	☼	Nov. 5	0 30	9 53
16	Pekin	☼	Nov. 1	5 13	2 8	680	Paris	☽	June 17	12 30	Total
2	Canton	☼	Feb. 1	20 8	11 42	683	Paris	☽	April 16	11 30	Total
Aft.						693	Conſtantinople	☼	October 4	23 54	11 54
Chr.						716	Conſtantinople	☽	Jan. 13	7 —	Total
1	Pekin	☼	June 10	1 10	11 43	718	Conſtantinople	☼	June 3	1 15	Total
5	Rome	☼	March 28	4 13	4 45	733	England	☼	Auguſt 13	20 —	11 1
14	Panonia	☽	Sept. 26	17 15	Total	734	England	☽	Jan. 23	14 —	Total
27	Canton	☼	July 22	8 56	Total	752	England	☽	July 30	13 —	Total
30	Canton	☼	Nov. 13	19 20	10 30	753	England	☼	June 8	22 —	10 35
40	Pekin	☼	April 30	5 50	7 34	753	England	☽	Jan. 23	13 —	Total

STRUYK's CATALOGUE OF ECLIPSES.

Aft. Chr.	Eclipſes of the Sun and Moon ſeen at		M. & D.	Middle H. M.	Digits eclipſed
760	England	☼	Auguſt 15	4 —	8 15
760	London	☽	Auguſt 30	5 50	10 40
764	England	☼	June 4	at noon	7 15
770	London	☽	Feb. 14	7 12	Total
774	Rome	☽	Nov. 22	14 37	11 58
784	London	☽	Nov. 1	14 2	Total
787	Conſtantinople	☼	Sept. 14	20 43	9 47
796	Conſtantinople	☽	March 27	16 22	Total
800	Rome	☽	Jan. 15	9 0	10 17
807	Angouleſme	☼	Feb. 10	21 24	9 42
807	Paris	☽	Feb. 25	13 43	Total
807	Paris	☽	Auguſt 21	10 20	Total
809	Paris	☼	July 15	21 33	8 8
809	Paris	☽	Dec. 25	8 —	Total
810	Paris	☽	June 20	8 —	Total
810	Paris	☼	Nov. 30	0 12	Total
810	Paris	☽	Dec. 14	8 —	Total
812	Conſtantinople	☼	May 14	2 13	9 —
813	Cappadocia	☼	May 3	17 5	10 35
817	Paris	☽	Feb. 5	5 4	Total
818	Paris	☼	July 6	18 —	6 55
820	Paris	☽	Nov. 2	6 26	Total
824	Paris	☽	March 18	7 55	Total
828	Paris	☽	June 30	15 —	Total
828	Paris	☽	Dec. 24	13 45	Total
831	Paris	☽	April 30	6 19	11 8
831	Paris	☼	May 15	23 —	4 24
831	Paris	☽	October 24	11 18	Total
832	Fulda	☽	April 18	9 0	Total
840	Paris	☼	May 4	23 22	9 20
841	Paris	☼	October 17	18 58	5 24
842	Paris	☽	March 29	14 38	Total
843	Paris	☽	March 19	7 1	Total
861	Paris	☽	March 29	15 7	Total
878	Paris	☽	October 14	16 —	Total
878	Paris	☼	October 29	1 —	11 14
883	Arracta	☽	July 23	7 44	11 —
889	Conſtantinople	☼	April 3	17 52	9 23
891	Conſtantinople	☼	Auguſt 7	23 48	10 30
901	Arracta	☽	Auguſt 2	15 7	Total
904	London	☽	May 31	11 47	Total
904	London	☽	Nov. 25	9 0	Total
912	London	☽	Jan. 6	15 12	Total
926	Paris	☽	March 31	15 17	Total
934	Paris	☼	April 16	4 30	11 36
939	Paris	☼	July 18	19 45	10 7
955	Paris	☽	Sept. 4	11 18	Total
961	Rhemes	☼	May 16	20 13	9 18
970	Conſtantinople	☼	May 7	18 38	11 22
976	London	☽	July 13	15 7	Total
985	Meſſina	☼	July 20	3 52	4 10
989	Conſtantinople	☼	May 28	6 54	8 40
990	Fulda	☽	April 12	10 22	9 5
990	Fulda	☽	October 6	15 4	11 10
990	Conſtantinople	☼	October 21	0 45	10 5
995	Augſburgh	☽	July 14	11 27	Total
1009	Ferrara	☽	October 6	11 38	Total
1010	Meſſina	☼	March 18	5 41	9 12
1016	Nimeguen	☽	Nov. 16	16 39	Total
1017	Nimeguen	☼	October 22	2 8	6 —
1020	Cologne	☽	Sept. 4	11 38	Total
1023	London	☼	Jan. 23	23 29	11 —
1030	Rome	☽	Feb. 20	11 43	Total
1031	Paris	☽	Feb. 9	11 51	Total
1033	Paris	☽	Dec. 8	11 11	9 17
1034	Milan	☽	June 4	9 8	Total
1037	Paris	☼	April 17	20 45	10 45
1039	Auxerre	☼	Auguſt 21	23 40	11 5
1042	Rome	☽	Jan. 8	16 39	Total
1044	Auxerre	☽	Nov. 7	16 12	10 1
1044	Cluny	☼	Nov. 21	22 12	11 —
1056	Nuremburg	☽	April 2	12 9	Total
1063	Rome	☽	Nov. 8	12 16	Total
1074	Augſburgh	☽	October 7	10 13	Total
1080	Conſtantinople	☽	Nov. 23	11 12	9 36
1082	London	☽	May 14	10 32	10 2
1086	Conſtantinople	☼	Feb. 16	4 7	Total
1089	Naples	☽	June 25	6 6	Total
1093	Augſburgh	☼	Sept. 22	22 35	10 12
1096	Gembluors	☽	Feb. 10	16 4	Total
1096	Augſburgh	☽	Auguſt 6	8 21	Total
1098	Augſburgh	☼	Dec. 25	1 25	10 12
1099	Naples	☽	Nov. 30	4 58	Total
1103	Rome	☽	Sept. 17	10 18	Total
1106	Erfurd	☽	July 17	11 28	11 54
1107	Naples	☽	Jan. 10	13 16	Total
1109	Erfurd	☼	May 31	1 30	10 20
1110	London	☽	May 5	10 51	Total
1113	Jeruſalem	☼	March 18	19 0	9 12
1114	London	☽	Auguſt 17	15 5	Total
1117	Trier	☽	June 15	13 26	Total
1117	Trier	☽	Dec. 10	12 51	Total
1118	Naples	☽	Nov. 29	15 46	4 11
1121	Triers	☽	Sept. 27	16 47	Total
1122	Prague	☽	March 24	11 20	3 49
1124	Erfurd	☽	Feb. 1	6 43	8 39
1124	London	☼	Auguſt 10	23 29	9 58
1132	Erfurd	☽	March 3	8 14	Total
1133	Prague	☽	Feb. 20	16 41	3 23
1135	London	☽	Dec. 22	20 11	Total
1142	Rome	☽	Feb. 11	14 17	8 30
1143	Rome	☽	Feb. 1	6 36	Total
1147	Auranches	☼	October 25	22 38	7 20
1149	Bary	☽	March 25	13 54	5 29
1151	Eimbeck	☽	Auguſt 28	12 4	4 29
1152	Augſburgh	☼	Jan. 26	0 42	11 —
1154	Paris	☽	June 26	16 1	Total
1154	Paris	☽	Dec. 21	8 30	4 42
1155	Auranches	☽	June 16	8 45	0 53
1160	Rome	☽	Auguſt 18	7 53	6 49
1161	Rome	☽	Auguſt 7	8 15	Total
1162	Erfurd	☽	Feb. 1	6 40	5 56
1162	Erfurd	☽	July 27	12 30	4 11
1163	Mont Caſſin	☼	July 3	7 40	2 0
1164	Milan	☽	June 6	10 0	Total
1168	London	☽	Sept. 18	14 0	Total
1172	Cologne	☽	Jan. 11	13 31	Total
1176	Auranches	☽	April 25	7 2	8 6
1176	Auranches	☽	October 19	11 20	8 53
1178	Cologne	☽	March 5	ſetting	7 52
1178	Auranches	☽	Auguſt 29	13 52	5 31
1178	Cologne	☼	Sept. 12	———	10 51

STRUYK's CATALOGUE OF ECLIPSES.

Aft. Chr.	Eclipſes of the Sun and Moon ſeen at		M. & D.	Middle H.	M.	Digits eclipſed
1179	Cologne	☽	Auguſt 18	14	28	Total
1180	Auranches	☼	Jan. 28	4	14	10 34
1181	Auranches	☼	July 13	3	15	3 48
1181	Auranches	☽	Dec. 22	8	58	4 40
1185	Rhemes	☼	May 1	1	53	9 0
1186	Cologne	☽	April 5	6	—	Total
1186	Franckfort	☼	April 20	7	19	4 0
1187	Paris	☽	March 25	16	17	8 42
1187	England	☼	Sept. 3	21	54	8 6
1189	England	☽	Feb. 2	10	—	9 —
1191	England	☼	June 23	0	20	11 32
1192	France	☽	Nov. 20	14	—	6 —
1193	France	☽	Nov. 10	5	27	Total
1194	London	☼	April 22	2	15	6 49
1200	London	☽	Jan. 2	17	2	4 35
1201	London	☽	June 17	15	4	Total
1204	England	☽	April 15	12	39	Total
1204	Saltzburg	☽	October 10	6	32	Total
1207	Rhemes	☼	Feb. 27	10	50	10 20
1208	Rhemes	☽	Feb. 2	5	10	Total
1211	Vienna	☽	Nov. 21	13	57	Total
1215	Cologne	☽	March 16	15	35	Total
1216	Acre	☼	Feb. 18	21	15	11 36
1216	Acre	☽	March 5	9	38	7 4
1218	Damiétta	☽	July 9	9	46	11 31
1222	Rome	☽	October 22	14	28	Total
1223	Colmar	☽	April 16	8	13	11 0
1228	Naples	☼	Dec. 27	9	55	9 19
1230	Naples	☼	May 13	17	—	Total
1230	London	☽	Nov. 12	13	21	9 34
1232	Rhemes	☼	October 15	4	29	4 25
1245	Rhemes	☼	July 24	17	47	6 —
1248	London	☽	June 7	8	49	Total
1255	London	☽	July 20	9	47	Total
1155	Conſtantinople	☼	Dec. 30	2	52	Annul.
1258	Augſburgh	☽	May 18	11	17	Total
1261	Vienna	☼	March 31	22	40	9 8
1262	Vienna	☽	March 7	5	50	Total
1262	Vienna	☽	Auguſt 30	14	39	Total
1263	Vienna	☽	Feb. 24	6	52	6 29
1263	Augſburgh	☼	Auguſt 5	3	24	11 17
1263	Vienna	☽	Auguſt 20	7	35	9 7
1265	Vienna	☽	Dec. 23	16	25	Total
1267	Conſtantinople	☼	May 24	23	11	11 40
1270	Vienna	☼	March 22	18	47	10 40
1272	Vienna	☽	Auguſt 10	7	27	8 53
1274	Vienna	☽	Jan. 23	10	39	9 25
1275	Lauben	☽	Dec. 4	6	20	4 29
1276	Vienna	☽	Nov. 22	15	—	Total
1277	Vienna	☽	May 18	———		Total
1279	Franckfort	☼	April 12	6	55	10 6
1280	London	☽	March 17	12	12	Total
1284	Reggio	☽	Dec. 23	16	11	9 13
1290	Wittemburg	☼	Sept. 4	19	37	10 30
1291	London	☽	Feb. 14	10	2	Total
1302	Conſtantinople	☽	Jan. 14	10	25	Total
1307	Ferrara	☼	April 2	22	18	0 54
1309	London	☽	Feb. 24	17	44	Total
1309	Lucca	☽	Auguſt 21	10	32	Total
1310	Wittemburg	☼	Jan. 31	2	2	10 10
1310	Torcello	☽	Feb. 14	4	8	10 20
1310	Torcello	☽	Auguſt 10	15	33	7 16
1312	Wittemburg	☼	July 4	19	49	3 23
1312	Plaiſance	☽	Dec. 14	7	19	Total
1313	Torcello	☽	Dec. 3	8	58	9 34
1316	Modena	☽	October 1	14	55	Total
1321	Wittemburg	☼	June 25	18	1	11 17
1323	Florence	☽	May 20	15	24	Total
1324	Florence	☽	May 9	6	3	Total
1324	Wittemburg	☼	April 23	6	35	8 8
1327	Conſtantinople	☽	Auguſt 31	18	26	Total
1328	Conſtantinople	☽	Feb. 25	13	47	11 —
1330	Florence	☽	June 30	15	10	7 34
1330	Conſtantinople	☼	July 16	4	5	10 43
1330	Prague	☽	Dec. 25	15	49	Total
1331	Prague	☼	Nov. 29	20	26	7 41
1331	Prague	☽	Dec. 14	18	—	11 —
1333	Wittemburg	☼	May 14	3	—	10 18
1334	Ceſena	☽	April 19	10	33	Total
1341	Conſtantinople	☽	Nov. 23	12	23	Total
1341	Conſtantinople	☼	Dec. 8	22	15	6 30
1342	Conſtantinople	☽	May 20	14	27	Total
1344	Alexandria	☼	October 6	18	40	8 55
1349	Wittemburg	☽	June 30	12	20	Total
1354	Wittemburg	☼	Sept. 16	20	45	8 43
1356	Florence	☽	Feb. 16	11	43	Total
1361	Conſtantinople	☼	May 4	22	15	8 54
1367	Sienna	☽	Jan. 16	8	27	Total
1389	Eugibio	☽	Nov. 3	17	5	Total
1396	Augſburgh	☼	Jan. 11	0	16	6 22
1396	Augſburgh	☽	June 21	11	10	Total
1399	Forli	☼	October 29	0	43	9 —
1406	Conſtantinople	☽	June 1	13	—	10 31
1406	Conſtantinople	☼	June 15	18	1	11 38
1408	Forli	☼	October 18	21	47	9 32
1409	Conſtantinople	☼	April 15	3	1	10 48
1410	Vienna	☽	March 20	13	13	Total
1415	Wittemburg	☼	June 6	6	43	Total
1419	Franckfort	☼	March 25	22	5	1 45
1421	Forli	☽	Feb. 17	8	2	Total
1422	Forli	☽	Feb. 6	8	26	11 7
1424	Wittemburg	☼	June 26	3	57	11 20
1431	Forli	☼	Feb. 12	2	4	1 39
1433	Wittemburg	☼	June 17	5	—	Total
1438	Wittemburg	☼	Sept. 18	20	59	8 7
1442	Rome	☽	Dec. 17	3	56	Total
1448	Tubing	☼	Auguſt 28	22	23	8 53
1450	Conſtantinople	☽	July 24	7	19	Total
1457	Vienna	☽	Sept. 3	11	17	Total
1460	Auſtria	☽	July 3	7	31	5 23
1460	Auſtria	☼	July 17	17	32	11 19
1460	Vienna	☽	Dec. 27	13	30	Total
1461	Vienna	☽	June 22	11	50	Total
1461	Rome	☽	Dec. 17	———		Total
1462	Viterbo	☽	June 11	15	—	7 38
1462	Viterbo	☼	Nov. 21	0	10	2 6
1464	Padua	☽	April 21	12	43	Total
1465	Rome	☼	Sept. 20	5	15	8 46
1465	Rome	☽	October 4	5	12	Total
1469	Rome	☽	Jan. 27	7	9	Total
1485	Norimburg	☼	March 16	3	53	11 —

Various machines have been contrived to explain and illuſtrate the doctrine of eclipſes. In all the mathematical ſhops are to be found tellurıums and lunariums, which are ſaid to be made for this purpoſe; for which, in fact, they are utterly unfit. For thoſe converſant on the ſubject, machines are unneceſſary; for thoſe who are not, particularly young people, theſe machines are only calculated to give them erroneous notions. What little difficulty there is in the general principle, that requires this kind of illuſtration, is not to ſhew how there is an eclipſe, but how it happens that moſt often there is not: now, in the above-mentioned inſtruments, the moon is in eclipſe for nearly one-half of the month, and the ſun during the remainder. This great defect ariſes from the impropriety of attempting to introduce the ſun, moon, and earth, on one machine, intended to illuſtrate appearances in aſtronomy, the particular modifications of which depend altogether on the relative magnitudes and diſtances of the bodies which produce the phenomena.

In the lectures which were given this year at the Royal Inſtitution by Mr. Pond, a machine was exhibited, which was entirely free from theſe objections. The ſun was altogether omitted, and ſuppoſed to be at a great diſtance, for inſtance, a mile: by this means, the magnitudes of the earth and moon, and the proportionate dimenſions of the lunar orbit, were preſerved. The machine being adjuſted for the preſent year, the moon revolved round the earth at her proper diſtance, and became, in the courſe of the year, twice eclipſed on the days marked in the ephemeris. An index, pointing to the ſun, carried a ſmall circle of card, repreſenting the ſolar ecliptic limit: twice in the courſe of the year the moon came within the circumference of this card, indicating that there would be a ſolar eclipſe. The machine is extremely ſimple in its conſtruction: it was made under the direction of Mr. D. Adams of Fleet-ſtreet, by Mr. R. Newman, a very intelligent and ingenious workman, who is very well known in his profeſſion.

The following deſcription, illuſtrated with a plate, will give the reader a perfect idea of the nature of it.

Deſcription of the Machine, to illuſtrate the Phenomena of Eclipſes.

This inſtrument has the earth in the centre, half an inch in diameter, on which is fixed a piece of black wood, about 15 inches long, to repreſent the ſhadow of the earth from the ſun: this earth, with the ſhadow, has a revolution on its axis in 365 days 6 hours. Underneath the earth, on the ſame centre, is a ſocket going round in 27 days 8 hours, on which is fixed an arm for carrying a ſmall ball, to repreſent the moon, 15 inches in length, that the moon may paſs clear of the end of the earth's ſhadow. This ball, which repreſents the moon, is about one-third the diameter of the earth.

Underneath the ſocket that carries the moon is another ſocket, going round retrograde, or contrary to the ſigns in the ecliptic, in 18 years 225 days, on which is fixed a circle with the moon's nodes, and latitude for every part of her orbit. This circle inclines to the ecliptic in an angle of 5° 18′, giving the moon's orbit an angle of 5° 18′ with the ecliptic.

Underneath the ſocket that carries the moon's orbit, and near the large plate on which is engraven the ſigns and degrees of the ecliptic, and the months and days of the month anſwering thereto, is a ſocket carrying round an index, to ſhew the ſun's place in the ecliptic, in 365 days 6 hours. This index points to the day of the month and ſun's place in the ecliptic through the year.

On the arm that carries the above index is fixed a circle, divided into $29\frac{1}{2}^{d}$ for ſhewing the moon's age in any part of her orbit.

On the ecliptic plate is a circle, divided into twice 12 hours, for ſhewing the hour of the day or night, by an index that moves round by the machine in 24 hours.

This inſtrument is conſtructed for ſhewing the mean time of all the new and full moons, and ſolar and lunar eclipſes, for any given year.

The above being the particulars of the different parts of the machine, we ſhall now ſhew that the machine, ſo conſtructed, will exactly anſwer the intended purpoſes.

In the firſt place, the earth being half an inch in diameter, and the moon nearly one-third the diameter of the earth, the true proportional diſtance of the moon from the earth will be about 30 times the diameter of the earth, equal to 15 inches.

The moon moves round the earth, from any particular meridian to the ſame meridian again, in 27 days 8 hours, (the moon's orbit inclining to the ecliptic 5° 18′;) but from the ſun to the ſun again, in 29 days 12 hours; the ſun having gone about 28° in the ecliptic, while the moon makes one revolution round the earth, and overtakes the ſun again in about 2 days 4 hours after paſſing the ſame meridian on the earth it ſet out from: the ſun, with the annual index moving round in the exact time with the earth's ſhadow, throws the earth's ſhadow always in its true place.

To find the time that the new and full moons and eclipſes will happen, on any given year, by the machine.—Firſt, by an ephemeris, find the exact time of the firſt new or full moon in January; ſet the annual index to the day of the month in the ecliptic; bring the earth's ſhadow oppoſite the ſun; if for new moon, bring the moon by turning the winder exactly between the ſun and earth; but if for full moon, bring the moon oppoſite the ſun, with the earth between the ſun and moon; ſet the hour-index to the time in the hour-circle; then find the place in the ecliptic of the aſcending or deſcending node, and ſet to its place in the ecliptic. This done, the inſtrument is rectified for uſe.

We will now ſuppoſe the inſtrument ſet to the firſt new moon in January: turn the winder, until the moon comes oppoſite where it ſet out from, which will be about the 15th day of the moon's age, in the circle of $29\frac{1}{2}'$; the annual index will point out the day of the month of the full moon; and the hour-index, the hour the moon is full; turn the winder, until the moon comes exactly between the ſun and the earth, and you will have the exact time of new moon; and ſo on, for every new and full moon throughout the year.

As no ſolar eclipſe can happen but at new moon, nor lunar eclipſe can happen but at full moon, continue turning the winder, until you ſee the moon enter the end of the earth's ſhadow, and the annual index will ſhew the day, and the hour-index will ſhew the hour, the firſt lunar eclipſe will happen on that year, for then the moon will be in the node of her orbit; and when the moon comes between the ſun and earth in her node, it will be the firſt ſolar eclipſe; and ſo on for every eclipſe through the year. At new or full moon, when there is no eclipſe, the moon will paſs either above or below the earth's ſhadow, according to the moon's latitude at the time.

In the figure (*fig.* 100.) in which this machine is repreſented, E*s* repreſents the earth's ſhadow, E*x* a fine wire or index in the ſame ſtraight line as the ſhadow, which always points to the ſame place. The arm carrying the moon has a hinge, by which means it always falls, and runs upon a ſmall wheel on the inclined plane, which repreſents the moon's orbit; the plane of the dial-plate repreſents the plane of the ecliptic. The reſt will eaſily be underſtood by inſpection.

ECLIPTA,

ECLIPTA, in *Botany*, from εκλειπω, *to be deficient*, alluding, as it ſhould ſeem, to the want of a crown, or wing, to the ſeeds, one of the chief characters that diſtinguiſh it from *Verbeſina*, with which it had formerly been confounded by Linnæus himſelf. Linn. Mant. 2. 157. Schreb. 569. Willd. Sp. Pl. v. 3. 2217. Juſſ. 187. Mart. Mill. Dict. v. 2. Gærtn. t. 169. (Eupatoriophalacron, Vaillant Mem. de l'Acad. des Sc. for 1720. Dill. Elth. 138. t. 113) Claſs and order, *Syngeneſia Polygamia-ſuperflua*. Nat. Ord. *Compoſitæ, oppoſitifoliæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* of many lanceolate nearly equal leaves, in a double row. *Cor.* compound, radiated; florets of the radius very numerous; female ſtrap-ſhaped, extremely narrow; thoſe of the diſk hermaphrodite, tubular, four-cleft, erect, nearly on the outſide. *Stam.* (in the latter.) Filaments four, very ſhort; anthers forming a cylinder. *Piſt.* (in the ſame.) Germen oblong; ſtyle moderately long; ſtigma of two ſpreading lobes. Germen in the female florets triangular; ſtyle and ſtigma as in the others. *Peric.* none, except the permanent calyx. *Seed* of the diſk oblong, compreſſed, crenulated, obtuſe, naked; of the radius triangular, oblong, crenulated, obtuſe, naked. *Recept.* flattiſh, clothed with very narrow upright ſcales.

Obſ. It differs from *Verbeſina* in having the florets of the diſk four-cleft, and naked ſeeds; and from *Cotula* in its ſcaly receptacle.

Eſſ. Ch. Receptacle chaffy. Seed-down none. Florets of the diſk four-cleft.

The number of ſpecies in Willdenow is ſeven, annuals of a very mean aſpect, growing on waſte, or cultivated ground, in the Eaſt Indies, or warmer parts of America. Their ſtem is branched. Leaves oppoſite, lanceolate, or ovate, acute, ſerrated, rough, more or leſs ſtalked. Flowers ſmall and inelegant, whitiſh, or yellowiſh, on long, ſimple, ſlender, lateral, axillary, or terminal, ſtalks. Scales of the calyx broad and hairy. Michaux deſcribes one ſpecies, his E. *brachypoda*, Fl. Boreal. Amer. v. 2. 130, as having the florets five-cleft. E. *erecta*, from South America, and E. *proſtrata*, from the Eaſt Indies, have been introduced into our ſtoves, certainly rather for curioſity than ornament. E. *punctata* is ſaid to afford a juice which turns black, when expoſed to the air, and is uſed by the negroes in the Weſt Indies to deepen the colour of their ſkin.

ECLIPTIC, Eclipticus, ſomething belonging to eclipſes. All new and full moons are not ecliptic, *i. e.* eclipſes do not happen every new and full moon, though there be then an interpoſition, either of the earth between the ſun and moon, or of the moon between the ſun and earth. The reaſon is, that the interpoſition is only as to longitude, and not as to latitude. The ſun is always in the ecliptic, but the moon is not; ſhe deviates from it above five degrees, and ½, ſometimes on the north ſide, and ſometimes on the ſouth. But every five months, or thereabouts, ſhe cuts the ecliptic; and it is only about thoſe times, that there can be eclipſes either of the moon or ſun. The places wherein ſhe cuts the ecliptic, are called the nodes of the moon. See Eclipse.

Ecliptic *bounds*, or *limits*, are the greateſt diſtances from the nodes at which the ſun and moon can be eclipſed. See Eclipse.

Ecliptic *digits, digiti ecliptici.* See Digits.

Ecliptic, in *Aſtronomy*, a great circle of the ſphere in which the ſun deſcribes its annual courſe.

It is ſometimes defined the projection in the heavens of the line deſcribed by the centre of gravity of the earth and moon, as ſeen from the centre of the ſun.

To have determined the exact path deſcribed by the apparent motion of the ſun, muſt have required the continued obſervations of many centuries. The path of the ſun, reſulting from the combination of its annual and diurnal motion, is, in fact, a ſpiral, and may be repreſented by winding a thread round that part of the celeſtial globe which comprehends the annual motion of the ſun, beginning at either ſolſtice, and making as many turns between it and the equator, as the ſun employs days to traverſe that part of his annual path. But the diſtance between the conſecutive threads would not be equal; they would almoſt coincide with each other near the ſolſtices, and would gradually widen as they approached the equator. An obſerver at the pole, if it were habitable, would ſee the whole of this ſpiral; and it is eaſy to conceive how familiar he might be with this phenomenon, without any idea of ſuch a circle as the ecliptic ever ſuggeſting itſelf to his imagination.

This ſpiral motion of the ſun may be conceived as produced by a motion nearly uniform, combined with a rectilinear motion extremely unequal. It may be repreſented by drawing a line on the celeſtial globe from the equator to the ſolſtice, the globe being, at the ſame time, ſuppoſed to be in motion round its axis; but the line muſt not be drawn with a uniform motion, but gradually retarded as the tracing point approaches the ſolſtice.

This may ſeem a very complicated way of arriving at a knowledge of the ecliptic; but we muſt recollect, that the problem is really repreſented to us in this form by nature. The Greeks were acquainted with the irregular ſpiral above deſcribed long before they had any conception of the exiſtance of ſuch a curve as the ecliptic. With them the difficulty of the problem conſiſted in reconciling this irregular motion of the ſun, from north to ſouth, with that ſimplicity they were accuſtomed to attribute to the operations of nature; and they were at a loſs to conceive what impediment the ſun met with in his path that could thus retard his progreſs, and compel him to return. Their philoſophers, who had more imagination than judgment, explained this phenomenon ſomething in this manner. They ſuppoſed that the ſun, as he approached the north, was impeded in his courſe by the increaſing thickneſs of the atmoſphere, which, by continually increaſing the difficulty of his progreſs, at length induced him to alter his courſe; that when, on his progreſs back again towards the ſouth, he croſſed the equator, finding there the climate more congenial to his nature, he proceeded with vivacity; but on again approaching the more intemperate regions, he found the climate ſo contrary to his nature, that he was again compelled to return.

Though the explanation of the phenomena, ariſing from the ſun's annual and diurnal motion, was known to the Eaſtern nations at a very early period of antiquity; yet the merit of the diſcovery has by ſome writers been attributed to Anaximander, an aſtronomer of the Ionian ſchool, who flouriſhed about 600 years before the Chriſtian era. He was a diſciple of Thales, who ſeems to have acquired his knowledge from the aſtronomers of Egypt. Both Thales and his ſucceſſors explained the motion of the ſun as we do at the preſent day. They appear diſtinctly to have underſtood how the above-mentioned ſpiral aroſe from the ſimple combination of two circular motions.

The nature of the ecliptic being once underſtood, the next object was to determine its inclination to the equator. The moſt ancient inſtrument for this purpoſe was, no doubt, the gnomon, or upright pillar to caſt a ſhadow of the ſun; the length of this ſhadow was obſerved throughout the year, particularly at the ſolſtices, by which means the ſun's greateſt and leaſt altitude was obtained: half of this difference, namely, half the difference between the altitude at the longeſt, and the altitude of the ſhorteſt day, was evidently the obliquity of the ecliptic. This being once determined, it became requiſite to deviſe ſome method of placing this circle in its poſition on the celeſtial ſphere; for, we ſhould obſerve, that none of the preceding obſervations give us any inſight into the true ſituation of the equinoctial points in the heavens. It was eaſy to determine, by the foregoing methods, the ſituation of the ſun at any moment, with reſpect to the equinoctial points; but to place the ecliptic on the ſphere, it was requiſite to know, at the ſame moment, the ſituation of the ſun, with reſpect to ſome given ſtar.

Before the invention of the pendulum this was an operation of great difficulty; for the ſun never being viſible, at the ſame moment, with any of the fixed ſtars, it was not eaſy to meaſure his diſtance from any of them. The ancient aſtronomers had recourſe to the moon as an intermediate object of compariſon. The moon is often viſible at the ſame time with the ſun; it was, therefore, practicable to meaſure the diſtance from the ſun to the moon; they then waited till the ſun deſcended below the horizon, and then meaſured the diſtance between the moon and any remarkable ſtar, and, by allowing for the motion of the moon in its orbit during this ſhort interval, they thus accompliſhed their purpoſe. Modern aſtronomers effect this by comparing the meridian tranſit of the ſun with that of the principal fixed ſtars, and thus determine the right aſcenſion of each. See TRANSIT and RIGHT ASCENSION.

This great circle of the ſphere being once placed in its proper poſition among the conſtellations of the fixed ſtars, according to the method above deſcribed, it was natural to ſuppoſe it would retain its poſition conſtantly the ſame; but, when practical aſtronomy had attained to ſome conſiderable degree of perfection under the aſtronomers of the Alexandrine ſchool, Hipparchus, by comparing his obſervations with thoſe of his predeceſſors, obſerved, that the ecliptic had certainly changed its ſituation relative to the equator. If this diſcovery of Hipparchus appeared to him entirely new, (and there is no reaſon to doubt it,) it is a proof of the great decline of aſtronomy in Egypt in his time; for certainly this phenomenon, now called the preceſſion of the equinoxes, muſt have been known, in ſome form or other, to the more early aſtronomers, as the effect of it is to render inaccurate the rules laid down by ancient authors for the regulation of the ſeaſons. Ancient zodiacs, likewiſe, prove that the ecliptic and equator were known to interſect each other, in points very different from thoſe determined by the predeceſſors of Hipparchus. There is, however, ſome obſcurity in theſe zodiacs; the equator and ecliptic are not laid down in the diſtinct manner they are on our globes, but often in a rude and unintelligible manner. One of thoſe, however, lately found in Upper Egypt, ſeems to refer to a period about 2000 years before the Chriſtian era. The writings of Heſiod, from ſimilar conſiderations, appear to refer to the year 900 A. C.; therefore, the effects of this phenomenon muſt have been known: but, perhaps, before the time of Hipparchus, they had never been attributed diſtinctly to their proper cauſe. The ecliptic, being divided into four equal parts by the equinoctial and ſolſticial points, the ſun was naturally ſuppoſed to deſcribe them in four equal portions of time; for the ecliptic, being a great circle, and every part of a circle bearing the ſame relation to its centre, what reaſon could be given why the ſun ſhould deſcribe equal portions of the ecliptic in unequal periods of time? Yet Hipparchus, when he came to examine more attentively, than had been done before, the circumſtances of the ſun's motion, found, that the ſun took above eight days more to perform the ſummer half than the winter half of the ecliptic: the time of his paſſing through the two equinoxes was likewiſe unequally divided by the ſolſtices. This unexpected phenomenon led to a more mathematical inveſtigation of the nature of the ſun's orbit. Hipparchus, and ſucceeding aſtronomers, explained this phenomenon, by ſuppoſing it was only an optical illuſion, cauſed by the earth's being placed in an eccentric poſition relative to the orbit of the ſun, which they imagined to be a perfect circle, deſcribed with a motion, likewiſe, perfectly uniform: this theory continued, till the beautiful diſcovery of Kepler demonſtrated the ſun's apparent orbit to be an ellipſe, and that the centre of motion was in one of the foci. In this ellipſe, the ſun deſcribes equal areas in equal times. But in either hypotheſis, there are two points of the apparent orbit of the ſun, in which he is at his leaſt and greateſt diſtance from the earth; theſe points are called the *perigee* and *apogee.* To complete, therefore, the theory of the ecliptic, it was neceſſary to determine the ſituation of theſe two points. This was done by Hipparchus, who determined the poſition of the perigee, about 150 A. C. to precede the winter ſolſtice.

Theſe points, like the equinoctial points, do not remain at reſt, but their motion is in an oppoſite direction. It was Albategnius, an Arabian aſtronomer, who flouriſhed in the middle ages, who firſt diſcovered the motion of the perigee; it advances 15″ with reſpect to a given fixed ſtar, and 65″ with reſpect to the equinoxes.

The great circle in the heavens then, which we call the ecliptic, is the perſpective repreſentation of the apparent orbit of the ſun, and neceſſarily partakes of all the irregularity of the original, in whatever relates to the ſun's motion. We thus ſee the reaſon why the ſeaſons are divided unequally, for the winter and ſummer half year can never be equal, but in the rare occurrence of the coincidence of the perigee with the vernal or autumnal equinox. It is a very curious circumſtance, that this coincidence did actually take place at the period in which chronologiſts place the creation of the world, that is, about the year 4000 A.C. Each hemiſphere of the earth had then an equal portion of the light and heat of the ſun, but as the perigee continued to advance on the ecliptic, the northern hemiſphere gradually obtained the greateſt ſhare, and about the year 1250 it attained its maximum of advantage; ſince that time the advantage in favour of the northern hemiſphere, though ſtill very conſiderable, continues to diminiſh, and will do ſo till the year 6470, when the perigee will coincide with the vernal equinox, and produce again a perfect equality between the two hemiſpheres. After this period, the ſouthern hemiſphere will obtain the advantage, and preſerve it in the ſame manner during another period of upwards of ten thouſand years.

But theſe are far from being the only irregularities to which the ſolar orbit is ſubject, and which find their correſponding ones in the ecliptic.

It not only continually changes its obliquity with reſpect to the equator, but alſo its poſition relatively to the fixed ſtars. Its poſition has varied ſlowly in the courſe of many ages, ſo that its moſt northern point is now more remote from the pole ſtar than it was in the time of Eratoſthenes, who obſerved its place 230 years before the birth of Chriſt. It appears from La Grange's calculations, that the limit of its greateſt variation among the fixed ſtars is about 10° or 12°, but the obliquity of the ecliptic to the equator never can differ more than two or three degrees, ſince the equator will follow, in ſome meaſure, the motion of the ecliptic.

On the Obliquity of the Ecliptic.

Sufficient proofs may be drawn from ancient obſervations of the diminution of the obliquity of the ecliptic; but whether the fact was known to the ancient aſtronomers, from a compariſon of ſtill more ancient obſervations, may admit of ſome doubt. Herodotus relates that the Egyptians had a tradition that the ecliptic was once perpendicular to the equator; this we know could not be true, but it indicates a theory of continued diminution, which might eaſily have aſſumed the form of a tradition; but conſidering what exact obſervations muſt have been neceſſary to have eſtabliſhed this theory, it is not impoſſible that it was only a fortunate conjecture.

Ptolemy expreſsly ſays (Almag. l. 11.) that he found, during many years, the diſtance of the tropics 47°, with two-thirds of a major portion, (or of a degree,) and three-quarters of a minor portion, (or of a minute,) that is to ſay, 47° 40′ 45″, the half of which is 23° 50′ 22″.

This, he adds, is nearly the ſame reſult which was found by Eratoſthenes, and of which Hipparchus has made uſe; for the diſtance of the ſolſtitial points is according to them, $\frac{11}{83}$ of the circumference of the meridian; which makes it 23° 51′ 20″, about 250 years before our era.

Ptolemy gives, at the end of his book, a table of ſhadows under different parallels; it is there ſhewn that the height of the gnomon being 60 parts, the length of the ſhadow at Marſeilles was $20\frac{5}{6}$. This determination is attributed to Pytheas. Theſe ancient obſervations agree very nearly in giving the obliquity of the ecliptic 23° 51′, 200 years before our era. If this obliquity be compared with that which is actually obſerved, 23° 28′, a diminution of 69″ every century is diſcovered.

Riccioli endeavours to prove that the obliquity of the ecliptic was then only $23\frac{1}{2}''$; but he could not poſſeſs proofs ſufficiently demonſtrative to contradict four ancient obſervations, which could be eaſily made at leaſt within an error of 10′.

It is true, that conſulting Pappus of Alexandria, who lived 200 years after Ptolemy, the obliquity of the ecliptic is found nearly the ſame as it is at preſent; but it is by admitting the interpretation of Commandinus, which Vindelinus thought ſhould not be relied on. Beſides, Pappus was not ſo correct an obſerver as Eratoſthenes, Hipparchus, and Ptolemy, and his object was not to give an aſtronomical determination of the obliquity of the ecliptic.

From the year 106 before our era, the Chineſe aſtronomers give as a known principle, the obliquity of the ecliptic 24 Chineſe degrees, which is 23° 39′ 18″; this quantity is leſs than that of the Greeks; but it proves, nevertheleſs, a diminution in the obliquity of the ecliptic, which even agrees with many modern obſervations, and gives a diminution of 35″ every century.

Albategnius, who lived about the year 880, ſays that he obſerved the zenith diſtance of the ſun on the meridian, at Aracte, to be 59° 36′ in winter, and that the leaſt was 12° 26′, from which he concludes the obliquity of the ecliptic 23° 35′. This obſervation was made with a very long and accurate ſtaff: 40″ muſt be added to it for the effect of refraction, minus the parallax, and we ſhall get $23° 35\frac{2}{3}'$ for the obliquity of the ecliptic about the year 900; we ſhould infer from this a diminution of 50″ every century. This obſervation differs but little from that of Almamoun; the diminution which it gives is a medium between thoſe which are deduced from more ancient obſervations. Edward Bernard has produced many other obſervations from the Arabians on the obliquity of the ecliptic, in the Philoſophical Tranſactions of 1684. They may be found likewiſe in a long memoir given by M. De la Lande on this ſubject, in the Mem. de l'Academie, 1780.

By the obſervations of Co-cheou-King it is found to be 23° 32′ 12″, for 1278.

By thoſe of Waltherus, made at Nuremberg, La Caille finds it 2° 29′ 47″ for 1490. (Mem. Ac. 1757.) There reſults from hence a diminution of 34″ in a century.

According to Tycho Brahe, the obliquity of the ecliptic, in 1587, was 23° 31′ 30″; but calculating all his obſervations more correctly, it is found to be 23° 29′ 30″, which gives the diminution 44″.

The obſervations of Hevelius give for 1660, 23° 29′ 0″, a diminution of 46″ in a century. P. Ximenes, by means of the gnomon at Florence, conſtructed about 1480, found 34″. (Mem. 1780.) The younger Caſſini, by the obſervations of Richer, made at Cayenne in 1672, found the obliquity 23° 28′ 54″; and by thoſe made by his father, made with the gnomon, at St. Petroni, 23° 29′ 0″. This is what he employs himſelf in his tables. The obſervations of Richer have been diſcuſſed by M. Le Monnier. (Mem. Ac. 1769 and 1774.) They ſeem to give a diminution of 33″ in a century.

Flamſteed alſo, in 1689 and 1690, found by repeated obſervations, the obliquity of the ecliptic 23° 28′ 56″; 8″ muſt be taken from it, and we ſhall obtain the mean obliquity for 1690, 23° 28′ 48″, a quantity greater by 30″ than that given by all modern obſervations, and which gives the diminution 47″. He examined the obſervations of Waltherus, Tycho, Riccioli, Hevelius, Mouton, Richer, De la Hire, and Margraf, and he always found the ſame reſult from thoſe neareſt to each other, as well as from thoſe moſt diſtant: but the ſyſtem which Flamſteed had embraced, made him, perhaps, give the preference to thoſe obſervations which were favourable to it.

Bianchini, in 1703, found the obliquity of the ecliptic 23° 28′ 35″. Horrebow, by the obſervations of Reaumur, made in 1709, finds 23° 28′ 47″.

The younger Caſſini, by obſervations made in the laſt century, at the obſervatory of Paris, finds the diminution $63\frac{1}{2}''$. (Mem. l'Acad. 1778. Connoiſſ. des Temps. 1781.) M. Mechain, by a great number of compariſons, found it 39″ in 1780. M. De La Lande conſiders that 33″ reconciles the greateſt number of obſervations. Mem. l'Acad. 1780.

Dr. Maſkelyne, by the obſervation of many ſolſtices, with excellent inſtruments, from 1765 to 1772, finds the mean obliquity for the 1ſt of January 1769, to be 23° 28′ 8″.5 (Phil. Tranſ. 1787.) If this be compared with that found by Bradley for 1750, 23° 28′ 19″, a diminution of 55″ or 54″ in a century is found. M. Hornſby finds 58″ ſince 1774. The obſervations of Almamoun, Albategnius, Co-cheou King, and Hevelius, give 50″. The theory likewiſe gives 50″, when the maſs of Venus is taken according to M. De la Lande.

The new ſolar tables publiſhed by the Board of Longitude, at Paris, ſuppoſe the obliquity 23° 27′ 57″ for the year 1800. According to Piazzi it is 23° 27′ 56″.3; and Dr. Maſkelyne found 23° 27′ 56″.6, by obſervations of the three ſolſtices of 1800, 1802, and 1803. Mr. Pond, by ſome obſervations made with an aſtronomical circle, by Troughton, at Weſtbury, found the obliquity, in 1800, to be 23° 27′ 56″.5.

Delambre's obſervations were made with the repeating circle of Borda, for twelve different ſolſtices, and from his determination the French tables were conſtructed.

It is, then, proved by obſervations made on the obliquity of the ecliptic at every period, as well as by the latitudes of ſtars mentioned by Ptolemy, that the ecliptic approaches the equator, as may be ſeen by the following table, in which the obſervations of aſtronomers of all ages have been collected together.

Author's Names.	Years before Chriſt.	Obliquity
Pytheas	324	23° 49′ 23″
Eratoſthenes and Hipparchus	230 and 140 after Chriſt	23 51 20
Ptolemy	140	23 48 45
Almamoun	832	23 35
Albategnius	880	3 35
Thebat	911	23 33 30
Abul Waſi and Hamed	999	23 35
Perſian Tables in Chryſococca	1004	23 35
Albatrunius	1007	23 35
Arzachel	1104	23 33 30
Almæon	1140	23 33 30
Choja Naſſir Oddin	1290	23 30
Prophatius the Jew	1300	23 32
Ebn Shattir	1363	23 31
Purbachius and Regiomontanus	1460	23 30
Ulugh Beigh	1463	23 30 17
Waltherus	1476	23 30
Corrected by refraction, &c.	——	23 29 8
Wernerus	1510	23 28 30
Copernicus	1525	23 28 24
Egnatio Danti	1570	23 29
Prince of Heſſe	1570	23 31
Rothmanus and Byrgius	1570	23 30 20
Tycho Brahe	1584	23 31 30
Corrected	——	23 29
Wright	1594	23 30
Kepler	1627	23 30 30
Gaſſendus	1630	23 31
Ricciolus	1646	23 30
Corrected	1655	23 29
Hevelius	1653	23 30 20
Corrected	1661	23 28 51½
Caſſini	1655	23 29 15
Mouton's, corrected, &c.	1660	23 29 3
Richer, corrected	1672	23 28 51½
De la Hire	1686	23 29
Corrected	——	23 29 28
Flamſteed	1690	23 29
Bianchini	1703	23 28 25
Roemer	1706	23 28 41
Louville	1715	23 28 24
Godin	1730	23 28 20
Bradley	1750	23 28 18
Meyer	1756	23 28 16
Hornſby	1772	23 28 8
Nautical Almanac	1779	23 28 7
Ditto	1800	23 27 50
Dr. Maſkelyne's obſervations	1800	23 27 56.6
Piazzi	1800	23 27 56.3
Mr. Pond	1800	23 27 56.5
Delambre with repeating circle of Borda, mean of many hundred obſervations	1800	23 27 57

It remains now to give a phyſical explanation of this phenomenon, agreeable to the principles of attraction.

Euler was the firſt perſon who demonſtrated that the attraction of the planets upon the earth ought to produce this effect. Inegalites de Saturn. Memoires de Berlin, 1754. Pieces de Prix, vol. vii.

M. De la Lande has given the demonſtrations and calculations at full length in the Mem. de l'Acad. 1758, 1761, and 1780. M. De la Grange has given others in the Mem. de l'Acad. 1774.

Whenever two planets move round the ſame centre in the ſame direction, but in different planes, each of theſe planets makes the node of the other retrograde upon its orbit. Let us ſee what ought to take place upon the earth in conſequence of this derangement, and let us take, for example, the attraction of Venus on the earth. Let E D Q (*Plate* XII. *Aſtronomy*, *fig.* 101.) be the equator, E G N the ecliptic, N V Q the orbit of Venus, ſo that the earth advances from E to N along the ecliptic, and Venus from Q to N in its orbit. The attraction of Venus on the globe of the earth cauſes the point N to retrograde to V, that is to ſay, that the node of the ecliptic on the orbit of Venus advances in a contrary direction to the motion of the earth.

The ecliptic will then change its ſituation, and will paſs from N to D V, without the inclination being affected, that is to ſay, ſo that the angle V may be ſtill equal to the angle N, but that the retrogradation of the node of the ecliptic upon the orbit of Venus may be equal to the quantity N V in a year. Now the equator E Q does not change its ſituation by the influence of which we are ſpeaking, becauſe the rotation of the earth is independent of its annual motion, and that the attraction of the planets is not ſenſible on the axis of our ſpheroid. Thus the ecliptic E N, inſtead of cutting the equator at the point E will, the ſucceeding year, biſect it in D. The equinoctial point E will advance the quantity E D along the equator, or the quantity E C along the ecliptic. And this alteration in the ſituation of the ecliptic will, in time, change the longitudes and latitudes of all the fixed ſtars, and the inclinations of the planetary orbits to the ecliptic.

In a triangle E N Q, in which the angles Q and N are conſtant, and in which the ſide N Q varies; for example, 2″.39, as that ſeems indicated by the obſerved diminution in the obliquity of the ecliptic of half a ſecond a-year: the change E D, which will reſult to the other ſide E Q, is equal $\frac{2'' \text{ ſin. N, coſ. E N}}{\text{ſin. E}}$. If a perpendicular D G be let fall on the ecliptic E G N, the ſmall quantity E G will be equal E D, coſ. E, therefore multiplying the preceding value of E D by coſ. E, we ſhall get 2″ ſin. N, coſ. E N, cotang. E, for the quantity E G, by which the equinoctial point has moved along the ecliptic by the action of Venus. As to the change which the arc of the ecliptic D V undergoes at its other extremity V, it is uſeleſs to pay attention to it; it only affects the longitude of the node V of Venus on the ecliptic, but does not change the longitudes of the other ſtars which are reckoned from the equinoctial point E or D. Theſe longitudes are only changed becauſe the equinox and the ſtar do not vary their poſition equally, with reſpect to this node, reckoning along the ecliptic; beſides the quantity required is much ſmaller than the total change of poſition of the ecliptic.

The ſame reſult may be found by conſidering the poles of the three circles, the circumferences of which have been inveſtigated. Let E be the pole of the ecliptic (*fig.* 102.); P the pole of the equator, or of the earth; V the pole of the orbit of Venus. The motion of the ecliptic on the orbit of Venus produces a motion of the pole of the ecliptic round the pole of the orbit of Venus, and it is the ſame thing to ſay, that

that ecliptic has a retrograde motion of 5″ on the orbit of Venus, or that the pole of the ecliptic retrogrades round the pole of the orbit a quantity E M, the value of which is 5″ of the circumference of the ſmall circle E M N, the radius of which is the diſtance between the poles of the ecliptic and of the orbit of Venus.

In the ſpherical triangle P V E, the two ſides P V and V E are conſtant, while the remainder varies by the motion of the pole E, in the circumference E M N, from hence it follows that the variation of the angle P, or the ſmall angle EPM, is $= \frac{MX}{\text{ſin.}\, pE} = \frac{EM\, \text{ſin.}\, XEM}{\text{ſin.}\, PE} = \frac{2''\, \text{ſin.}\, EV,\ \text{ſin.}\, XEM}{\text{ſin.}\, PE} = \frac{2''\, \text{ſin.}\, EV,\ \text{coſ.}\, PEV}{\text{ſin.}\, PE}$, but in the triangle P B E the variation of P is to that of E as radius is to the coſine of P E. Therefore the variation of the angle P E B, which is the ſame as that of the angle P E V, is = 5″ ſin. E V, coſ. P E V, cotang. P E, which is the ſame as the preceding formula; for E V is equal to the inclination of the orbit of Venus; P E is equal to the obliquity of the ecliptic, and the angle P E V is equal to the longitude of the node of Venus, becauſe it is the angle formed at the pole of the ecliptic E, by the colure of the ſolſtices E P, which is 90° diſtant from the equinoxes, and the circle E V, which paſſes through the poles of the orbit of Venus, and which is 70° from its node. This change of the angle P E B is the quantity by which the colure of the ſolſtices E P changes its place in taking the new ſituation M P, and conſequently the change of the colure of the equinoxes, which is always at right angles with that of the ſolſtices: it is therefore the quantity by which the equinoctial point departs from the line E M B C, which is ſuppoſed to be fixed during the time which the pole takes to traverſe the ſmall ſpace E M. This equinoctial point being always at the extremity of an arc of 90°, or of a circle of latitude perpendicular to E P, and the poſition of which changes as well as the poſition of the colure E P, all the celeſtial longitudes which are reckoned from the equinoctial colure, will change by this quantity, which will be, conſequently, a part of the preceſſion of the equinoxes.

In the triangle P E V the variation of the ſide P E is equal to 2″ ſin. E V, ſin. P E V; this is the quantity by which the obliquity of the ecliptic varies every year by the action of Venus.

Subſtituting for V E its value 3° 23′ 35″, and for the angle E 74° 26′, the longitude of the node of Venus in 1750, and multiplying by 100, we ſhall find 30″.88 for the quantity by which the obliquity diminiſhes in a century from the action of Venus alone.

Making the ſame ſubſtitution in the other formula, which expreſſes the change in the angle E, we ſhall get 2″ ſin. 3° coſ. 74°, cot. 23½° = 0″.0887 for the quantity which the angle E (*fig.* 102.) or the point D (*fig.* 101.) varies every year, by the action of Venus, that is to ſay, that the preceſſion of the equinoxes diminiſhes 8″.87 every century by the action of Venus.

The quantity by which the longitudes and latitudes of the fixed ſtars vary from this alteration in the poſition of the ecliptic, may be calculated in the ſame manner. It may be demonſtrated, that if the pole of the equator revolves round the pole of the ecliptic, the inequality of the poſitions of the ſtars along the ecliptic is equal to L ſin. 23°, ſin. R A, tang. declin. in which expreſſion L repreſents the preceſſion in longitude, that is to ſay, that in general the inequality of the poſitions reckoned upon the revolving circle is equal to the motion of the revolving pole, multiplied by the ſine of the diſtance of the two poles, by the ſine of the diſtance of the ſtar from the node of the two circles, meaſured along the revolving circle, and by the tangent of the diſtance of the revolving circle. If we apply this theorem to the motion of the pole of the ecliptic round the pole of Venus, we ſhall get for the change of longitude, which reſults to a fixed ſtar every year, 5″ multiplied by the ſine of the inclination of Venus, by the ſine of the diſtance of the ſtar from the node of Venus, meaſured along the ecliptic, and by the tangent of the latitude of the ſtar.

The change in the declination of the fixed ſtars is equal L ſin. 23°, coſ. R A. Hence it appears, that where the pole of the equator revolves round the pole of the ecliptic, the change in the diſtance of a ſtar from the equator, or from the revolving pole, is equal to the motion of this pole, multiplied by the ſine of the diſtance of the two poles, and by the co-ſine of the diſtance of the ſtar from the interſection of the two circles meaſured along the revolving circle. This expreſſion, applied to the preſent caſe, ſhews, that if the pole of the ecliptic turns round the pole of the orbit of Venus, the change in the diſtance of a ſtar from the ecliptic, or its latitude, is equal to the motion of the ecliptic, multiplied by the ſine of the inclination of the orbit of Venus, and by the co ſine of the diſtance of a ſtar from the node of Venus, meaſured along the ecliptic.

Let us call D the diſtance of a ſtar from the aſcending node of a planet, or the longitude of a ſtar minus that of the planet's aſcending node, I the inclination of the planet's orbit, L the latitude of the ſtar, M the motion of the pole of the ecliptic round the pole of the planet, or the change N V (*fig.* 100.) of the planet's node along its orbit; we ſhall get M ſin. I, ſin. D, tang. L, for the change of the ſtar in longitude, and M ſin. I, coſ. D, for the change in latitude.

The formula for the motion of the nodes (ſee NODE,) being applied to each planet, gives the actual motion of the node of the ecliptic on the orbit of each planet: this is the value of M in the preceding expreſſions.

The quantity D, or the diſtance of a ſtar from the node of it, is variable, on account of the motion of the nodes of each planet, and that of the ſtars in longitude, but from the ſlowneſs of theſe motions, and the ſmallneſs of the quantities that are to be determined, the diſtance D may be conſidered as invariable for one century.

To obtain D, the place of the node of each planet for 1750 muſt be taken, and it muſt be taken from the longitude of the ſtar; the inclination muſt be taken equal to I, the value of M is given by the motion of the node of the ecliptic on each orbit; thus, knowing the latitude of the ſtar, we have all the data required for finding the value of theſe two formulas.

For example, we find 6″.983 for the action of Jupiter for one year. This is the value of M; its inclination is 1° 18′ 50″ = I; then M ſin. I = 0″.1601; its node is at 3^s 7° 56′ of longitude; therefore the change of latitude M, ſin. I, coſ. D = 0″.16 coſ. (longit. − 98°.)

This expreſſion may be put in a more commodious form, by conſidering that the co-ſine of the difference of the two arcs is equal to the product of the co ſines, added to that of the ſines; now the co-ſine of 98°, is equal to that of 82° taken negatively; we ſhall therefore get 0″.16 coſ. (longit. − 98°) = − 0″.16, coſ. 82°, coſ. long. + 0″.16, ſin. 82°, ſin. long. = 0″.1586, ſin. long. − 0″.0211, coſ. longit.

Employing the motions of the nodes, and the inclinations of each of the other planets in the ſame manner to obtain the value of this formula M, ſin. I, coſ. D, and multiplying the annual motion by 100, we get the ſecular motion of the northern ſtars, in latitude, from the action of each planet, ſuch as they have been given by M. de la Lande, in the Mem. de l'Acad. for 1758, 1761, 1780, according to different ſuppoſitions for the maſs of each planet. The following numbers are thoſe which he has given, and are the ſame as thoſe of M. de la Grange (Mem. de Berlin, 1782), with the exception of Venus, the maſs of which M. de la Lande has diminiſhed about one quarter, in order to find the ſecular diminution in the obliquity of the ecliptic 50″ in round numbers.

Saturn	1″.39 ſin long.	− 0″.53 coſ. long. of the ſtar.
Jupiter	15.86	− 2.11
Mars	1.03	+ 0.95
Venus	30.88	+ 8.87
Mercury	0.84	+ 0 85
Total	+ 50″.00 ſin. long.	+ 8″.03 coſ. long.

The ſigns change for the ſtars which have ſouthern latitudes. The change of ſines muſt alſo be obſerved.

This expreſſion is the ſame as 50″.64 ſin. (longit. + 9° 7′,) becauſe $\frac{8''.03}{50''.00} = \text{tang. } 9^\circ\, 7'\, 26''$; for, if we call this quantity of 9°, y, and the co-efficient required, x, we ſhall get for 0° of longitude $8''.0 = x \text{ ſin. } y$, and for 90° $50'' = x \text{ coſ. } y$; therefore, $x = \frac{8''}{\text{ſin. } y} = \frac{50''}{\text{coſ. } y}$; therefore, $\frac{\text{ſin. } y}{\text{coſ. } y} = \frac{8''}{50''} = \text{tang. } 9^\circ\, 7'\, 26''$, and $x = \frac{50''.0}{\text{coſ. } 9^\circ\, 7'} = 50''.64$.

Example.—Sirius had $3^s\, 10^\circ\, 38'$ longitude in 1750; multiplying the 50″ of this formula by the ſine of 79° 22′, we ſhall get 49″.1; and multiplying 8″.03 by the coſine of 79° 22′, taken negatively, we find 1″.5; the difference is 47″.6. This is the ſecular diminution of the latitude of Sirius in this century.

It would be neceſſary to know theſe quantities for more diſtant centuries; for example, inſtead of $3^s\, 8^\circ$, which is the place of Jupiter's node, its longitude $2^s\, 20^\circ$ muſt be ſubſtituted for the year 50. If the motion of the node of Venus, 14° 38′, be equally taken into conſideration; the change of latitude in the firſt century of our era will be found 46″.66 ſin. long. + 20″.41 coſ. long. This quantity is different from that which has been found for this century; and it is by taking a medium, that the ſecular change of the fixed ſtars in latitude may be found, from the age of Ptolemy to the preſent time. Beſides, this change in the firſt century depends on the motion of the nodes of each planet, which is yet but imperfectly known; therefore, this effect cannot be determined with preciſion.

The ſame numbers will ſerve to find the change in the longitude of the fixed ſtars, M ſin. I, ſin. D, tang. L; becauſe it is ſufficient to change the words into *ſine* and *coſine of longitude*, and to multiply the whole by the tangent of the latitude of the ſtar. The value for the firſt century of our era, and for that in which we are, is as follows: The ſigns are for northern ſtars, and the ſign minus indicates a diminution of longitude, (− 46″.7 coſ. long. + 20″.4 ſine long.) tang. latit. year 50; (− 50″.0 coſ. long. + 8″.03 ſine long.) tang. latit. year 1750. Theſe expreſſions are equivalent to − 50″ 93 coſ. (long. + $23^\circ\, 37\tfrac{1}{2}'$) tang. latit. year 50; A − 50″.64 coſ. (long. + 9° 7′) tang. lat. year 1750. The change in the ſign of the tangent of this latitude ſhould be attended to when the ſtar is ſouth.

The change of the ſigns of the coſines and ſines ſhould alſo be obſerved. Thus, for Sirius, the longitude of which is $3^s\, 10^\circ\, 38'$, and the latitude 39° 33′ ſouth, we ſhall get − 50″ coſ. long. = + 9″.2; becauſe the coſine of $3^s\, 10^\circ$ changes its ſign, and + 8″.03 ſine long. = + 7″.9, the ſum is + 17″.1, which, multiplied by the tangent of 39° 33′, which is negative, gives − 14″.1 This is what muſt be taken from the preceſſion 1° 23′ 45″: to obtain the mean motion of Sirius 1° 23′ 31″. The real preceſſion is here taken, and not the mean, becauſe the equinox and the ſtar, each having their proper motion, both muſt be taken into conſideration; thus, its longitude diminiſhes by 14″ in this century, from the attraction of the planets on the earth, independent of the general cauſe of the preceſſion, and of the particular derangement of this ſtar.

The motion in longitude and the motion in latitude, determined by the preceding formulæ, nearly agree with obſervation, as may be ſeen, by comparing the poſitions which are in the ancient catalogue of Ptolemy, with thoſe which are obſerved at preſent. We ſee, for example, that the firſt ſtar in Auriga, which, in Ptolemy's catalogue, has 30° latitude, is 30° 49′ in Flamſteed's catalogue; on the contrary, the fourteenth ſtar of Gemini, which is ſouth of the ecliptic, has 1° 30′ latitude in Ptolemy's catalogue, and only 0° 56′ in Flamſteed's. It is the ſame with the latitude of almoſt all the ſtars. The differences of longitude appear equally changed, in a manner perfectly conſonant to this theory. Between the twenty-ſeventh ſtar of the Great Bear, and the tenth of the Dragon, of which the latitude is 81° 48′, we find a difference of longitude leſs by 1° 21′ than it is in Ptolemy's catalogue; becauſe, one of the ſtars has augmented in longitude, while the other has diminiſhed.

Theſe differences can only be perceptible in ſtars that have conſiderable latitude; it is nothing for thoſe ſituated in the ecliptic.

In the general formula for the preceſſion of the equinoxes, (ſee PRECESSION,) there is one part, L coſ. $23\tfrac{1}{2}^\circ$, common to every ſtar; in this caſe, it would be equal to M coſ. E V; this part indicates only that the line E V is more advanced than M V, by the quantity M coſ. E V; this is the motion of the node of the planet, or of the pole E, referred to the ecliptic.

If an arc of a circle E M B C be drawn perpendicular to E V, and coinciding with the ſmall arc E M, this will be the circle of latitude which paſſes through the node of the orbit of Venus. The change in longitude of a ſtar S, found by the preceding formulæ, is the difference between the angle S E P, and the angle S M P; part of this difference ariſes from the variation of the angle E, in the triangle S C E, in which the ſide S C and the angle C are conſtant; this variation is equal E M ſine E, cotang. E S. But, beſides this change of the ſtar S, relatively to the circle E M C, there is that of P E, or of the colure of the ſolſtices, which paſſes from the ſituation P E into that of P M; the angle P E B changing itſelf into the angle P M B, is the variation of the angle E in the ſpherical triangle P B E, in which P B, and the angle B are conſtant. Thus, this quantity is E M, ſin. P E B cotang. E P; it is common to all the ſtars, and is a part of the preceſſion.

The change of the obliquity of the ecliptic, and that of the angle P E B, which is the change of longitude common to all the points of the heavens, may be found in the ſame manner as we ſhould find the variation in longitude of a ſtar at P; that is to ſay, that in the preceding formulæ we may conſider the pole of the equator as a ſtar, of which the longitude is $90°$, and its latitude $66° 32'$, and we may find, by the ſame formulæ, how much it changes, relatively to the moveable pole of the ecliptic, whether in longitude or latitude. We ſhall get $50''$ for the variation of the ecliptic in this century, and $46''.7$ for the firſt century.

The change of the pole in longitude is found by the ſame method to be $8''.03$ tang. $66° = 18''$. This is the diminution of the preceſſion of the equinoxes, which the action of the planets produces in this century by diſplacing the ecliptic, or the orbit of the earth. This would be $26''.1$ according to M. De la Grange. This difference ariſes from his making a different ſuppoſition relative to the maſs of Venus.

M. De la Place has given more general and rigorous formulæ for theſe calculations. (Mem. de l'Acad. 1788.) The following gives the variation of the ecliptic for any number of years n, beginning from 1700; $932''.56$ coſ. $17''.7686\,n$ — $3140''.34$ ſin. $32''.8412\,n$, ſuppoſing the change to be $50''$ in this century. The ſecond term changes its ſign for the years anterior to 1700: thus for the year 300 before our era, $17''.7686$, multiplied by 2000, give $9° 52' 17''.2$, the coſine of which multiplied by $932''.56$ gives $918''.75$; the ſecond term is $+ 983.''19$; the term $932.''56$ muſt be taken from the ſum, which takes place when $n = 0$, or in 1700; there remains $969''.38$, which muſt be taken from the mean obliquity of the ecliptic in 1700, $23° 18' 43''$; and we get $23° 44' 52''$, which differs but little from that employed by M. De la Lande in the ſolar tables. This formula gives $46''.26$ ſecular for the variation, 2000 years ago; it is $46''.0$ according to the tables of M. De la Lande.

In the table which we have annexed the ſecular variation of the obliquity of the ecliptic is aſſumed $52''.1$ for the preſent century, and $48''.5$ for a period 2000 years back.

The obliquity of the ecliptic is likewiſe ſubject to a periodic change from the effect of nutation. (See NUTATION.) This inclination increaſes to $9''$ when the node is in Aries; the pole is then in A (*fig.* 103.); the diſtance of the poles E A becomes greater by $9''$ than when the node is in Capricorn or Cancer, and is greater by $18''$ than when the node is in Libra, and the pole in C. The obliquity of the ecliptic, in 1774, was $23° 27' 57''$; in 1784, $23° 28' 10''$; not only it has not diminiſhed $5''$, as it ought to have done, but it has augmented $13''$, which gives $18''$ more for the effect of nutation alone, which is equal to A C.

When the pole of the earth is in O, the obliquity of the ecliptic is E O or E H, and the nutation is equal to P H; the arc A O, or the angle A P O is equal to the longitude of the node, and P H is the coſine of it; now P H is equal $9''$ ſine O D, or $9''$ coſ. A O; therefore the nutation $PH = + 9''$ coſ. of the node, or $9''$ multiplied by the coſine of the longitude of the moon's node.

This is the change which Dr. Bradley remarked in the variation in declination which the ſtars ſituated near the ſolſtitial colure had experienced during 19 years.

This nutation ought to be ſubtracted from the mean or uniform obliquity, while the moon's node is between three and nine ſigns: it is additive in the firſt and fourth quarter of the moon's longitude.

It is now ſeveral years ſince many aſtronomers who have been in the habit of conſtantly obſerving the ſun at the ſummer and winter ſolſtices for the purpoſe of aſcertaining the obliquity of the ecliptic have noticed, that they obtained a different reſult from their winter and ſummer obſervations. The firſt aſtronomer who noticed this circumſtance was Dr. Slop, who ſuperintended the grand duke's obſervatory at Piſa. The inſtrument he uſed was a ſix feet mural quadrant conſtructed by Siſſon; as his determination was founded on a compariſon with ſtars that paſſed on the ſame parallax, this diſcordance could not be attributed to any error in the diviſions of the inſtruments. The moſt plauſible ſuppoſition was, that it aroſe from ſome temporary expanſion which periodically affected the inſtrument in ſimilar ſituations of the ſun. This occurrence took place for many years: the difference obſerved varied from $6''$ to $12''$. About the year 1790 the above aſtronomer received a letter from Oriani, and the aſtronomers at Milan, who had begun to obſerve the ſolſtices with a ſuperb mural quadrant of eight feet radius, made by Ramſden, in which they remarked, that to their great ſurpriſe they found a diſcordance they could not explain in the determination of the obliquity of the ecliptic, as deduced from the ſummer and winter ſolſtices. Neither of the above aſtronomers made theſe circumſtances known to the public at that time, conceiving they aroſe from ſome accidental derangement of their inſtruments, which time would explain. They were communicated in converſation to the perſon who has favoured us with this account when in Italy.

It was at this period that Piazzi began to obſerve at Palermo with the great aſtronomical circle made by Ramſden. The ſame perplexing occurrence happened to him, though he was quite ignorant of the ſame thing having occurred to the aſtronomers above-mentioned. Finally, the French aſtronomers in uſing the repeating circle of Borda, which gave the altitude of the ſun with greater accuracy than any inſtrument before invented, met with the ſame embarraſſment before the obſervations of Piazzi were publiſhed. Mr. Pond, who obſerved ſeveral ſolſtices at Weſtbury with a very capital circular inſtrument made by Troughton, found likewiſe the ſame diſcordance, and the difference was very nearly the ſame as the mean of that found by the French and Italian aſtronomers; the obliquity appearing about $10''$ greater in ſummer than winter. It may appear ſurpriſing that no notice has been taken of this in the Greenwich obſervations; it can only be accounted for by ſuppoſing that ſome deviation in the quadrant, has cauſed one error to counterbalance another. In the Philoſ. Tranſactions for 1806, Mr. Pond has given an inveſtigation of the ſtate of this inſtrument, which has been ſince confirmed by a mechanical examination by Mr. Troughton, by which it appears that the weight of that fine inſtrument has, in the courſe of time, cauſed it to deflect from its original form, and to give a conſtant error, which increaſes as the obſerved objects approach the horizon. (See Dr. Maſkelyne's Obſ. for 1807, where a table of corrections is given.)

The cauſe of this want of coincidence in the ſummer and winter obſervations is by no means eaſy to be explained; it has been propoſed as a prize by ſome foreign academies, but no ſatisfactory explanation has yet been given. The French aſtronomers, to reconcile their obſervations, alter both their latitude a ſmall quantity, and likewiſe the mean refraction as eſtabliſhed by Dr. Bradley, but M. Piazzi objects to this, and very properly obſerves, that his table of refraction was founded on his own obſervations made with the ſame inſtrument. Beſides, this ſuits all latitudes, and it ſeems probable, that this diſcordance would be found general, as by the above account it ſeems to have happened to all thoſe aſtronomers who had inſtruments ſufficiently accurate to detect it. It has been ſuggeſted by M. Piazzi that it may be connected with ſome peculiar modification of the refractions of the ſun's rays which may differ from thoſe of the ſtars. Not being able to offer any ſatisfactory conjecture on the ſubject, we can only preſent the above ſtatement of this curious fact to our aſtronomical readers.

Table of the Obliquity of the Ecliptic for forty Centuries, with its Secular Variation.

		Mean Obliquity.	Secular Var.
A. C.	900	23° 50′ 26″.2	
	800	23 49 39.6	46″.9
	700	23 48 52.7	47.2
	600	23 48 5.5	47.5
	500	23 47 18.0	47.9
	400	23 46 30.1	48.2
	300	23 45 41.9	48.5
	200	23 44 53.4	48.9
	100	23 44 4.5	49.1
	0	23 43 15.4	49.3
A. D.	100	23 42 26.1	49.7
	200	23 41 36.4	49.9
	300	23 40 46.5	50.1
	400	23 39 56.4	50.3
	500	23 39 6.1	50.5
	600	23 38 15.6	50.8
	700	23 37 24.8	51.0
	800	23 36 33.8	51.1
	900	23 35 42.7	51.3
	1000	23 34 51.4	51.4
	1100	23 34 0.0	51.5
	1200	23 33 8.5	51.7
	1300	23 32 16.8	51.8
	1400	23 31 25.0	51.9
	1500	23 30 33.1	52.0
	1600	23 29 41.1	52.0
	1700	23 28 49.1	52.1
	1800	23 27 57.0	52.1
	1900	23 27 5.0	52.1
	2000	23 26 12.8	52.2
	2100	23 25 20.6	52.3
	2200	23 24 28.3	52.2
	2300	23 23 36.1	52.2
	2400	23 22 43.9	52.2
	2500	23 21 51.7	52.2
	2600	23 20 59.5	52.1
	2700	23 20 7.4	52.1
	2800	23 19 15.3	52.1
	2900	23 18 23.3	52.0
	3000	23 17 31.3	52.0

Ecliptic, *Poles of the.* See Pole.

Ecliptic, *Reduction to the.* See Reduction.

Ecliptic, in *Geography*, &c. is a great circle of the globe cutting the equator under an angle of 23° 28′. See Globe.

The terreſtrial ecliptic, therefore, is in the plane of the celeſtial ecliptic; like which it has its equinoctial and ſolſtitial points, and is bounded by tropics.

ECLOGARII, among the *Ancients*, were perſons who ſelected the beſt pieces of the books they read, which, for that reaſon, were called *eclogues*, or ſelect pieces. See Eclogue.

ECLOGUE, Εκλογη, in *Poetry*, a kind of paſtoral compoſition, wherein ſhepherds are introduced converſing together. The eclogue is properly an image of the paſtoral life.

The beauty of the eclogue, M. Fontenelle obſerves, is not attached to what is rural, but rather to what is calm and eaſy in the rural life.

Yet there are eclogues in Theocritus of a lofty character; and Virgil has ſome in the ſublime ſtyle: the eclogue, therefore, occaſionally raiſes its voice. Yet M. Fontenelle eſteems it a fault in ſome modern poets, to have put matters of high concern in their eclogues, and to have made their ſhepherds ſing the praiſes of kings and heroes. The ſentiments in eclogues, the ſame author obſerves, ſhould be finer and more delicate than thoſe of real ſhepherds; only their form ſhould be as ſimple and rural as can be. But this ſimplicity excludes none beſides glaring and exceſſive ornaments.

Since the eſtabliſhment of the academy or aſſembly of Arcadians at Rome, about the year 1690, the taſte for eclogues has been greatly improved among the Italians. Thoſe gentlemen, who are the flower of the wits of Italy, take the name of the ſhepherds of Arcadia, and will not allow their aſſembly to be treated as an academy. They have each of them a poetical name, which is always that of ſome ſhepherd; and apply themſelves particularly to eclogues, as pieces moſt proper to their profeſſion. See Academy.

The word eclogue is formed from the Greek εκλογη, *choice.* So that, according to the etymology of the word, eclogue ſhould be no more than a ſelect or choice piece; but cuſtom has determined it to a farther ſignification, *viz.* a little elegant compoſition in a ſimple natural ſtyle and manner. Idyllion and eclogue, in their primary intention, are the ſame thing: thus the Idyllia, Ειδυλλια, of Theocritus, are pieces written perfectly in the ſame vein with the Eclogæ of Virgil.

But cuſtom has made a difference between them, and appropriated the name of eclogue to pieces wherein ſhepherds are introduced ſpeaking; idyllion, to thoſe written like the eclogue, in a ſimple natural ſtyle, but without any ſhepherds in them. Some imagine the name eclogue to have been originally attributed to ſuch poems as were written in imitation of others; ſuch as the Eclogues of Virgil, which are only imitations of Theocritus.

Others are of opinion, the word was firſt formed from αιξ, αιγος, *goat*, and λογος, *diſcourſe*, *q. d.* a converſation or diſcourſe of goats, or goatherds. But Ruæus, in his notes on Virgil, thinks they would then have made it Αιγολογια, *ægology*, rather than eclogue; or, at leaſt, the word would have been written in Greek with αι, and in Latin by *æ*, not *e*.

Barthius advances another opinion, *viz.* that the name eclogue was given to all poetical compoſitions that were of a moderate length, though too ſhort to give them the name of books; and that hence it is that Statius, in the epiſtle at the head of the third book of his Sylvæ, and in the preface of his fourth book, calls his poems eclogues, though he had not called them ſo in the title.

Auſonius, in the preface to his Cupid crucified, calls alſo his idylls eclogues. Cruquius alſo, in his comment on Horace, declares that he had ſeen very ancient manuſcripts, wherein the ſatires of the poet are called eclogues; in which he is ſeconded by our learned countryman, Mr. Baxter. See Pastoral Poetry.

Eclogue is alſo applied to certain compoſitions in proſe. Thus we read of the eclogues of Diodorus, of Polybius, of

Cteſias, Theophraſtus, Strabo, &c. In which ſenſe the word only ſignifies *extract* or *collection*.

ECLOPES, in *Botany*, Gærtner, t. 169. See Relhania.

ECLUSE, L', in *Geography*. See Sluis.

Ecluse, *Fort de l'*, or *Fort de la Cluſe*, a ſmall town of France, in the department of the Ain; 12 miles W. of Geneva, on the river Rhône, or rather, near the place where the Rhône, loſing itſelf among rocks, diſappears, as it were, under ground, and re-appears at no great diſtance.

ECLYSE, in the Greek *Muſic*, was lowering the mode, or an alteration of the enharmonic genus, when a ſtring was accidentally lowered three dieſes below its uſual ſtandard.

ECLYSIS, from εκλυω, *I faint*, a word uſed by the ancient *Phyſicians*, for a general faintneſs and feebleneſs of all parts of the body. Hippocrates uſes it for a loſs of voice, with a general decay of ſtrength, and in ſome other places, for a great weakening of the body, by violent diſcharges of ſtool.

ECMARTYRIA, Εκμαρτυρια, in *Antiquity*, a kind of ſecond-hand evidence, admitted in the Athenian courts. It was not founded on the knowledge of the witneſs himſelf, but on that of another perſon, who had been an eye-witneſs of the fact in queſtion, but was at this time either dead, or in a foreign country, or detained by ſickneſs; for, except in ſuch caſes, the allegations of abſent perſons were never taken for lawful evidence. Pott. Archæol. Græc. lib. i. cap. 21. tom. i. p. 117.

ECMELES, ſounds in the Greek *Muſic*, which, like thoſe of ſpeech, were inappreciable, and in tune with no fixed tones of the muſical ſcale; conſequently, they could furniſh no melody. This term was oppoſed to *emmeles*, or muſical ſounds.

ECNEPHIAS, from εκ and νεφος, *a cloud*, a word uſed by Galen, to expreſs a peculiar ſort of fever, which, he ſays, was at once hot and humid, and which he therefore reſembles, by the name, to the ſun breaking out from a watery cloud.

ECOBROGIS, in *Ancient Geography*, a town of Aſia, in Galatia. Anton. Itin.

ECOMMOY, in *Geography*, a ſmall town of France, in the department of the Sarthe, chief place of a canton in the diſtrict of Le Mans, with a population of 2662 individuals. The canton contains 11 communes and 12,998 inhabitants, on a territorial extent of 220 kiliometres.

ECORCHEUR *de* Madagascar, in *Ornithology*, the name given by Buffon to the *Lanius Curviroſtris*, which ſee.

ECOS, in *Geography*, a ſmall town of France, in the department of the Eure, chief place of a canton in the diſtrict of Les Andelys; nine miles S. of Giſors, with only 360 inhabitants. But the canton has a population of 9748 individuals, diſperſed in 33 communes, on a territorial extent of 245 kiliometres.

ECOUCHE', a ſmall town of France, on the river Orne, in the department of the Orne, chief place of a canton in the diſtrict of Argentan, and ſix miles W. of that place. It contains 1492 inhabitants. The canton has an extent of 190 kiliometres, with 24 communes, and a population of 11,765 individuals.

ECOUEN, a ſmall town of France, in the department of Seine and Oiſe, chief place of a canton in the diſtrict of Pontoiſe, with a population of 992 individuals. The canton compriſes 22 communes, with 10.508 inhabitants, on a territorial extent of 110 kiliometres.

ECOUIS, a ſmall town of France, in the department of the Eure; ſix miles N. of Les Andelys, in a country which, till the revolution of 1789, was called La Vexin Normand.

ECOUTE', in the *Manege*, is uſed for a pace, or motion of a horſe, when he rides well upon the hand and the heels, is compactly put upon his haunches, and hears, or liſtens, to the heels or ſpurs; and continues duly balanced between the heels, without throwing to either ſide. This happens when a horſe has a fine ſenſe of the aids of the hand and heel.

ECPHONESIS, Εκφωνησις, in *Rhetoric*, the ſame with *Exclamation*; which ſee.

ECPHORA, from εκ, *out*, and φερω, *I bear*, *projecture*, in *Architecture*, uſually denotes the line, or diſtance, between the extremity of a member, or moulding, and the naked of the column, or other part its projects from.

Some authors, however, account the ecphora, or projecture, from the axis of the column; and define it to be the right line intercepted between the axis and the outermoſt ſurface of a member or moulding. See Projecture.

ECPHRACTICS, Εκφρακτικα, in *Medicine*, ſuch remedies as have a faculty of opening and unſtopping the veſſels through which the humours are to paſs; or which incide and attenuate tough viſcid humours, and thereby promote their diſcharge. They are the ſame with aperients and deobſtruents.

The word is formed from the Greek εκφρασσειν, *to free from obſtructions*; of εκ and φρασσω, *obſtruo*, *ſepio*.

The chief ſimple ecphractics, are the little centaury, wormwood, agrimony, hyſſop, chamædrys, bark of tamariſk, roots of capers, ſcolopendrium, &c.

ECPHRAXIS, is taking away obſtructions in any part. Blancard.

ECPHYSESIS, from εκ and φυσαω, *I breathe*, is a diſeaſe in which the patient breathes thick.

ECPHYSIS, of εκ and φυω, *I produce*, in *Anatomy*, is any proceſs that coheres with, or adheres to a bone.

ECPIESMA, Εκπιεσμα, from εκ and πιεζω, *I preſs*, in *Surgery*, a kind of a fracture of the ſkull, &c. wherein there are ſeveral ſplinters, that preſs and diſorder the inner membranes. See Fracture.

ECPIESMUS, Εκπιεσμος, in the ancient writers of *Medicine*, a word uſed to expreſs a diſtemperature of the eye, which conſiſts in a very great prominence of the entire globe of the eye, which is, as it were, thruſt out of its ſocket, or orbit, by a great flux of humours, or an inflammation.

ECPLEROMA, of εκ and πληροω, *I fill*, in the writings of the *Ancient Phyſicians*, the name given to a kind of cuſhion of leather, ſtuffed with ſome firm ſubſtance, and fitted to the cavities of the arm-pits, uſed in reducing luxations of the humerus.

ECPLEXIS, from εκπλησσω, *I am diſturbed*, a word uſed to expreſs a tranſport of mind, proceeding from ſome ſudden perturbation. Hippocrates and Galen uſe the word to ſignify a ſtupor, or ſtupefaction, in which the patient lies without motion, without ſpeaking, or ſtirring, and with his eyes open.

ECPNEUMATOSIS, in *Medicine*, the ſame with expiration.

ECPNOE, from εκ and πνεω, *I breathe*, a word uſed, by medical writers, to expreſs that part of reſpiration, in which the breath is expelled out of the lungs.

ECPTOMA, from εκπιπτω, *I fall out*, a word uſed by the ancient phyſicians in three or four different ſenſes. It is ſometimes made to expreſs a luxation or diſlocation of a bone. Sometimes it is uſed for the falling off of any corrupted part, ſometimes for the excluſion of the ſecundines after child-birth, and ſometimes for a falling down of the womb, or a deſcent of the omentum or the inteſtine into the ſcrotum.

ECPTOSIS, in *Surgery*, the ſame with luxation.

ECPUCTICA, from εκπυεω, *I ſuppurate*, in the *Materia Medica*, are condenſing medicines.

ECPYE'MA, in *Surgery*. This word is derived from εκ and πυον, *pus*, *ſuppuration*, an abſceſs.

ECREGMA, from εκρηγνυμι, *I break off*, in *Medicine*, properly the name of a part, piece, or ſegment of any thing; but Hippocrates has, in ſome places, uſed it as the name of an eruption.

ECRITHMUS, from εκ, *without*, and ῥιθμος, *number*, an irregular pulſe, which obſerves no method, nor number, incident to any age. Blancard.

ECSARCOMA, in *Surgery*, a fleſhy excreſcence. The term is derived from εκ and σαρξ, *fleſh*.

ECSTASIS, in *Medicine*, is underſtood in a different ſenſe by different medical writers. Sauvages conſiders it as diſtinct from catalepſy, inaſmuch as the limbs are rigid, and retain the poſition in which they happen to be at the inſtant of the ſeizure; whereas, in the catalepſy they are flexible, and retain any poſition, into which they are moved by external force. In this acceptation, however, the ecſtaſis muſt be conſidered merely as an imperfect or ſpurious CATALEPSY, under which head we have already mentioned it. (See Sauvages Noſol. Method. claſs vi. *genus* 25.) Vogel, Burſerius, and others, view it in this light, and give the appellation of ecſtaſis to that variety of catalepſy, during the paroxyſm of which the patient avers that he witneſſed extraordinary viſions, and is ſaid to ſpeak in unknown languages, and even to propheſy future events. "Quidam cataleptici," ſays Vogel, "*ſimul ecſtatici* fiunt durante paroxyſmo, atque mira phantaſmata, viſiones divinas, conſortium angelorum enarrant; linguas, quas non didicerunt, loquuntur, ſi ſabula vera; quin et futura prænunciare videntur." (De cognoſc. et curand. præcip. corp. humani affect. § 509.) In this ſenſe the word ecſtaſis ſeems to be ſynonymous with TRANCE, which ſee.

ECSTATICI, thoſe who labour under the affection termed ECSTASIS.

ECSTATICI, Εκςατικοι, from εξιςημι, *I am entranced*, in *Antiquity*, a kind of diviners, who were caſt into trances or ecſtaſies, in which they lay like dead men, or aſleep, deprived of all ſenſe and motion; but after ſome time, returning to themſelves, gave ſtrange relations of what they had ſeen and heard. Pott. Archæol. Græc. lib. ii. cap. 12. tom. 1. p. 302.

ECSTROPHIUS, from εκςρεφω, *I turn out*, a name given by the ancient writers in *Medicine*, to any thing that threw out the internal tumours of the piles, ſo that external remedies might be applied to them.

ECTENÆ, in *Ancient Geography*, a people who, according to Pauſanias, firſt inhabited the territory of Thebes in Bœotia. Ogygus is ſaid to have been their firſt king, whence Thebes obtained the appellation of Ogyges. Theſe people, being exterminated by a plague, were ſucceeded by the Hyautes.

ECTHESIS, in *Church Hiſtory*, a name which the emperor Heraclius gave to a confeſſion of faith publiſhed by him in 639.

The word is Greek, εκθεσις, and ſignifies *expoſition*.

The ecthesis favoured the error of the Monothelites, and eſtabliſhed only one will and one operation in Jeſus Chriſt. Heraclius publiſhed it at the inſtigation of Athanaſius, chief of the Jacobites, Cyrus, patriarch of Alexandria, and Sergius, patriarch of Conſtantinople, by whom it was compoſed; but the Roman church deemed it heretical, and rejected it in a council held at Rome, A. D. 639; under the pontiff John IV. though Honorius, in ſpite of his infallibility, had approved it; and another edict was iſſued, ſuppreſſing the ecthesis, called the *Type*, which ſoon after ſhared the ſame fate.

ECTHLIMA, from εκθλιβω, *I preſs out*, an ulceration ariſing from a violent compreſſion in the ſurface of the ſkin.

ECTHLIPSIS, in the *Latin Proſody*, a figure whereby an *m* is retrenched, or cut off, chiefly at the end of a word, when the following word begins with a vowel, or an *h*.

The word is Greek, εκθλιψις, which ſignifies *eliſion*.

Thus, in *multum ille, & terris jactatus & alto*. Virg.

In ſcanning the verſe, we drop the *m* at the end of *multum*, and only make three ſyllables in the two firſt words, *mult-il-le*.

Some account the ecthlipſis a poetical licence in the Latin verſification; but, in reality, the eliſion of an *m* final, when the following word in the ſame verſe begins with a vowel, is a matter of neceſſity, not licence.

Anciently the *s* was likewiſe retrenched before a conſonant; as *facundu ſuoque*, for *facundus*, &c. In reality, the *m* and *s* were peculiarly rough and harſh in the Latin pronunciation; as appears from Quintilian; and it was this that led the poets to retrench them at the ends of their words, as the like cauſe induced the French to drop their *e* feminine before a word beginning with a vowel, to avoid the hiatus, or concourſe of vowels.

ECTHYMA, from εκθυω, *I break out*, in *Medicine*, a name given by Hippocrates to any puſtule, or cutaneous eruption.

ECTHYMOSIS, of εκ, *ex*, and θυμος, *animus*, *mind*, a vehement agitation and dilatation of the blood and ſpirits; ſuch as happens in extraordinary emotions of joy.

ECTODURUM, in *Ancient Geography*, a town of Rhætia, in Vindelicia. Ptolemy.

ECTOMIAS, from εκτεμνω, *I cut off*, a name uſed, by the ancient phyſicians, to expreſs a caſtrated animal.

ECTOPIÆ, in the noſology of Sauvages and Cullen, is the appellation of an order of diſeaſes, which are characterized by tumours, occaſioned by the removal of ſome part of the body from its proper ſituation. This order includes the varieties of *hernia*, or rupture, of *prolapſus*, and of luxation, all of which are deſcribed at length by Sauvages. Claſs 1. ord. 6.

ECTRIMMA, from εκτριβω, *I rub off*, excoriation or galling. Hippocrates has uſed the word particularly to expreſs exulcerations in the ſkin about the os ſacrum, contracted by lying long in one poſture, in caſes of fractures of the thigh, or in lingering illneſſes, in which the patient is confined to his bed for a long time.

ECTROPIUM, (εκτροπιον, from εκτρεπω, *to divert*,) a turning out of the eye-lid. The lower one is the moſt ſubject to this diſeaſe, the upper one being very ſeldom affected. The diſplaced eye-lid hangs down over the cheek, and does not apply itſelf properly to the eye-ball; conſequently, the inner ſurface of the eye-lid becomes turned out, while the lower portion of the globe of the eye remains uncovered. This part of the eye, and the ſenſible lining of the eye-lid itſelf, in conſequence of ſuffering inceſſant irritation from expoſure to the air, and the ſtimulus of the extraneous particles always ſuſpended in the atmoſphere, very ſoon become affected with chronic inflammation, which is not only attended with pain, a continual diſcharge of tears, &c. but alſo with a preternatural redneſs and ſwelling of the membranous lining of the diſeaſed eye-lid. At length, the inner ſurface of the latter part, in general, loſes all its natural appearance, becomes thick, callous, dry, and inſenſible, and looks like an excreſcence at the lower part of the eye.

The turning out of the eye-lid alſo obſtructs the paſſage of the tears to the inner canthus, and hinders them from entering the puncta lachrymalia. Hence, beſides the above complaints, and the very conſiderable deformity which an ectropium occaſions, the patient has the additional annoyance of an inceſſant flux of tears from his eye.

The moſt frequent cauſe of the diſeaſe is, either too great a relaxation and ſwelling of the lining of the eye-lids, or elſe too great a contraction and ſhortening of the ſkin of theſe parts, or of that on the adjoining part of the face.

Hence, in reſpect to cauſes, there are two kinds of ectropium; one depending upon a ſwelling of the lining of the eye-lid, which ſwelling occaſions a ſeparation of the edge of the palpebra from the globe of the eye, and, at laſt, turns the inſide of the eye-lid completely out; the other ariſing from a contraction of the ſkin of the eye-lid, or adjacent parts, in conſequence of which ſhortening of the integuments, the margin of the eye-lid firſt becomes drawn further from the eye, and, ſubſequently, inclined quite outward.

Scarpa remarks, that the morbid ſwelling of the lining of the eye-lids, which cauſes the firſt ſpecies of ectropium, (putting out of preſent conſideration a ſimilar affection incidental to old age,) ariſes moſtly from a congenital laxity of this membrane, afterwards increaſed by obſtinate chronic ophthalmies, particularly thoſe of a ſcrofulous nature, in relaxed unhealthy ſubjects. Sometimes the diſeaſe is the conſequence of the ſmall-pox, which has ſeverely affected the eyes.

While the diſeaſe is confined to the lower eye-lid, as it moſt commonly is, the lining of this part may be obſerved riſing in the form of a ſemi-lunar fold, of a pale red colour, like the fungous granulations of wounds, and intervening between the eye and eye lid, which latter it in ſome meaſure turns outward. When the ſwelling is afterwards occaſioned by the lining of both the eye-lids, the diſeaſe aſſumes an annular ſhape, in the centre of which the eye-ball ſeems ſunk, while the circumference of the ring preſſes and turns outward the edges of the two eye-lids, ſo as to cauſe both great uneaſineſs and deformity. In each of the above caſes, on preſſing the ſkin of the eye-lids with the point of the finger, it becomes manifeſt that they are very capable of being elongated, and would readily yield ſo as entirely to cover the eye-ball, were they not prevented by the intervening ſwelling of their membranous lining.

Beſides the very conſiderable deformity which the diſeaſe produces, it occaſions a continual diſcharge of tears over the cheek, and what is worſe, a dryneſs of the eye-ball, frequent exaſperated attacks of chronic ophthalmy, incapacity to bear the light, and laſtly, opacity and ulceration of the cornea.

The ſecond ſpecies of ectropium, or that ariſing from a contraction of the integuments of the eye-lids, or neighbouring parts, is not unfrequently a conſequence of puckered ſcars, produced by the confluent ſmall-pox; deep burns; or the exciſion of cancerous or encyſted tumours, without a ſufficient quantity of ſkin having been ſaved; or, laſtly, the diſorder is the effect of malignant carbuncles, or any kind of wound attended with much loſs of ſubſtance. Each of theſe cauſes is quite ſufficient to bring on ſuch a contraction of the ſkin of the eye-lids, as to draw theſe parts towards the arches of the orbit, ſo to remove them from the eye-ball and turn their edges outward. No ſooner has this circumſtance happened, than it is often followed by another equally unpleaſant, namely, a ſwelling of the internal membrane of the affected eye-lids, which afterwards has a great ſhare in completing the ectropium. The lining of the eye-lids, though trivially turned out, being continually expoſed to the air, and irritation of extraneous ſubſtances, ſoon ſwells and riſes up, like a fungus. One ſide of this fungus-like tumour covers a part of the eye-ball; the other puſhes the eye-lid ſo conſiderably outward, that its edge is not unfrequently in contact with the margin of the orbit. The complaints, induced by this ſecond ſpecies of ectropium, are the ſame as thoſe brought on by the firſt; it being noticed, however, that in both caſes, whenever the diſeaſe is very inveterate, the fungous ſwelling of the inſide of the eye-lids becomes hard, coriaceous, and, as it were, callous.

Although, in both ſpecies of ectropium, the lining of the eye-lids ſeems equally ſwollen, yet the ſurgeon can eaſily diſtinguiſh to which of the two ſpecies the diſeaſe belongs. For, in the firſt, the ſkin of the eye-lids, and adjoining parts, is not deformed with ſcars, and by preſſing the eye-lid, which is turned out, with the point of the finger, the part would with eaſe completely cover the eye, were it not for the intervening fungous ſwelling. But, in the ſecond ſpecies of ectropium, beſides the obvious cicatrix and contraction of the ſkin of the eye-lids, or adjacent parts, when an effort is made to cover the eye with the affected eye-lid, by preſſing upon the latter part with the point of the finger, it does not give way, ſo as completely to cover the globe, or only yields, as it ought to do, for a certain extent; or elſe it does not move in the leaſt from its unnatural poſition, by reaſon of the integuments of the eye-lids having been ſo extenſively deſtroyed, that their margin has become adherent to the arch of the orbit.

From a compariſon of the two ſpecies of ectropium, it clearly appears, that the cure of this diſeaſe cannot be accompliſhed with equal perfection in both its forms, and that the ſecond ſpecies is even, in ſome caſes, abſolutely incurable. For, as in the firſt ſpecies of ectropium, the diſeaſe only depends upon a morbid intumeſcence of the internal membrane of the eye-lids, and the treatment merely conſiſts in removing the redundant part; art poſſeſſes many efficacious means of accompliſhing what is deſired. But in the ſecond ſpecies of ectropium, the chief cauſe of which ariſes from the loſs of a portion of the ſkin of the eye-lids, or adjacent parts, which loſs no known artifice can reſtore; ſurgery is not capable of effecting a perfect cure of the malady. The treatment is confined to remedying, as much as poſſible, ſuch complaints as reſult from this kind of ectropium, and this can be done in a more or leſs ſatisfactory manner, according as the loſs of ſkin on the eye-lid is little or great. Caſes, in which ſo much ſkin is deficient that the edge of the eye-lid is adherent to the margin of the orbit, are to be abandoned as incurable. "Si nimium palpebræ deeſt (ſays Celſus) nulla id reſtituere curatio poteſt." (lib. 7. cap. 7). Hence, in treating the ſecond ſpecies of ectropium, the degree of ſucceſs attending the cure may always be eſtimated by remarking to what point the eye-lid admits of being replaced, on being gently puſhed with the end of the finger towards the globe of the eye, both before and after the employment of ſuch means as are calculated to effect an elongation of the ſkin of the eye-lid; for it is to this point, and no further, that art can reduce the part that is turned out, and permanently keep it ſo replaced. With reſpect to the treatment of the firſt ſpecies of ectropium, when the diſeaſe is recent, the fungous ſwelling of the lining of the eye-lid is not conſiderable, and, conſequently, the edge of the eye-lid not much turned out, and, in young ſubjects, (for in old ones the eye-lids are ſo flaccid, that the diſeaſe is irremediable,) it may be cured by deſtroying the fungous ſurface of the internal membrane of the eye-lid, with the argentum nitratum, which is to be done as follows. The ſurgeon muſt evert the whole of the affected eye-lid with his left hand, and with his right wipe it dry with a piece of rag; then he is to rub the cauſtic forcibly over the whole ſurface of the fungous ſwelling, ſo as to form an eſchar. And, that the patient may ſuffer as little as poſſible, an aſſiſtant is inſtantly to apply a little oil to the burnt part, immediately when the cauſtic is removed, by which means the argentum nitratum will be kept from diſſolving in the tears, and ſpreading over the eye. Should, however, any part of the cauſtic be diſſolved, and give the patient pain, the ſurgeon or attendants muſt immediately waſh the irritating ſubſtance away, by repeatedly bathing the eye with new milk. The cauterization is to be repeated for ſeveral days in ſucceſſion, until the argentum nitratum has produced a ſufficient deſtruction of the internal membrane of the eye-lid, and of its fungous ſurface, particularly near the tarſus. Afterwards bathing the eye with plain water, or barley-water and mel. roſæ, will prove ſufficient for healing the ſore on the inſide of the eye-lid. The reſult of ſuch treatment will be, that in proportion as the wound within the eye-lid heals, the gaping of the eye-lid will gradually diminiſh, and its edge at laſt return into its natural poſition. Scarpa informs us, that this plan of cure can only be ſucceſsfully put in practice in caſes in which the ectropium is ſlight and recent. To remedy the conſiderable and inveterate form of the firſt ſpecies of the diſeaſe, in an expeditious and effectual way, the quickeſt and ſafeſt plan is, to cut away the whole of the fungous ſwelling cloſely to the muſcular ſubſtance on the inſide of the eye-lid. The patient being therefore ſeated, with his head a little inclined backward, the ſurgeon with the index and middle finger of his left hand is to keep the eye-lid ſteadily turned out, and, holding a ſmall pair of curved ſciſſars with convex edges in his right, he is completely to cut off the whole fungoſity of the internal membrane of the eye-lid, as near as poſſible to its baſe. The ſame operation is then to be repeated on the other eye-lid, ſhould that be affected with the ſame diſorder. If the excreſcence ſhould be of ſuch a ſhape that it cannot be exactly included between the edges of the ſciſſars, it muſt be raiſed as much as poſſible with forceps, or a double pointed hook, and diſſected off at its baſe, by means of a ſmall biſtoury with a convex edge. The bleeding, which occurs at the beginning of the operation, as if it would be copious, ſtops of itſelf, or as ſoon as the eye is bathed with cold water. The ſurgeon is then to apply the dreſſings, which are to conſiſt of two ſmall compreſſes, one put on the upper, the other on the lower arch of the orbit, and over theſe the uniting bandage, in the form of the monoculus, or ſo applied as to compreſs and replace the edges of the affected eye-lids, in order to make them cover the eye. On the firſt removal of the dreſſings, which ſhould take place about twenty-four or thirty hours after the operation, the ſurgeon will find the whole, or almoſt the whole of the eyelid in its natural poſition. The treatment ſhould afterwards conſiſt in waſhing the ulcer on the inſide of the eye-lid with ſimple water twice a day, or elſe with barley-water and mel. roſæ, until it is completely well. If towards the end of the cure the wound ſhould aſſume a fungous appearance, or the edge of the eye-lid ſeem to be too diſtant from the eye ball, the wound on the inſide of the eye-lid muſt be rubbed ſeveral times with the argentum nitratum, for the purpoſe of deſtroying a little more of the membranous lining, ſo that when the cicatrization follows, a greater contraction of it may draw the edge of the eye-lid nearer the eye. In the mean time proper ſteps ſhould be taken with a view of removing the cauſes by which the ectropium was originally induced. Chronic ophthalmy, and a weak and varicoſe ſtate of the veſſels of the conjunctiva, are frequently concerned.

In the ſecond ſpecies of ectropium, or that originating from a contraction of the ſkin of the eye-lids, or adjacent parts, Scarpa obſerves, that the indication is not different from what it is in the caſe already deſcribed. In the ſame manner, as the ſhortening of the integuments has occaſioned a turning out of the eye-lid, the deſtruction of a part of its internal membrane, and the conſequent cicatrix, may replace the eye-lid in its natural poſition. However, as the part of the ſkin, which is loſt, can never be regenerated, and, in whatever degree the eye-lid is ſhortened, ſo it muſt perpetually continue, even after the moſt ſucceſsful operation; it follows, that the ſecond ſpecies of ectropium can never be ſo completely cured, as the firſt. Although the eye-lid may be reſtored to its natural poſition, it will always remain ſhortened in a degree proportioned to the quantity of ſkin which is deficient. But, Scarpa very accurately explains, that, in a great number of caſes the ectropium ſeems to be more conſiderable than might be expected, conſidering the little portion of the integuments which is wanting. The Italian profeſſor refers this circumſtance to the increaſe of the ectropium always happening, when once the affection has commenced, and cauſed by the ſwelling of the lining of the eye-lid. In this manner, the turning out of the part is rendered complete, even when the contraction of the ſkin would produce a very partial ectropium.

Scarpa aſſures us, that, in theſe caſes, the operation proves ſucceſsful in a degree, which inexperienced perſons would never ſuppoſe. When the fungous thickened portion of the membranous lining of the diſeaſed eye-lid has been cut away, and its edge brought near the eye-ball, the ſhortening of the eye-lid, which now continues, is ſo trivial, compared with the grievances and deformity which it occaſioned while the part was turned out, that the ectropium may be regarded as being quite relieved. Hence, when the ſhortening of the integuments of the affected eye-lid is not ſo very great, as utterly to prevent it from being brought up again and partially covering the eye-ball, the ſurgeon ought always to have recourſe to the operation which we have above deſcribed. The curved ſciſſars, or the convex-edged biſtoury, or both, may be uſed according to circumſtances. When the diſeaſe has been of very long duration, and the lining of the eye-lid has become indurated and callous, the part affected with ectropium ſhould be covered for a few days before the operation, with a ſoft bread and milk poultice, with a view of rendering it leſs rigid.

Scarpa lays it down as a poſitive and demonſtrable truth, that dividing the ſcars in the ſkin, which have ſhortened, and turned the eye-lid out, never produces any permanent lengthening of the part, and, of courſe, no laſting benefit. This author accurately notices, that the ſame circumſtance may be remarked, after large deep burns on the ſkin of the palm of the hand and fingers. In theſe caſes, when the parts have healed, the fingers become immediately bent, notwithſtanding the greateſt pains may have been taken to keep them continually extended during the whole of the treatment. The ſame circumſtance may alſo be frequently noticed after burns of the face and neck. Fabricius ab Aquapendente knew very well how uſeleſs it was to make a ſemilunar diviſion of the integuments, with a view of rectifying their ſhortened ſtate, and the turning out of the eye-lids. This writer recommends ſtretching theſe parts with pieces of adheſive plaſter, applied on them and the eye-brow, and firmly tied together.

Whatever beneficial effects may be produced in this manner, Scarpa has learnt, from experience, that equal good ariſes from the employment of the bread and milk poultice for a few days; then uſing oily liniments, and, laſtly, the uniting bandage, put on in ſuch a way, as to ſtretch the contracted eye-lid, in a contrary direction to that in which the part is drawn by the cicatrix.

When the operation is to be performed, Scarpa directs that the patient, if an adult, is to ſit down in a chair, and, if a child, it is to be laid on a table, with its head a little elevated, and well ſupported by the aſſiſtants. The operator is next to take a biſtoury with a convex edge, and make an inciſion of proper depth, into the lining of the eye-lid, along the tarſus. He muſt uſe great caution to avoid wounding the puncta lachrymalia. The edge of the divided membrane is now to be raiſed with a pair of forceps, and detached, by means of the knife, from all the inner ſurface of the eye-lid, until the ſeparation is made as far as the place where the membrane is about to leave the eye-lid, and cover the front of the eye-ball, under the name of the tunica conjunctiva. The ſurgeon is now to raiſe the detached part of the membrane ſtill more, and then cut it away with the ſciſſars, near the deepeſt part of the eye-lid.

A compreſs and the uniting bandage are to be afterwards applied, with a view of promoting the return of the eye-lid, affected with ectropium, towards the eye-ball. When the dreſſings are changed, a day or two after the operation, the eye-lid will be found to have reſumed, in a great degree, its natural poſition, and the deformity to be materially diminiſhed.

The operation is ſeldom followed by any diſagreeable ſymptoms, ſuch as vomiting, pain, violent inflammation, &c. Should vomiting happen, however, Scarpa ſtates, that it may be relieved by an opiate clyſter. Inflammatory ſymptoms are to be leſſened by applying ſoft emollient poultices to the part, and employing antiphlogiſtic means in general, until ſuppuration has begun on the inſide of the eye-lid. The part is then to be waſhed, twice a day, with barley water, containing a little of the mel. roſæ. The wound may alſo be now and then touched with the argentum nitratum, ſo as to keep the granulations from becoming too high. Saggio di Oſſervazioni e d'eſperienze ſulle Principali Malattie degli Occhi. Venezia, 1802. Richter's Anfangſgr. der Wundarzn. B and Q.

ECTROTICA, from εκτιτρωσκω, *I cauſe to miſcarry*, a name given, by the ancient phyſicians, to ſuch medicines as have a power to occaſion abortion.

ECTYLOTICS, Εκτυλωτικα, from εκ and τυλος, *callus*, remedies proper to conſume and eat off calluſes, warts, and other excreſcences, formed on the fleſh.

ECTYPE, Εκτυπος, amongſt *Medalliſts*, an emboſſed figure, or impreſſion of a ſeal, ring, or medal; or a figured copy of an inſcription, or other ancient monument.

The word is Greek, αρχετυπον, denotes the *original*, or *model*; εντυπον, the *copy*, or *image*, moulded, or ſtruck in creux; and εκτυπον, *ectypon*, the image in relievo, or emboſſed.

Ectype *Craticular*. See Anamorphosis.

ECU, or Escu, the French crown. See Crown, Escu, and Coin.

Ecu *Ancient*, in *Heraldry*, a term ſignifying the ancient ſhield. By this they mean the antique triangular-ſhaped ſhield, on which the arms of the noble families of France have been painted. This ſhield is to be ſeen on old gems, and ſome ruins; but the modern ſhield, which is ſquare, and rounded and pointed at the bottom, has baniſhed the uſe of this.

ECUEILLE', in *Geography*, a ſmall town of France, in the department of the Indre, chief place of a canton, in the diſtrict of Chateauroux, with a population of 1200 individuals. The canton has a territorial extent of 245 kiliometres, on which there are 13 communes, and 5695 inhabitants.

ECUR, or Icur, in *Ancient Geography*, a town of India, on this ſide of the Ganges, placed by Ptolemy in N. lat. 16° 40'.

ECURIE, in the *Manege*, the covert place for the lodging, or houſing of horſes. The word is French. We uſe ſtable in common diſcourſe.

ECURY. See Equery.

Ecury *ſur Coole*, in *Geography*, a ſmall town of France, in the department of the Marne, chief place of a canton, in the diſtrict of Châlons-ſur-Marne. It has only 355 inhabitants, but the canton contains 30 communes, and a population of 7242 individuals, on a territorial extent of 440 kiliometres.

ECUSSON, in *Heraldry*, an ineſcutcheon, or little eſcutcheon. See Escutcheon.

ECUYER, in the French *Manege*, is uſed for the riding-maſter. Sometimes it denotes certain officers formerly in the king of France's houſhold, who helped the king in mounting his horſe and alighting, and followed him on horſe-back, and carried his ſword. Theſe are called ecuyers de quartier.

Gentlemen uſhers to the queen of France, and the maſters of the horſe to princes, and perſons of quality, are alſo called ecuyers. Beſides theſe, there are others, called ecuyers cavalcadours. See Cavalcadour.

ECZE'MA, (from εκζεω, *to boil out*,) a hot painful eruption, or puſtule. Mr. Pearſon implies, by mercurial eczema, a particular kind of eruption, occaſioned by the employment of mercury. See Erythema.

ED, in *Geography*, a town of Sweden, in the province of Weſt Gothland; 33 miles N. of Uddevalla.—Alſo, a town of Sweden, in the province of Smaland; 80 miles N. of Calmar.

EDA, in *Ancient Geography*, a river of the Peloponneſus, in Meſſenia. Suidas.

Eda, in *Geography*, a town of Sweden, in the province of Warmeland; 40 miles N. of Carlſtadt.—Alſo, one of the Orkney iſlands, about 7 miles long, and half a mile to two miles broad; ſituated about 8 miles N.N.E. from Pomona. N. lat. 59° 2'. Long. 0° 33' E. of Edinburgh.

EDAM, or Eydam, a ſmall but populous town of the kingdom of Holland, in the department of the Amſtel, ſituated about 9 miles N. of Amſterdam, and 6 S. of Hoorn, not far from the Zuyder Zee, with which it communicates by means of a canal. E. long. 5°. N. lat. 52° 53'. There are a great many ſhips built at Edam; it has a good timber trade; but it is chiefly noted for its cheeſe trade, being the chief mart for all the cheeſe made in North Holland, and remarkable for its red cruſt.

EDBO, a town of Sweden, in the province of Upland; 30 miles E.N.E. of Upſal.

EDDA, in *Antiquities*, is a ſyſtem of the ancient Icelandic, or Runic mythology, containing many curious particulars of the theology, philoſophy, and manners of the northern nations of Europe; or of the Scandinavians, who had migrated from Aſia, and from whom our Saxon anceſtors were deſcended. Mr. Mallet apprehends that it was originally compiled, ſoon after the Pagan religion was aboliſhed, as a courſe of poetical lectures, for the uſe of ſuch young Icelanders as devoted themſelves to the profeſſion of a ſcald, or poet. It conſiſts of two principal parts; the firſt containing a brief ſyſtem of mythology, properly called the Edda; and the ſecond being a kind of art of poetry, and called Scalda, or Poetics. The moſt ancient Edda was compiled by Soemund Sigfuſſon, ſurnamed the Learned, who was born in Iceland about the year 1057. This was abridged, and rendered more eaſy and intelligible about an hundred and twenty years afterwards, by Snorro Sturleſon, who was ſupreme judge of Iceland in the years 1215 and 1222; and it was publiſhed in the form of a dialogue. He added alſo the ſecond part in the form of a dialogue, being a detail of different events tranſacted among the divinities. The only three pieces that are known to remain of the more ancient Edda of Sœmund, are the Voluſpa, the Havamaal, and the Runic chapter. The Voluſpa, or prophecy of Vola, or Fola, appears to be the text, on which the Edda is the comment. It contains, in two or three hundred lines, the whole ſyſtem of mythology, diſcloſed in the Edda, and may be compared to the Sibylline verſes, on account of its laconic yet bold ſtyle, and imagery and obſcurity. It is profeſſedly a revelation of the decrees of the Father of nature, and the actions and operations of the gods. It deſcribes the chaos, the formation of the world, with its various inhabitants, the functions of the gods, their moſt ſignal adventures, their quarrels with Loke, their great adverſary, and the vengeance that enſued; and concludes with a long deſcription of the final ſtate of the univerſe, its diſſolution and conflagration, the battle of the inferior deities, and the evil beings, the renovation of the world, the happy lot of the good, and the puniſhment of the wicked. The Havamaal, or "Sublime Diſcourſe," is attributed to the god Odin, who is ſuppoſed to have given theſe precepts of wiſdom to mankind; it is compriſed in about a hundred and twenty ſtanzas, and reſembles the book of Proverbs. Mr. Mallet has given ſeveral extracts of this treatiſe on the Scandinavian ethics. The Runic chapter contains a ſhort ſyſtem of ancient magic, and eſpecially of the enchantments wrought by the operation of Runic characters, of which Mr. Mallet has alſo given a ſpecimen. A manuſcript copy of the Edda of Snorro is preſerved in the library of the univerſity of Upſal; the firſt part of which hath been publiſhed, with a Swediſh and Latin verſion, by Mr. Goranſon. The Latin verſion is printed as a ſupplement to Mr. Mallet's Northern Antiquities. The firſt edition of the Edda was publiſhed by Reſenius, profeſſor at Copenhagen, in a large quarto volume, in the year 1665; containing the text of the Edda, a Latin tranſlation by an Icelandic prieſt, a Daniſh verſion, and various readings from different MSS. Mr. Mallet has alſo given an Engliſh tranſlation of the firſt part, accompanied with remarks; from which we learn, that the Edda teaches the doctrine of the Supreme, called the Univerſal Father, and Odin, who lives for ever, governs all his kingdom, and directs the great things as well as the ſmall; who formed the heaven, earth, and air; made man, and gave him a ſpirit, or ſoul, which ſhall live, after the body ſhall have mouldered away; and then all the juſt ſhall dwell with him in the place called Gimle, or Vingolf, the palace of friendſhip; but wicked men ſhall go to Hela, or death, and from thence to Niflheim, or the abode of the wicked, which is below in the ninth world. It inculcates alſo the belief of ſeveral inferior gods and goddeſſes, the chief of whom is Frigga, or Frea, *i. e. lady*, meaning hereby the earth, who was the ſpouſe of Odin, or the Supreme God; whence we may infer, that, according to the opinion of theſe ancient philoſophers, this Odin was the active principle, or ſoul of the world, which, uniting itſelf with matter, had thereby put it into a condition to produce the intelligences, or inferior gods, and men, and all other creatures. The Edda likewiſe teaches the exiſtence of an evil being, called Loke, the calumniator of the gods, the artificer of fraud, who ſurpaſſes all other beings in cunning and perfidy. It teaches the creation of all things out of an abyſs, or chaos; the final deſtruction of the world by fire; the abſorption of the inferior divinities, both good and bad, into the boſom of the grand divinity, from whom all things proceeded, as emanations of his eſſence, and who will ſurvive all things; and the renovation of the earth in an improved ſtate. Fables 1, 2. 10. 16. 33. For a farther account of the Edda, ſee Mallett's Northern Antiquities, vol. ii. 1770, paſſim.

EDDANA, in *Ancient Geography*, a town of Aſia, ſituated on the Euphrates; built by the Phœnicians, who eſtabliſhed in it a colony. It is ſaid to have derived its name from Eddanos, the chief of the colony.

EDDARA, a town of Arabia Deſerta. Ptolemy.

EDDISH, or EADISH, the latter paſture, or graſs, which comes after mowing or reaping; otherwiſe called *ear-graſs*, *earſh*, and *etch*.

EDDISTO, in *Geography*, a river of America, in South Carolina, which runs into the ſea by two ſtreams, called N. and S. Eddiſto; the former 16 and the latter 25 miles S.W. of Charleſtown.

EDDRED-SI, a ſmall iſland in the Red ſea, two leagues from the coaſt of Arabia. N. lat. 17° 10'. E. long. 41° 33'.

EDDY, or (as it is more commonly uſed in the plural) *Eddies* (from the Saxon *ed*, *backward*, *again*, and *ea*, *water*), in *Hydrodynamics*, denotes the irregular movements of water, or of wind, *viz.* thoſe deviations from the principal direction of the whole ſtream, which are occaſioned by obſtacles of any kind. And when theſe irregular motions become rotatory or circular about a certain centre, then they are more particularly called *whirlpools*.

Eddies in navigation, in hydrodynamics, or in hydraulics, are highly deſerving the attention of the ſeaman and of the engineer, on account of their being often productive of very ſerious conſequences. The principal cauſes upon which they depend are the momentum of a fluid in motion, and all ſorts of impediments to the direction of the fluid. This will be eaſily underſtood by attending to the annexed figure, which repreſents a river, or ſtream of water, flowing towards W. (*Plate* III. *Hydraulics*, *fig.* 3.) From A as far as B the channel is regular, and the water runs uniformly through it. Near B, a part of the ſtream, meeting with the obſtacle C, is forced to alter its courſe in the direction *a b*, whence, acquiring a momentum in that direction, it proceeds a certain way towards *c*; but the other part of the ſtream A B, which has not met with any ſolid obſtruction, croſſes in great meaſure the direction *a b c*, which produces an eddy, and the two parts of the ſtream obſtruct each other. From the ruffling of the ſurface of the water, or from the motion of light bodies floating upon the ſurface, this obſtruction may be eaſily perceived. Farther on, the water paſſes from the narrow part O R into the broader channel P Q, and its momentum will enable it to move on in the ſtraight direction *e d*; but, in conſequence of the attraction between the particles of water, it will drag part of the water at *e*, towards *d*, which occaſions a depreſſion of the level of the water about *e*; hence the water runs from the adjacent parts *f*, *g*, to ſupply that defect, and thus a curvilinear, or whirling motion *d f g e*, is produced. The velocity of the water, then, is checked not only in conſequence of its paſſing from a narrow into a larger channel, but likewiſe in conſequence of the above-mentioned eddy; when theſe whirling eddies are pretty ſtrong, both at ſea and in large rivers, a depreſſion is always obſerved about the centre thereof, which ſometimes is very conſiderable, and becomes very dangerous to ſmall veſſels, for they are ſometimes ſwallowed up by it. Mackenzie (in the Phil. Tranſ. for 1749) ſays, that eddies of this whirling kind, with a cavity of two or three feet, which ſometimes ſwallow up ſmall boats, may be broken and filled up by throwing in an oar. The cauſe of the hollow in the middle of theſe whirls, and of the abſorption of boats, &c. will be pointed out in the ſequel.

The inequalities of the bottom of a river are likewiſe productive of ſimilar derangements in the motion of the water. Thus, for inſtance, when the motion of the ſtream is rapid, and the bottom, or bed, of it riſes abruptly in ſome particular part, a ſenſible riſing of the water may be perceived over it, and in many ſuch caſes, even ſand or mud is forced up to the ſurface of the water at that particular place.

At ſea, and eſpecially amongſt iſlands, or in channels, the eddies ariſing from tides, currents, winds, &c. are ſo very frequent, ſo uncertain, and ſo impetuous, particularly in ſtormy weather, as to render the navigation extremely dangerous. Several ſpots are peculiarly remarkable for ſuch irregularities of motion, and they are, for that reaſon, well known to all experienced ſailors. The Eddyſtone rocks, near Plymouth, well known for the light-houſe which is built upon one of them, are ſaid to have obtained their name from the great and powerful eddies that do almoſt at all times take place among them. But eddies have alſo been obſerved in open ſeas far from any land, where they are produced by the oppoſition of the wind to a current, or to the tide, or to a ſwell occaſioned by a previous wind. When a veſſel is ſailing, unleſs it proceeds with the ſtream, the eddies which are formed by it are very evident, and they may be perceived for a conſiderable way behind the veſſel. The ſeamen call that eddy, which ſeems to throw the water on the rudder of a ſhip under ſail, the *dead water*.

In pipes, conduits, or aqueducts, all ſorts of bendings, internal contractions, elongations, enlargements, and projections, of the conducting pipe, diminiſh the quantity of diſcharge, more or leſs, according to the number and form of ſuch irregularities; ſharp angular bendings hindering the motion of the fluid, more than thoſe of a regular curvature. The cauſe of this retardation is undoubtedly owing to the eddies, and to the croſſing of the various parts, or (as they are otherwiſe called) *filaments* of the fluid, which, according to what has been ſaid above, muſt neceſſarily take place at thoſe irregularities: for all eddies and croſs directions muſt unavoidably deſtroy part of the moving force. This production of eddies in the inſide of pipes may be rendered ſufficiently evident, if an irregular glaſs tube be applied to a pretty large veſſel full of water, and if with the water there be mixed ſome particles of pounded amber, or other ſubſtance, whoſe ſpecific gravity differs but little from that of water; as theſe particles will eaſily ſhew the irregularities of the motion of the water in its paſſage through the glaſs tube.

Whenever an irregularity of the ſhape of the aperture, or ſome particular conformation of the veſſel; (or even an obſtacle to the ſtream at ſome diſtance from the aperture,) compels the particles of the fluid to run obliquely towards an aperture, a circular motion is readily communicated to the fluid, and an hollow whirl, or eddy, is formed above the aperture. By this circular motion the particles of the fluid acquire a centrifugal force, in conſequence of which they endeavour to recede from the centre, or from the axis of motion, where, of courſe, a hollow is formed, which is larger or ſmaller, according as the rotation of the fluid is more or leſs rapid. When the whirling motion is pretty conſiderable, if any light bodies float upon the fluid, they will be readily drawn towards the centre, and then downwards towards the aperture; for ſince the ſpecific gravity of the fluid is greater than that of thoſe bodies, the fluid will acquire a greater degree of centrifugal force, and will recede farther than thoſe bodies from the axis of the whirl. This may be eaſily obſerved in a common funnel, when water or other fluid is running out of it.

It needs hardly be obſerved, that ſuch eddies as occur in water, muſt likewiſe take place in other fluids under ſimilar circumſtances; due allowance being made for their different ſpecific gravities, tenacities, denſities, elaſticities, &c.

The eddies, and whirls, of air are ſo commonly met with in the ſtreets of a town, eſpecially when the wind is pretty briſk, and they are ſo often indicated by the ſmoke which iſſues out of chimneys, as to require no farther illuſtration in this article. Amongſt ſeamen, the *eddy wind* is that wind which is returned, or beat back, from any ſail.

EDDYSTONE, or EDDYSTONE-*Rocks*, in *Geography*, the name of a cluſter of rocks ſituated in the Engliſh channel, at the diſtance of about 14 miles from Plymouth-ſound, lying nearly in the direction of veſſels coaſting up and down the channel; they formerly proved very dangerous, and many veſſels were caſt away on them. To guard againſt theſe diſaſters, it was deemed neceſſary to erect a light-houſe here; but to effect this in a complete and permanent manner, ſo as to reſiſt ſtorms and afford light, was a taſk of extreme difficulty. The rocks are ſo peculiarly expoſed to the ſwells of the ocean from the ſouth and weſt, that the heavy ſeas break upon them with uncontrolled fury. Sometimes, after a ſtorm, when the ſea is apparently quite ſmooth, and its ſurface unruffled by the ſlighteſt breeze, the growing ſwell, or under current meeting the ſlope of the rocks, the ſea beats tremendouſly upon them, and even riſes above the light-houſe, overtopping it for the moment as with a canopy of frothy wave. Notwithſtanding this awful ſwell, Mr. Henry Winſtanley undertook, in the year 1696, to build a light-houſe on the principal rock, for the reſt are under water; and in 1700 he completed it. So confident was this ingenious mechanic of the ſtability of his edifice, that he declared his wiſh to be in it during the moſt tremendous ſtorm that could ariſe. This wiſh he unfortunately obtained, for he periſhed in it during the dreadful ſtorm which deſtroyed it Nov. 27, 1703. Another light-houſe, of a different conſtruction, was erected of wood on this rock, by Mr. John Rudyard, in 1709: which being conſumed by fire in 1755, a third, of ſtone, was begun by the juſtly celebrated Mr. John Smeaton, April 2, 1757, and finiſhed Aug. 24, 1759, which has hitherto withſtood the attacks of the moſt violent ſtorms. The rock, which ſlopes towards the ſouth-weſt, is cut into horizontal ſteps, into which Portland ſtone and granite are dove-tailed and ſtrongly cemented: for Mr. Smeaton diſcovered that neither could be uſed excluſively, as the former would be ſubject to the depredations of a marine animal, and the working of the latter would have been too expenſive. He therefore uſed the one for the internal part of the ſtructure, and the other for the external. Upon the principle of a broad baſe and accumulation of matter, the whole, to the height of thirty-five feet from the foundation, is a ſolid maſs of ſtones engrafted into each other, and united by every poſſible augmentation of ſtrength. The light-houſe conſiſts of four rooms, one over another, with a gallery and lanthorn at the top. The ſtone floors, which are flat above, but concave below, are prevented from preſſing againſt the ſides of the building by a chain let into the walls. The edifice is eighty feet in height; and has now ſtood fifty years, during which time, though frequently aſſaulted by all the fury of the element, it has withſtood the moſt violent attacks without ſuſtaining the ſmalleſt injury: and, in all probability, as Mr. Smeaton ſaid, nothing but an earthquake can deſtroy it. The wooden part was burnt in the year 1770, but renewed in 1774. Its ſituation is long. 4° 21′ W. Lat. 50° 3. N. For an intereſting, ſcientific account of this ſtructure, and for much uſeful information concerning ſimilar buildings, the reader is referred to Smeaton's "Hiſtory, &c. of Eddyſtone Light-houſe."

houſe," with plates, 8vo. Many additional particulars reſpecting it are recorded in the "Beauties of England and Wales," vol. iv.

Eddystone, a rock on the coaſt of Patagonia. S. lat. 48° 30′. W. long. 64° 56′.

EDDYVILLE, a poſt town of America, in the ſtate of Kentucky, and county of Livingſton; 821 miles W. by S. from Waſhington.

EDEBASSUS, in *Ancient Geography*, a town of Aſia Minor, in Lycia. Steph. Byz.

EDELBACH, in *Geography*, a town of Germany, in the archduchy of Auſtria; 6 miles E.S.E. of Bavarian Waidhoven.

EDELINCK, Gerard, in *Biography*, was an engraver of conſiderable eminence, a member of the French royal academy of painting and ſculpture, and one of the conſtellation of diſtinguiſhed artiſts that ſhed luſtre on the reign of Louis XIV. He was born at Antwerp, but reſided at Paris after the year 1665, where he was honoured with the title of Chevalier, and had, by the king's appointment, an apartment in the Gobelins. He engraved both portraits and hiſtory with admirable ſkill. His portraits are chiefly thoſe of artiſts and men of ſcience; and ſome of his hiſtorical engravings are very large, particularly his "Crucifixion," and his "Tent of Darius," both after Le Brun, and an "allegorical" engraving in honour of the king. He died at Paris, at a very advanced age, in the year 1707. For ſome further particulars of this artiſt, ſee French *School of Engravers*.

EDELING. See Edhiling, and Atheling.

EDELMANN, John Fried., born at Straſbourg, 1749, a harpſichord maſter, and compoſer for that inſtrument, long reſident at Bruſſels. He had a lively finger and played his own pieces with great neatneſs and ſpirit. But his ſtyle of compoſition would now be called flimſy and rattling. It is a bad copy of Schobert's nervous ſymphonic ſtrains. Emanuel Bach's refinements in melody, and ſcience in harmony and modulation, had not reached Bruſſels, or, at leaſt, touched the heart of Edelmann, when he compoſed any of his leſſons which have come to our knowledge. We believe this muſician, who had the character of an innoxious good natured man, much eſteemed by his pupils, had removed to Paris previous to the revolution, in the horrors of which he was early involved, and ſuffered under the guillotine at Straſbourg; we never heard why, except that it was Roberſpierre's pleaſure.

EDELSTEIN, in *Geography*, a town of Sileſia, in the principality of Neiſſe; five miles S. of Ziegenthals.

EDEMA, in *Ancient Geography*, a town of Judea, in the tribe of Naphtali.

EDEN, *Land* or *Country of*, in *Scripture Geography*, a diſtrict or province of Aſia, in which was "Paradiſe" or the "Garden of Eden." The word *Eden*, according to its primary meaning in the Hebrew language, denotes pleaſure or delight; and hence it was uſed as an appellative for ſeveral places, whoſe ſituation was peculiarly pleaſant and delightful. Such was the *Eden*, or Beth-Eden, mentioned by the prophet Amos (ch. i. v. 5.) which, as Huet, biſhop of Soiſſons, thinks, was a valley ſituated between the mountains of Libanus and Antilibanus, in that part of Syria, of which Damaſcus was the metropolis. Some have ſuppoſed that the paradiſe of our firſt parents was ſituated in this valley; and they have been induced to adopt this opinion by having diſcovered in its vicinity a town called "Paradiſa," and mentioned both by Pliny and Ptolemy. There is alſo a village called *Eden*, near Tripoli in Syria, ſeated on mount Libanus, near which were the river Adonis and the cedars of Lebanon. Maundrel alſo mentions this village. In this place ſome have ſought the ſite of the terreſtrial paradiſe. But in order more preciſely to aſcertain the ſituation of the "Garden of Eden," thoſe who acquieſce in the literal deſcription of it given by Moſes, refer to his account of it, and inveſtigate the country in which it was ſituated by the attendant circumſtances, which he has recited. (See Gen. ii. 8—14.) From the ſcripture account it appears, that the Eden, in which was planted the garden of paradiſe, lay on a river or ſingle channel, which out of Eden was parted into four heads or rivers, called Piſon, Gihon, Hiddekel, and Perath or Euphrates. We are, therefore, to inveſtigate ſome ſingle channel or river, common to theſe four rivers; ſuppoſing that their courſe has not been materially altered in ſubſequent times, and particularly by the cataſtrophe of the deluge. *Piſon*, the firſt of theſe rivers, *compaſſeth*, ſays the ſacred hiſtorian, *the whole land of Havilah, where there is gold; and the gold of that land is good: there is bdellium and the onyx-ſtone.* In order to diſcover this land of Havilah, we find that it is mentioned in two other places of ſcripture, *viz.* Gen. xxv. 18. and 1 Sam. xv. 7. In both theſe places we may well ſuppoſe, that the expreſſion "from Havilah unto Shur" denotes the whole extent of that part of Arabia, which lies between Egypt to the weſt, and a certain channel or river (which empties itſelf into the Perſian gulf) to the eaſt. Shur appears to have been the weſtern extremity of this part of Arabia, (Exod. xv. 22.) which came up to the bottom of the Red ſea or Arabian gulf, and ſo joined on to Egypt. Havilah, therefore, was the eaſtern extremity of this part of Arabia. Moreover, ſacred and profane authors have highly commended the gold of Arabia. (See Ezek. xxvii. 22, 23. Diod. Sic. l. ii. and iii.) As for the bedolach, or bdellium, mentioned by the hiſtorian, writers have differed concerning the meaning of the term; ſome having ſuppoſed that it ſignified pearls, and others, that it was a peculiar kind of gum. Both theſe, it is ſaid, are to be found in the land of Havilah. The ſea about Baharen, an iſland in the Perſian gulf, which ſea lies next to the land of Havilah, has always abounded with pearls of the fineſt kind; as we learn from the teſtimonies of Nearchus, one of Alexander's captains, Iſidorus of Charax, Pliny, Arrian, Ælian, Origen, Benjamin of Navarre, Teixeira, a Portugueſe, and many other modern travellers. If by bedolach or bdellium we underſtand a gum, this is likewiſe found in the land of Havilah, as we learn from Dioſcorides, Iſidorus, Galen, Pliny, Strabo, Arrian, &c. &c. Precious ſtones have been alſo found from time immemorial in the ſame country. (See Ezek. xxvii. 22, 23.) Nearchus, Strabo, Diodorus, and Pliny, teſtify to the ſame fact, and Pliny, in particular, ſays, on the authority of the ancients, that the onyx-ſtone, if we underſtand this to have been the "ſchoham" of the text, was no where elſe to be found but in the mountains of Arabia. It further appears, that a channel, or river, called by Moſes Piſon, bounds Havilah eaſtward, and diſcharges itſelf into the Perſian gulf, and conſequently anſwers to his deſcription. Beſides, as Moſes is ſuppoſed to have written his hiſtory in Arabia Petræa, or ſome place nearly adjoining it, this river was the neareſt to him of the four rivers which he names, and, therefore, it is natural to imagine, that it muſt be the firſt which he would mention. The etymology of Piſon, derived from *puſch*, to be full or increaſe, or from *poſcha*, to ſpread itſelf, correſponds to the ſituation of this river, for the tides in this part of the Perſian gulf are ſo violent and ſo high, that no trenches furniſh a ſufficient defence againſt their irruption into the neighbouring grounds, which are ſoft and low. No name could be more appropriate to that channel, which was apt ſo often to overflow, as that of Piſon.

Of the ſecond river Moſes ſays; *the name of the ſecond river is Gihon; the ſame is it that compaſſes the whole land of Cuſh.* As Piſon was the firſt river with reſpect to the place where Moſes was writing, it is natural to imagine, that Gihon, being the ſecond, was the river next to it, and the moſt eaſterly channel of the two, into which the Euphrates, after its junction with the Tigris, is again divided. The name Cuſh did formerly belong to the country waſhed by this eaſterly river. By the Greeks and Latins it was called Suſiana, and it is now called Chuzeſtan or Chuſiſtan, evidently indicating its original appellation Cuſh.

The third river is thus deſcribed; *and the name of the third river is Hiddekel, that is it which goes before Aſſyria.* Hiddekel, the Hebrew name, is rendered by the LXX interpreters Tigris; and that this was the Hiddekel of Moſes has been argued from the etymology of the word Tigris. In the Levant they call it Diglath; and if we take away the aſpiration from Hiddekel, we have the word Dekel, which the Syrians termed Diklat, called by Joſephus and the Chaldee paraphraſts, and alſo by the Arabians and Perſians Diglath, and by the modern orientals Degil and Degolah, by Pliny Diglito, and by the Greeks, inſtead of Digli, Tigris. Hence it is inferred, that the names Tigris and Diglito are one and the ſame, varied according to the diverſity of dialects or languages. The method obſerved by Moſes in reckoning up theſe four rivers is alſo alleged as a preſumptive argument, that the Hiddekel is the Tigris. Having named the Piſon and the Gihon, it was natural for him to return towards the place where he was writing, and to mention the firſt river he met with on his return, and this was the Tigris. Beſides, the river Tigris actually runs along Aſſyria, the province or diſtrict ſurrounding Niniveh the capital, ſo conſidered with reſpect to the place where Moſes was writing.

As to the fourth river, or the Euphrates, it would naturally be the laſt mentioned by Moſes. This river and the Tigris join together into one channel, which is afterwards divided again into two channels, the weſterly one of the two being the river Piſon, and the eaſterly one the river Gihon. Now, the *country of Eden* was ſituated on the common channel of theſe four rivers; and the words of Moſes obviouſly intimate, that the *Garden of Eden*, or the terreſtrial paradiſe, lay on the ſingle channel, which is common to all the four rivers, for *from thence*, that is, out of Eden, *it was parted and became four heads.* Some other circumſtances have been adduced in order to aſcertain the ſituation of Eden. The fertility of the ſoil has been alleged as affording a concurring argument in favour of the diſtrict to which it has been now referred. It has been farther argued, that Moſes, by ſaying the garden was planted *eaſtward* in Eden, deſigned to mark out to them, in what part or place of the land of Eden Paradiſe was ſituated. Since, then, Paradiſe lay in the eaſterly part of the land of Eden, and the river that watered it ran through that province before it entered into Paradiſe, it muſt follow, that Paradiſe was ſituated on one of the turnings of this river, that goes from weſt to eaſt, and probably at the eaſterly end of the ſoutherly branch of the loweſt great turning, taken notice of by Ptolemy.

It has been imagined that the "Garden of Eden" was the original of thoſe curious gardens, which the princes of the Eaſt cauſed to be made, and by which they would repreſent this delightful ſpot. Such was that golden garden valued at 500 talents, which Ariſtobulus, king of the Jews, preſented unto Pompey; and which Pompey afterwards carried in triumph, and conſecrated to Jupiter in the capitol. It has been alſo apprehended, that the conformity between the words "Garden of Eden" and "Garden of Adon" ſeems to ſhew, that to the garden of Eden was owing the riſe of thoſe gardens conſecrated to Adonis, which the Greeks, Egyptians, and Aſſyrians, planted in earthen veſſels and ſilver baſkets, for the purpoſe of adorning their houſes, and which they carried about in their proceſſions. Hence it has likewiſe been ſuppoſed, that the poets formed their "Fortunate iſlands," the "Elyſian fields," the "Meadows of Pluto," and the gardens of the Heſperides, of Jupiter, and of Alcinous, as well as thoſe of Adonis. Wells's Geography of the Old Teſtament, vol. i. Shuckford's Creation and Fall of Man.

Eden, in *Geography*, a town of Germany, in the circle of Weſtphalia, and county of Rietberg; one mile E.S.E. of Rietberg.

Eden, a river of England, which riſes in Weſtmoreland, on the borders of Yorkſhire, traverſes the county of Cumberland, and diſcharges itſelf into an arm of the ſea, called Solway Frith; about ſeven miles below Carliſle.

Eden, a river of Scotland, which runs into the Tweed, not far from Coldſtream.

Eden, a poſt town of America, in Hancock county, and ſtate of Maine, incorporated in 1796, taken from the northerly part of mount Deſert; 764 miles eaſterly from Waſhington.—Alſo, a townſhip of Orleans county, in the ſtate of Vermont, N W. of Craftſbury, which adjoins to it.

EDENBURG, a town of Hungary, 29 miles S.W. of Preſburg, and 36 S. of Vienna.

EDENBERRY, a town of Ireland, in King's county; 29 miles W. of Dublin.

EDENKOBEN, a ſmall town of France, in the department of Mont Tonnerre, chief place of a canton in the diſtrict of Spire, with a population of 3014 individuals. The canton has 26 communes, and 16,468 inhabitants.

EDENTON, a diſtrict of America, on the ſea coaſt of N. Carolina, bounded N. by the ſtate of Virginia, E. by the ocean, W. by Halifax diſtrict, and S. by Newbern. It is ſubdivided into nine counties, *viz.* Chowan, Paſquotank, Parquimins, Gates, Hertford, Bertie, and Tyrrel. It contains 56,986 inhabitants, of whom 21,632 are ſlaves. The lands in this diſtrict are level, rich, and well watered, and produce abundance of wood, chiefly pine, oak, cypreſs, and juniper.

Edenton, the capital of the above diſtrict, is a poſt town and port of entry, ſituated at the head of a bay on the N. ſide of Albemarle ſound, and at the N.E. ſide of the opening of Chowan river. It contains more than 150 wooden buildings, and 1302 inhabitants, of whom 713 are ſlaves. Its public buildings are an ancient brick epiſcopal church, a court-houſe, and a gaol. The proſperity of this town, though its ſituation is favourable for trade, has been retarded by its inſalubrity. It is 97 miles N. of Newbern and 440 S.S.W. of Philadelphia. N. lat. 36° 6′. W. long. 77° 11′.

EDER, a town of Africa, in Morocco, on the coaſt of the Atlantic; 10 miles N.E. of Cape Cantin.—Alſo, a river of Bohemia, which runs into the Elbe, at Leitmeritz.—Alſo, a river of Germany, which runs into the Fulda; ſeven miles S. of Caſſel.

EDERIC, a town of Aſia, in the country of Tibet; 40 miles S.S.E. of Toſun-Hotun.

EDERITZ, a town of Germany, in the circle of Upper Saxony, and principality of Anhalt-Cothen; four miles. S. of Cothen.

EDESHEIM, a town of Germany, in the circle of the Upper Rhine, and biſhopric of Spire; 14 miles W. of Spire.

EDESSA, in *Ancient Geography*, a city of Aſia, in Meſopotamia, and the capital of Mygdonia, which formed a part of Oſrhoené; ſeated on the bank of a ſmall river called

Scirtus, N.E. of Zeugma, and E.S.E. of Samoſata. It was about 20 miles beyond the Euphrates, into which the Scirtus diſcharged itſelf. Edeſſa is ſaid to have been one of thoſe numerous cities, which were built by Seleucus Nicator about 300 years B. C. It was once a place of great celebrity, and famous for a temple of the Syrian goddeſs, which was one of the richeſt in the world; and hence it was denominated Hierapolis, or the holy city. During the inteſtine broils, which greatly weakened the kingdom of Syria, Augarus, or Abgarus, ſeized on the city of Edeſſa, and its fruitful territory, which he erected into a new kingdom, ſtyling himſelf king of Edeſſa, and tranſmitting the ſame title to his poſterity. He left this ſmall principality in a very flouriſhing condition, and was ſucceeded by his ſon Abgarus II.; the name of Abgarus being common to all the kings of Edeſſa. This prince made himſelf maſter of the province of Oſrhoené, and entering into an alliance with Pompey againſt Tigranes the Great, king of Armenia, ſupplied his army with proviſions. In the Parthian war he pretended to take part with Craſſus, but maintaining a private correſpondence with the enemy, contributed to the great overthrow which the Romans ſuſtained at Carrhæ. From him the royal authority deſcended to Abgarus III. a prince celebrated by eccleſiaſtical hiſtorians on account of the letters which are ſuppoſed to have paſſed between him and our Saviour. (See Abgarus.) We learn from St. Auſtin, (apud Aug. Epiſt. 230.) that our Saviour promiſed Abgarus that the city ſhould be impregnable; and Evagrius (Hiſt. Eccleſ. b. iv. c. 27.) obſerves, that although this circumſtance was not mentioned in our Lord's letter, it was the common belief; which was much confirmed, when Coſrhoes, king of Perſia, having ſet down before it, was obliged to raiſe the ſiege. The deliverance of the city is aſcribed to the picture of Chriſt, which was the perfect impreſſion of his face on linen, and which being expoſed on the rampart, ſerved as a palladium to the beſieged. This image was revered as a pledge of the divine promiſe already mentioned, that Edeſſa ſhould never be taken by a foreign enemy. After this important ſervice, the image of Edeſſa was preſerved with reſpect and gratitude. This fable, as Gibbon imagines, (Rom. Emp. vol. ix.) was invented between the years 521 and 594, moſt probably after the ſiege of Edeſſa in 540. Abgarus V. reigned in the time of the emperor Claudius, and joined C. Caſſius, governor of Syria, who had been ordered by that emperor to place Meherdates on the throne of Parthia; but abandoning the Romans in the heat of an engagement, he occaſioned the defeat of their army. Abgarus V. was contemporary with Trajan, and was declared by him friend and ally of the Roman people. But he afterwards deſtroyed and burnt the city of Edeſſa. Another prince of the ſame name reigned at Edeſſa in the time of the emperor Severus, and having aſſiſted him in his wars in the Eaſt, attended him to Rome, where he was received and entertained with extraordinary pomp and ſplendour. But being afterwards ſuſpected by Caracalla of holding a correſpondence with the enemies of Rome, and being ſummoned to juſtify himſelf before the emperor, he was, by his order, confined, and his kingdom reduced to a Roman province. The emperor Julian took occaſion, on account of the diſorderly conduct of the Arians in this city, to confiſcate the whole property of the church, and to diſtribute it among the ſoldiers. In the time of the cruſades, towards the cloſe of the 11th century, count Baldwin, being called to the aſſiſtance of a Greek or Armenian tyrant, who had been ſuffered under the Turkiſh yoke to reign over the Chriſtians of Edeſſa, accepted the character of his ſon and champion; but no ſooner was he introduced into the city, than he inflamed the people to the maſſacre of his father, occupied the throne and treaſure, extended his conqueſts over the ſouth of Armenia and the plain of Meſopotamia, and founded the firſt principality of the Franks or Latins, which ſubſiſted 54 years beyond the Euphrates. About the middle of the 12th century, Zenghi, ſon of Alcantar, a valiant Turk, having commenced his military career by the defeat of the Franks at Antioch proceeded to the ſiege of Edeſſa, and after 25 days, he ſtormed the city, and recovered from the Franks their conqueſts beyond the Euphrates.

Edessa, in *Geography*, a town of European Turkey, in the province of Macedonia, near the Viſtricza, called by the Turks "Moglena"; 316 miles W. of Conſtantinople. N. lat. 40° 50′. E. long. 22° 3′.

EDESSENUM, the name of a famous collyrium, reckoned among the number of the monohemera, or ſuch as cured certain diſorders of the eyes in one day. It is ſuppoſed to have had its name edeſſenum from the city of Edeſſa, where it was firſt invented, and in great uſe. Its compoſition was this: take gum arabic, tragacanth, ſarcocolla, acacia, and ſtarch, of each two drams; opium, four drams; ceruſe, eight drams; cadmia, ſixteen drams; theſe were all to be reduced to a fine powder, and afterwards mixed with a ſufficient quantity of water, to be uſed to waſh the eyes.

EDETA, Liria, in *Ancient Geography*, a very ancient town of Spain, ſituated towards the ſouth, at ſome diſtance on the left of the river Turia, N.W. of Valencia. It has given name to the *Edetani*, whoſe territory extended from the Iberus to the river Xucar, and was bounded by Celtiberia on the weſt, and on the eaſt by Ileriaonia. This territory contained, beſides Edeta, ſeveral other towns, as Salduba or Saragoſſa; Celſa below Salduba, and on the oppoſite ſide of the river; Belia, Carthago Vetus, S. of Celſa; Turbula or Tervil, near Albaraçin, where the Edetani were defeated by Quintius Minucius, A.U.C. 557; Segobriga or Segorbe, on the right bank of the Morviedro; Saguntum or Morviedro, deſtroyed by Hannibal and reſtored by the Romans, famous for its clay; and Valentia or Valencia.

EDFUERIM, in *Geography*, a town of Norway; 36 miles N. of Berga.

EDGAR, in *Biography*, one of the moſt diſtinguiſhed of the Saxon kings of England, was ſon of Edmund. When he was but 13 years old, he was placed by the inſurgents, who had rebelled againſt his brother Edwy, at their head, and upon the death of Edwy he ſucceeded peaceably to the throne, in 959. The monks and Dunſtan had been the inſtruments of Edgar's elevation, and to them he gave great powers, allowing them the government of all monaſteries inſtead of the ſecular canons, who were accuſed of a general diſſoluteneſs of manners. This prince, however ſubſervient to the monks in religious concerns, never gave the civil and military concerns of his kingdom out of his own hands. He maintained a large body of troops to repel the invaſions of the Scots, and fitted out a navy, which he always kept under ſtrict diſcipline, to prevent any attack of the Danes: hence he ſecured the ſubmiſſion of the little independent princes of Wales and Ireland. One of the moſt remarkable circumſtances in the reign of Edgar, is the extirpation, or at leaſt, the great diminution of wolves in the ſouthern parts of the iſland. This he effected by commuting the puniſhment of certain crimes for a fine of wolves' tongues, and by exchanging a tribute in money from Wales for a payment of the heads of thoſe animals. Edgar, in the monkiſh hiſtories, is celebrated for his piety, but he was a man of very licentious morals. As his reputation allured a great number of foreigners to his court, they imported all the vices of their reſpective countries, and contributed to encourage the king's licentiouſneſs, and to corrupt the ſimple manners of his ſubjects. One of his amours has afforded an intereſting ſubject for a tragedy. Elfrida, daughter of Olgar, earl of Devonſhire, was highly celebrated for her beauty; the report reached the king, who ſent his favourite, the earl of Athelwold, to diſcover if the praiſes beſtowed upon her were ſuch as her beauty claimed The earl found it too great for him to withſtand. He ſatisfied the king by a falſe report, that it had been greatly exaggerated, and then obtained leave to marry her as a very rich heireſs. Edgar ſoon diſcovered the artifice, and deſired to be introduced to his wife, who, perhaps, ambitious of being the wife of the king rather than of one of his ſubjects, diſplayed her perſon in the moſt ſtriking manner. Edgar, tranſported with rage, drew Athelwold to a retired place in a wood under pretence of hunting, ſtabbed him with his own hand, and ſhortly after married the widow. King Edgar, ſays judge Blackſtone (vol. iv.), who, beſides his military merit, as founder of the Engliſh navy, was alſo a moſt excellent civil governor; obſerving the ill effects of three diſtinct bodies of laws, *viz.* the Dane-lage, Weſt-Saxon-lage, and Mercian-lage (ſee COMMON *Law*), prevailing at once in ſeparate parts of his dominions, projected and begun what his grandſon king Edward the Confeſſor afterwards completed, that is, one uniform digeſt or body of laws to be obſerved throughout the whole kingdom; this was probably no more than a revival of king Alfred's code, with ſome improvements ſuggeſted by neceſſity and experience; particularly the incorporation of ſome of the Britiſh, or rather Mercian cuſtoms, and alſo ſuch of the Daniſh as were reaſonable and approved, into the Weſt-Saxon-lage, which was the ground-work of the whole.

EDGARTON, in *Geography*, a port of entry and poſt-town of Maſſachuſetts, and chief town of Duke's county, ſituated E. of the iſland of Martha's Vineyard. The fertile iſland of Chabaquidick is within the juriſdiction of Edgarton, and has a ſmall trade to the Weſt-Indies. It is 100 miles S. S. E. of Boſton, incorporated in 1671, and containing 1226 inhabitants.

EDGCOMB, formerly *Freetown*, a townſhip of America, in Lincoln county and ſtate of Maine, E. S. E. of Wiſcaſſet, containing 989 inhabitants. It was incorporated in 1774, and is diſtant 180 miles N. by E. from Boſton.—Alſo, a county of Halifax diſtrict in N. Carolina, bounded S. by Pitt county, S.W. by Wayne county, and Tar river, which affords a communication with ſeveral counties in the ſtate, W. by Naſh county, and E. by Martin and Halifax counties. It contains 9898 inhabitants, of whom 3580 are ſlaves.

EDGCUMB-Bay, a bay on the N. E. coaſt of New Holland. S. lat. 20°.

Edgcumb-*Iſland*, one of the cluſter called "Queen Charlotte's iſlands," in the South ſea, ſo called by Capt. Carteret in 1767. It has a fine pleaſant appearance, and lies in S. latitude 11° 10′. E. long. 165° 14′.

EDGE *in with a ſhip*, in the *Sea Language*, is ſaid of a chace, that is making up to it.

Edge *away*, is to decline gradually from the ſhore, or from the line of the courſe which the ſhip formerly ſteered, when ſhe ſails nearer the direction of the wind, or *larger* before the wind.

EDGECOMBE, Mount, in *Geography*, a high round mountain, ſo called by Cook in 1769, ſituated upon the main land S. W. by S. of the iſland of Mowtohora, in the South Pacific ocean, and not far from the ſea. It ſtands in the middle of a large plain, and on this account is the more conſpicuous. S. lat. 37° 59′. E. long. 193° 7′.

Edgecumbe, *Cape*, a cape on the weſt coaſt of North America, in the north Pacific ocean. It is a point of land that ſhoots out from a round elevated mountain, called by Capt. Cook, in 1778, "Mount Edgecumbe." N. lat. 57° 3′. E. long. 224° 7′.

EDGEFIELD, a diſtrict of South Carolina, in America, bounded N. by Saluda river, which ſeparates it from Newbury diſtrict, S W. by Savannah river, which divides it from the ſtate of Georgia, and W. by Abbeville. This diſtrict is about 45 miles long and 24 broad. The poſt-office in this diſtrict, called "Edgefield court-houſe," is 20 miles from Abbeville court-houſe, 25 from Auguſta, and 60 from Columbia.

EDGEMONT, a townſhip of America, in Delaware county, Pennſylvania, containing 509 inhabitants.

EDGEWARE, a town of England, in the county of Middleſex, on the borders of Hertfordſhire, with a weekly market on Thurſday; 8 miles N. W. of London.

EDGHILL, the name of an elevated place in Warwickſhire, ſituated about 14 miles from the town of Warwick, and near the village of Kineton, or Kenton. It is memorable in the military annals of the kingdom for a battle fought here in the time of the civil wars between king Charles and the parliament: on which occaſion nearly 1500 perſons were killed in the field, among whom were ſeveral of the nobility. It occurred October 23, 1642, and the monarch's army proved victorious. They afterwards marched to Banbury, took poſſeſſion of its caſtle, and then proceeded to Oxford. Mr. Jago, in a poem entitled "Edge-hill," has related many intereſting events concerning this engagement, and has deſcribed the features of the country with much felicity and propriety.

Near this place is the noted vale of Redhorſe, ſo called from a figure of a horſe cut on the ſide of a hill. The figure is ſuppoſed, by Mr. Wiſe, who has written a diſſertation on the ſubject, to have been cut in commemoration of the valorous feats performed by Guy, earl of Warwick, who poſſeſſed Fulbrook caſtle in the vicinity.

EDGINGS, in *Gardening*, rows of ſhrubs, herbs, or flowers, placed by way of borders around beds, compartiments, &c. For the edgings of compartiments, box ſeems the moſt proper. See Box.

EDHILING, Edhilingus, an ancient appellation of the nobility among the Anglo-Saxons.

The Saxon nations, ſays Nithard, Hiſt. lib. iv. is divided into three orders, or claſſes of people; the edhilingi, the frilingi, and the lazzi; which ſignify the nobility, the freemen, and the vaſſals or ſlaves.

Inſtead of edhiling, we ſometimes meet with atheling, or ætheling, which appellation was likewiſe given to the king's ſon, and the preſumptive heir of the crown. See Atheling.

EGHIR, in *Geography*, a town of Hindooſtan, in the country of Golconda, 10 miles W. of Racnore, and 75 S.W. of Hydrabad.

EDICT, an inſtrument, ſigned and ſealed by a prince, to ſerve as a law to his ſubjects.

Edicts have no room in England, where the enacting of laws is not lodged in the king, but in the parliament.

In the Roman law we find frequent mention of the edict of the prætor, *quod prætor edixit*, which was a phraſe appropriated to the ordinances of the prætor; though it was ſometimes alſo uſed on other occaſions.

Theſe occaſional edicts of the prætors ſupplied the ſilence or ambiguity of the laws. This ancient prerogative of the Roman kings was transferred, in their reſpective offices, to the conſuls and dictators, the cenſors and prætors; and a ſimilar right was aſſumed by the tribunes of the people, the ædiles, and the pro-conſuls. At Rome, and in the provinces, the duties of the

the ſubject, and the intentions of the governor, were proclaimed, and the civil juriſprudence was reformed by the annual edicts of the ſupreme judge, the prætor of the city. As ſoon as he aſcended his tribunal, he announced, by the voice of the cryer, and afterwards inſcribed on a white wall, the rules which he propoſed to follow in the deciſion of doubtful caſes, and the relief which his equity would afford from the preciſe rigour of ancient ſtatutes. A principle of diſcretion, ever congenial to monarchy, was introduced into the republic: the art of reſpecting the name, and eluding the efficacy of the laws, was improved by ſucceſſive prætors; ſubtleties and fictions were deviſed to defeat the plaineſt meaning of the decemvirs, and where the end was ſalutary, the means were frequently abſurd. A juriſdiction thus vague and arbitrary was expoſed to the moſt dangerous abuſe: the ſubſtance, and alſo the form of juſtice were often ſacrificed to the prejudice of virtue, the bias of laudable affection, and the groſſer ſeductions of intereſt or reſentment. But the errors or vices of each prætor expired with his annual office; and the temptations of injuſtice were removed by the Cornelian law, which compelled the prætor of the year to adhere to the letter and ſpirit of his firſt proclamation. It was reſerved for Adrian to accompliſh the deſign, which had been conceived by Cæſar; and the prætorſhip of Salvius Julian, an eminent lawyer, was immortalized by the compoſition of the "Perpetual Edict." Dion Caſſius fixed the perpetual edict in the year of Rome 686. (tom. i. l. 36.) This well digeſted code was ratified by the emperor and ſenate; the long divorce of law and equity was at length reconciled; and inſtead of the twelve tables, the perpetual edict was fixed as the invariable ſtandard of civil juriſprudence. This perpetual edict was formed by a ſelection from all the ancient edicts of prætors, and Adrian ordained that this ſhould be always conſidered as a law, from which no deviation ſhould be allowed.

The celebrated "Edict of Milan" was announced by Conſtantine about five months after the conqueſt of Italy, A. D. 313, as a ſolemn and authentic declaration of his ſentiments, and was the means of reſtoring peace to the Catholic church. In the perſonal interview of the two weſtern princes, Conſtantine, by the aſcendant of genius and power, obtained the ready concurrence of his colleague Licinius; the union of their names and authority diſarmed the fury of Maximian; and after the death of the tyrant of the Eaſt, the edict of Milan was received as a general and fundamental law of the Roman world. The Latin original of this edict is preſerved by Cæcilius (De Mort. Perſecut. c. 48.); and Euſebius (Ecc. Hiſt. l. x. c. 3.) has given a Greek tranſlation of it, which refers to ſome proviſional regulations. The wiſdom of the emperors provided by this edict for the reſtitution of all the civil and religious rights of which the Chriſtians had been ſo unjuſtly deprived. It was enacted, that the places of worſhip and public courts, which had been confiſcated, ſhould be immediately reſtored without any expence. The ſalutary regulations which guard the future tranquillity of the faithful are formed on the principles of enlarged and equal toleration: and the two emperors concurred in proclaiming to the world that they granted a free and abſolute power to the Chriſtians and to all others, of following the religion which each individual might prefer, as the beſt adapted to his uſe. They alſo exacted from the governors of the provinces a ſtrict obedience to the true and ſimple meaning of an edict, which was deſigned to eſtabliſh and ſecure, without any limitation, the claims of religious liberty, and they aſſign two weighty reaſons, which induced them to allow this univerſal toleration: the humane intention of conſulting the peace and happineſs of their people, and the pious hope, that by ſuch a conduct, they ſhall appeaſe and propitiate the Deity, whoſe ſeat is in heaven. Gibbon's Hiſt. Rom. Emp. vol. iii.

In the French law, edicts, *edits*, make a great figure; they are of various kinds; ſome importing a new law, or regulation, as the edict of duels, that of ſecond marriages, &c. Others, the erection of new offices, eſtabliſhment of duties, rents, &c. Sometimes articles of pacification, as the edict of Nantz, paſſed by Hen. IV. in 1598, and revoked hy Louis XIV. in 1685, &c. Edicts are all ſealed with green wax, to ſhew that they are perpetual and irrevocable.

Edicts with them were much the ſame as proclamations with us; but with this difference, that the former had the authority of a law in themſelves, from the power which iſſued forth; whereas, the latter are only declarations of a law, to which they refer, and have no power in themſelves.

EDICT, *chamber of the.* See CHAMBER.

EDIFICE, ÆDIFICIUM, a building. See BUILDING. The word is formed of the Latin *ædes* and *facio*, I make.

EDILE, or rather ÆDILE. See ÆDILE.

EDINBURGH, in Latin *Edemburgum*, or *Aneda*, in *Geography*, the capital of Scotland, is a large, populous, and ancient town ſituated in the northern part of the county of Mid Lothian, or Edinburghſhire, about two miles ſouth of the eſtuary of the river, or frith of Forth; 380 miles N.W. of London, and 225 N.E. of Dublin, in W. long. $3^{\circ} 35'$. N. lat. $55^{\circ} 56' 22''$.

The origin of Edinburgh is involved in much obſcurity. That part of Scotland where it is ſituated formed, in the days of Agricola, the Roman province of Valentia. On the departure of the Romans from Great Britain, this province fell into the hands of the Saxon invaders, under their leaders Octa and Ebuſa, in the year 452, and continued in their poſſeſſion till the defeat of Egfrid, king of Northumberland, by the Picts, in 685.

The earlieſt mention of Edinburgh has been detected by the induſtry of Mr. David Macpherſon, in the "Annales Ultonienſes," a manuſcript in the Britiſh Muſeum, where this paſſage occurs, under A. D. 637, "Bellum Gline Mureſan et Obſeſſio Edin." In 960, Eden town is mentioned, in an old manuſcript quoted by Camden, as being evacuated by the Saxons, and abandoned to Indulf, king of the Scots. In a charter of Alexander I., Edinburgh is called Edeneſburg; in one of David I., Edwyneſburg; in the Chronicle of Melroſe, Edenburc and Edinburgh; by Simon of Durham, Edwineſburch; in the Chronicle of Lanercoſt, Edwyneſburgh; by Hemingford, Edenſburgh; in the Polychronicon of Higden, Edenburch; by Knighton, Ednyſborg and Edeneſburgh; by the prior of Lochleven, Edynburch, Edynbrowch, Maydyn-caſtle, and the Sorrowful Hill; by the highlanders Dun Edin; and by the Welſh, Myned Agned. This laſt appellation of Myned Agned, or Caer Agned; in Engliſh, Maiden-caſtle; and, in Latin, Caſtrum Puellarum, might, in time, have been ſoftened into Aned, and then inverted into Edan, a conjecture, which was firſt ſuggeſted by the Edinburgh reviewers, and which appears, in ſome degree, ſupported by the Latin Aneda.

Mr. J. Sibbald, in his "Chronicle of Scottiſh Poetry," thinks, that Snadoun Eaſt muſt have been Edinburgh, becauſe Stirling was Snodon, or Snedin Weſt; ſo that its name was firſt Sneddinburgh, then Neddenburgh, and, laſtly, Edinburgh. Others derive its name from Edwin, a Saxon monarch. But the moſt probable etymology is from the Gaelic Edin, the ſteep face of a rock, a compound which occurs in Edenbelly, Edinmore, and other local appellations. When the Saxons acquired poſſeſſion of the fortreſs,

treſs, Dun Edin, of courſe, became Edinburgh ; the former name being ſtill retained by the highlanders.

To David I. Edinburgh muſt have been indebted for the diſtinction of being a royal borough, as this king is ſuppoſed to have been the firſt who erected royal boroughs in Scotland, and in his charter of foundation of the abbey of Holyrood-houſe, in the year 1128, the town is mentioned by the title of "Burgum meum de Edwineſburg."

In the year 1215, the firſt parliament was held at Edinburgh, in the reign of Alexander II., but it was only after the year 1456, when parliaments continued to be held regularly in this city, that it was looked upon as the capital of Scotland. Little is known of the hiſtory of Edinburgh before this period. The oldeſt charter in the archives of the town, is one granted by king Robert I., on the 28th of May, 1329, in which he beſtows upon Edinburgh the town of Leith, with its harbour and mills, and his grandſon John, earl of Carrick, who afterwards aſcended the throne by the name of Robert III., conferred upon the burgeſſes the privilege of erecting houſes in the caſtle, on the ſole condition of their being perſons of good fame.

When James III. was at variance with his nobles, in 1482, the inhabitants of Edinburgh diſtinguiſhed themſelves in his behalf, and he granted them two charters, in which, among other privileges, the provoſt was made hereditary high ſheriff within the city, an office which is ſtill enjoyed by the chief magiſtrate ; the town council inveſted with the power of making ſtatutes for the government of the city ; and the corporated trades were preſented with a banner, known by the name of the "Blue Blanket," which ſtill exiſts, and is always confided to the convener of the trades.

A conſiderable degree of alarm was excited at Edinburgh, in 1497, by the firſt appearance of the venereal diſeaſe, which, being conſidered as a ſpecies of plague, all perſons affected with it were ſent to Inchkeith, a ſmall iſland in the middle of the frith of Forth.

In the year 1504, the tract of ground to the ſouth of the city, called the Burrough Muir, or Borough Moor, or Myre, being covered with wood, the town-council enacted, that whoever ſhould purchaſe as much of the wood as was ſufficient to make a new front to his houſe, might extend it ſeven feet farther into the ſtreet. Edinburgh, in a ſhort time, was filled with houſes of wood, inſtead of ſtone, and the principal ſtreet was reduced fourteen feeth in breadth.

The loyalty which Edinburgh diſplayed to James IV. on his expedition into England, led to the eſtabliſhment of the town-guard. A conſiderable number of the inhabitants, headed by the earl of Angus, their provoſt, joined the royal army, and ſhared in its defeat at Flowden, in 1513. This diſaſter obliged, at firſt, every fourth man to keep watch at night : but when the alarm had ſubſided, the militia, known by the name of the town-guard, was raiſed for the defence of the city. The plague raged with violence at Edinburgh during the general conſternation which ſucceeded that unfortunate expedition.

In 1542, Edinburgh was plundered and burnt by the Engliſh forces, under the earl of Hartford, and when it had recovered from this misfortune, it fell again into the hands of the ſame commander, after the defeat of the Scottiſh army at Pinkey : but though expoſed to pillage, it eſcaped conflagration.

The progreſs of the reformation of religion, which, about that time, ſpread over the greateſt part of Europe, occaſioned ſeveral diſturbances at Edinburgh, particularly in 1559, when the boiſterous Knox was appointed a preacher in the city, and French troops, whom the queen regent had called to her aſſiſtance, ſeized Edinburgh. Theſe troubles were allayed by the powerful help of queen Elizabeth of England. A parliament was held, which ſanctioned the confeſſion of faith of the reformed church.

On the 1ſt of September, 1561, Mary, queen of Scots, made her public entry into Edinburgh, to take poſſeſſion of the throne : but the different religion in which ſhe had been educated ſoon created freſh diſturbances in 1563, when the town council cauſed the picture of St. Giles to be cut out of the town's ſtandard, and the thiſtle to be inſerted in its place.

During the commotions which diſtracted Scotland after Mary's retreat into England, Edinburgh ſuffered much from the divided intereſts of the different factions, being ſometimes in the poſſeſſion of the one, and at other times under the power of the other, till, at length, the caſtle ſurrendered to the Engliſh, and James, having a ſhort time after attained his majority, a parliament was convened at Edinburgh. On the 17th of October, 1579, James made his public entry.

The ſpirit of fanaticiſm which ſucceeded the reformation not having yet ſubſided, violent commotions continued to take place at Edinburgh. In the year 1588, when the kingdom was alarmed at the approach of the Spaniſh armada, the people entered into a bond, known by the name of the "Covenant," for the maintenance of the true religion, and the defence of the king's perſon, on which occaſion the town-council raiſed three hundred men for the protection of the city.

In December, 1591, the inhabitants of Edinburgh defeated the earl of Bothwell's attempt to ſeize the king. In 1592, the Preſbyterian church government was eſtabliſhed in Scotland by law : but the mutual diſtruſt of the monarch and the clergy occaſioned a freſh commotion in 1596. James, with all his attendants, withdrew to Linlithgow. Parliament, and the courts of juſtice, were ordered to leave a city where it was no longer conſiſtent either with their ſafety or dignity to remain. Deprived of its magiſtrates, deſerted by its clergy, who fled to England, abandoned by the courts of juſtice, and proſcribed by the king, the capital of the kingdom was left to deſolation and deſpair, until Elizabeth of England interceded with the offended monarch in its behalf.

On the Sunday previous to the departure of James to take poſſeſſion of the Engliſh throne, in 1603, he repaired to the church of St. Giles, at Edinburgh, to bid a formal farewell to his northern ſubjects. Six years after, the differences between the king and the inhabitants of Edinburgh appear to have been entirely buried in oblivion. The provoſt was allowed to have a ſword of ſtate carried before him, and the magiſtrates were permitted to wear gowns on public occaſions. In 1618, when James paid his laſt viſit to Edinburgh, he was received by the magiſtrates with uncommon magnificence.

A perfect harmony ſeems to have ſubſiſted between the court and the city of Edinburgh in the beginning of the reign of Charles I. : but this good underſtanding was not of long duration. The eſtabliſhment of epiſcopacy was a favourite object with Charles, and Preſbyterianiſm was too deeply rooted in Scotland to yield to his attempts. The people renewed the covenant againſt popery. Some of the biſhops were aſſaulted, and narrowly eſcaped with their lives. Yet, when Charles viſited Edinburgh, in 1641, he was ſumptuouſly entertained by the magiſtrates.

During the civil war, which ended in Cromwell's uſurpation, Edinburgh was again deſolated by the plague ; and almoſt depopulated in 1645.

Upon the acceſſion of king William to the Britiſh throne, the populace plundered the abbey church of Holyrood-houſe, having firſt defeated a party of about one hundred men, ſtationed in the abbey, who adhered to the intereſts of James.

The union of the two kingdoms of North and South Britain cauſed freſh diſturbances at Edinburgh in 1707. Whilſt the act was paſſing in the Scottiſh parliament, four regiments of foot were introduced, in addition to the regular guards, for the purpoſe of preſerving the peace of the city. But, during the rebellion of 1715, Edinburgh remained faithful to the cauſe of the houſe of Brunſwick. An attempt of the rebels upon the caſtle was rendered abortive. The loyalty of Edinburgh was ſtill more conſpicuous in 1725, when the Exciſe Bill excited diſturbances in almoſt every part of Great Britain.

The year 1736 was diſgraced by the execution of captain Porteus of the town guard by the populace. This unfortunate officer had been found guilty of having ordered the ſoldiers to fire upon a mob that had aſſailed the guards, when they eſcorted to the ſcaffold a criminal, who had become an object of general compaſſion, for having enabled his companion to eſcape, at the peril of his own life. The queen, in the abſence of the king, had granted captain Porteus a reprieve, and it was the ſuppoſition that his life would ultimately be ſpared, which led to this atrocious inſult on government.

In the month of September, 1745, Edinburgh was occupied by the army of prince Charles, the Pretender's eldeſt ſon. General Gueſt, governor of the caſtle, on being appriſed of the circumſtance, diſcharged ſeveral guns, as a warning for the inhabitants not to approach the caſtle-hill. On the 25th of the ſame month, he fired upon the rebels ſtationed at the Weſt-port, or Weſt-gate. This occaſioned the prince to order a guard to be placed at the Weigh-houſe, to prevent all intercourſe between the city and the caſtle. On the 1ſt of October, ſeveral perſons, who were carrying proviſions to the caſtle, were fired at by the highlanders, who, in their turn, were fired upon from the caſtle. Many houſes in the city were damaged, and ſome perſons wounded. To cut off all communication between the caſtle and the town, the prince placed guards in St. Cuthbert's church and Livingſtone's yards. On a ſally from the caſtle, one of the guard-houſes was ſet on fire, a few of the rebels were killed, and ſome taken priſoners. But as theſe unimportant ſkirmiſhes did not raiſe the blockade, a cannonading was commenced againſt the rebel's poſts, on the 4th of October; in the following night, a party from the caſtle burnt ſome houſes on the eaſtern ſide of Caſtle-hill, where the rebels uſed to ſhelter themſelves. The Pretender's army raiſed the blockade on the 5th, and on the 31ſt the prince left Edinburgh, on his march to England. His defeat at Culloden put an end to the rebellion. The provoſt of Edinburgh was tried for not having defended the city; but acquitted.

Several tumults of inferior importance have agitated Edinburgh in the years 1756, 60, 63, 65, 78, 79, and 84, moſtly on account of a temporary ſcarcity of proviſions, and on the repeal of the penal laws againſt the Roman Catholics.

The French revolution of 1789 occaſioned alſo ſome diſturbances at Edinburgh, and cauſed the trial and condemnation of a few individuals. But in the war of 1793, and in that which commenced in 1803, and is ſtill raging, (1809) the inhabitants of Edinburgh have evinced their attachment to the genuine principles of the Britiſh conſtitution, by the voluntary arming of all ranks. Every attempt to diſturb the peace of the city on account of a temporary high price of proviſions, has latterly been checked in its origin by the ſpirited conduct of the magiſtrates.

Edinburgh is on all ſides ſurrounded by lofty hills, except northwards, where the ground gently declines to the frith of Forth. Arthur's ſeat, Saliſbury Craigs, and Calton hill bound it on the eaſt; the hills of Braid and the extenſive ridge of the Pentland hills on the ſouth; and the beautiful Corſtorphine hill on the weſt. The principal part of the old town is built upon a hill of ſingular form, which, riſing gradually from eaſt to weſt, is terminated towards the weſt by a precipice three hundred feet in height. On the rock forming this extremity of the hill, ſtands the caſtle, and along the ſummit of the ridge is carried a ſtreet, which, under the ſeveral denominations of the Lawn-market, High-ſtreet, and Canon-gate, extends from the caſtle to the place where the riſe of the hill commences, a diſtance of ſomewhat more than a mile. At its eaſtern extremity, it is terminated by the palace of Holyrood-houſe. On each ſide of the hill, which thus forms the central parts of the town, is another ridge of ground inferior, however, in elevation, and terminating much leſs abruptly. The ſouthern hill is covered with what may be termed the new part of the old town, which, though it contains many good ſtreets and buildings, is laid out with little attention to that regularity which diſtinguiſhes the new town. It is connected with the central ridge by a bridge of nineteen arches, only one of which is viſible. This is named the South-bridge. The intervening valley is occupied by a long, narrow, and dirty ſtreet, called the Cow-gate, from which numerous ſtreets and alleys run up the ſides of the hill to High-ſtreet.

The new town is the peculiar pride of Edinburgh, and as far as regards regularity of deſign and beauty of ſituation, it may be conſidered as one of the moſt ſplendid aſſemblages of buildings in the kingdom. It ſtands on the ridge to the north of the old town, from which it is ſeparated by a deep valley, formerly a moraſs, called the North Loch. The communication between the two towns is effected by the North-bridge, and by an earthen mound, thrown acroſs the valley, a little further to the weſt. This mound was formed entirely from the ſoil and rubbiſh obtained in laying the foundations of the new town. The north bridge is remarkable for the lightneſs and elegance of its ſtructure, and for the ſingularity of the views which it commands.

The plan of the new town is extremely ſimple. Three principal ſtreets, extending nearly a mile in parallel lines from eaſt to weſt, are interſected at right angles and at equal diſtances by ſix croſs ſtreets, about a quarter of a mile in length.

The improvements of Edinburgh began in the year 1753, by the erection of the Royal Exchange. At that time Edinburgh occupied the ſame ſpace of ground which it had done for two centuries before; but ſince that period, it has been enlarged to more than twice its former ſize. The extent of Edinburgh, from eaſt to weſt, is about two Engliſh miles, and from north to ſouth nearly the ſame diſtance. The circumference of the whole is upwards of eight miles.

Edinburgh is governed by a town council of 33 members, twenty-five of whom conſtitute the ordinary council, the remaining eight are named extraordinary councilmen. The chief magiſtrate, whoſe office is much the ſame with that of the lord mayor in London, is ſtyled lord provoſt. He is high ſheriff, coroner, and admiral within the city and liberties, and the town, harbour, and roadſtead of Leith. Under him are four magiſtrates, called baillies, equivalent to the aldermen in London. There is alſo a dean of guild, who has the charge of the public buildings, and without whoſe warrant no houſe can be erected within the city. The revenue of the town conſiſts of an impoſt on wines, ſhore dues at Leith, duties on markets, &c. and is ſuppoſed to amount to 10,000*l.* ſterling, annually. The hall, where the magiſtrates meet, is ſituated at the north-weſt entrance of the Parliament ſquare, or Parliament cloſe.

Of the principal public buildings the moſt ancient is the caſtle, ſituated on the weſtern and rugged extremity of the central hill, on which the old town is built. It is ſeparated from the buildings of the city by a ſpace of about 350 feet in length and 300 in breadth. The area of the rock, on which it ſtands, meaſures about ſeven Engliſh acres. It is 394 feet above the level of the ſea, and acceſſible only on the eaſtern ſide; all the other ſides are nearly perpendicular. It is chiefly uſed as a ſtation for ſoldiers. A long range of new barracks affords accommodation to about one thouſand men, and the other buildings together may accommodate as many more. The governor is generally a Scottiſh nobleman. It has beſides a deputy governor, who reſides in the garriſon, a fort-major, a ſtore-keeper, a maſter-gunner, and a chaplain.

Holyrood houſe, the royal palace of Edinburgh, ſtands at the eaſtern extremity of the city, at the bottom of Canongate. It is a beautiful building of a ſquare form; the area in the centre meaſures 230 feet in circumference. The weſtern front conſiſts of two lofty double towers, joined by a gallery adorned with a balluſtrade, in the middle of which is a portico decorated with four Doric columns, which ſupport a cupola in the form of an imperial crown. Underneath the cupola is a clock, and over the gateway are the royal arms of Scotland. Round the area in the inſide is a handſome arcade. The more ancient parts were built by James V. about the year 1528. It was deſtroyed by Cromwell's troops, and repaired and altered into its preſent form by Charles II. The duke of Hamilton is hereditary keeper of the palace. Some years ago, apartments were fitted up in Holyrood houſe for the reſidence of the count of Artois. Adjacent to the palace is the ruined abbey of Holyroodhouſe, founded by David I. in 1128, and deſtroyed by the Engliſh about the middle of the fifteenth century.

The buildings of the mint of Scotland, which were erected in 1574, but in which no money has been coined ſince the union, form a ſmall ſquare, which, as well as the abbey of Holyrood houſe, is an aſylum for inſolvent debtors.

The parliament houſe occupies the ſouth and weſt angles of the ſquare, to which it gives its name. It was begun in 1632 and completed in 1640. It forms no inconſiderable ornament to the city; but yields in point of grandeur to the regiſter office, a building erected in 1774 for preſerving the public records. This noble edifice ſtands at the eaſt end of Prince's-ſtreet, and its front looks ſouthward along the north bridge. In its centre is a large dome 50 feet in diameter, and 80 in height, lighted from the top by a window 15 feet in diameter.

On the north ſide of the High-ſtreet is the Royal Exchange, an elegant building in the form of a ſquare, with a court in the centre. The bank of Scotland, at the head of the entrance to the earthen mound, is likewiſe one of the architectural ornaments of Edinburgh. Two other public buildings of leſſer importance are the tollbooth and the weighhouſe.

In the old town the houſes are all remarkably high, ſome having not leſs than thirteen ſtories. Each ſtory, or *flat*, as it is termed in Scotland, is inhabited by two families.

The population of Edinburgh, including the port of Leith, was in 1678 computed at 35,500 perſons; in 1755 at 70,430; in 1775, according to Mr. Arnot, at 13,806 families, which he ſuppoſed to have given 82,836 individuals; in 1791, according to Sinclair's ſtatiſtical account, at 84,886 perſons; and in 1802, Mr. Pinkerton ſuppoſed it to fall little ſhort of 90,000. But in 1806, as there had been fifty new ſtreets built ſince 1791, Mr. J. Stark was of opinion, that Edinburgh, with its ſuburbs and the ſeaport town of Leith, might fairly be ſuppoſed to contain conſiderably upwards of 100,000 inhabitants.

The religious eſtabliſhments of the Preſbyterian church are upheld by twenty-four miniſters. The number of pariſhes into which Edinburgh is divided, and of which they are the paſtors, are fourteen, including the ſuburb of Canongate, St. Cuthbert's, and Leith. The number of churches is the ſame; but ſome of the buildings contain under their roof more than one place of worſhip. There are alſo three chapels belonging to the old epiſcopal church of Scotland, in which are retained all the ancient forms of this eſtabliſhment. One of the biſhops reſides in the town. Beſides theſe, there are three chapels of the Engliſh epiſcopal eſtabliſhment, where the form of worſhip is ſimilar in every reſpect to that obſerved in England. The places of worſhip belonging to the different diſſenters from the eſtabliſhed church, and other ſectaries, are numerous. The Antiburghers have two; the Burghers three; the Relief three; the Glaſſites, or Sandimanians, one; the Quakers one; the Bereans one; the Baptiſts one; the Methodiſts one; and the Roman Catholics two. There is likewiſe a chapel where the ſervice is performed in the Gaelic or Erſe language for the benefit of the highlanders. Tabernacles have been lately eſtabliſhed on Mr. Whitefield's plan, under the auſpices of Mr. Haldane. That in Leith walk is perhaps the largeſt place of worſhip in Scotland. The total number of churches and chapels is forty-four. Conſidered as architectural objects, the principal churches are St. Giles's church, a magnificent Gothic fabric, Tron church, St. Andrew's church in the new town, and St. George's chapel. Edinburgh has a ſociety for propagating Chriſtian knowledge, and a miſſionary ſociety.

Among the charitable inſtitutions of Edinburgh, the Royal Infirmary, founded in 1736, claims the firſt rank. The male and female patients are kept entirely diſtinct. Two hundred and twenty-eight ſick individuals can be accommodated in ſeparate beds. It has a well lighted theatre, where upwards of 200 ſtudents may attend, when chirurgical operations are performed. The Public Diſpenſary is an uſeful ſupplement to the Royal Infirmary. The principal hoſpitals are Heriot's, Watſon's, Gilleſpie's, Merchant maiden, Trades maiden, Trinity, orphan, and Lying-in-Hoſpital. Edinburgh has alſo a ſociety for the relief of miniſters' widows, and for the ſons of the clergy, a magdalen, and an aſylum for the blind. A new houſe of induſtry was opened in January 1801, for the reception of poor and deſtitute women, who are willing to work but unable to procure employment, and for poor female children who are taught lace working. The whole of their earnings is regularly paid to them; they have a warm comfortable room to work in, their dinners gratis, and ſuch of the women as have young children ſix-pence weekly in addition; they come in the morning and go home at night.

The celebrity which Edinburgh has derived from the ſplendid talents of Hume, Blair, Home, Robertſon, Black, and others, is ſtill kept up by a numerous body of literary and ſcientific men, whoſe valuable productions are daily iſſuing from the Edinburgh preſs. In the year 1763, Edinburgh had only ſix printing offices; in 1790 their number had increaſed to twenty-one; in 1800 to thirty; and in 1805 to forty. They employ upwards of 120 printing preſſes.

The univerſity of Edinburgh was eſtabliſhed in the year

1582, by king James VI. and from that period to the preſent has been progreſſively advancing in its reputation as a ſchool of literature and ſcience. The buildings connected with this inſtitution are ſituated in the old town on the moſt ſoutherly of the three ridges. They were originally conſtructed on ſo ſmall a ſcale, that a new building was commenced in 1789, the greateſt part of which, however, is ſtill in an unfiniſhed ſtate. It is called the college; the univerſity buſineſs is conducted in what remains of the old building, and in that part of the new ſtructure which is completed. The plan of education purſued in the college of Edinburgh is the ſame with that of the Proteſtant German univerſities, and differs materially from that adopted in the Engliſh univerſities. The ſtudents are diſperſed in lodgings in different parts of the town, and no direct obligation is impoſed upon them to attend to the daily buſineſs of the college. They are taught through the medium of lectures, delivered by the ſeveral profeſſors of the different departments of ſcience and literature. The number of profeſſors is about thirty, of whom eleven are connected with the ſeveral branches of medical ſtudy, three with the ſtudy of divinity, and three with that of the law. The remainder are occupied with the claſſes of general literature, mathematics, and philoſophy. Their emoluments depend almoſt entirely on the fees which they receive from the ſtudents. As a ſchool of medicine, the univerſity of Edinburgh ranks higher than any other in Europe. The anatomical theatre, ſituated in the new part of the college buildings, is remarkable for its ſpaciouſneſs and elegance. There are no academical honours conferred except in the medical line, and the number of graduates frequently exceeds forty in a year; foreigners generally compoſe the fifth part of this number. An idea may be formed of the progreſs of the ſchool of medicine at Edinburgh, from its commencement in 1720, till the year 1800, from the following ſtatement.

From 1720 to 1790, conſequently during 70 years, the number of ſtudents in medicine amounted to - - - - - - -	12,800
And from 1790 to 1800, during ten years only, to - - - - - - - - -	3,130
Total -	15,930

Upon an average of five years the total number of ſtudents is ſuppoſed to be 1400 annually. Mr. Thomas Forſyth, in his "Beauties of Scotland," ſtates the univerſity to be attended by from 1200 to 1400 ſtudents.

Connected with the univerſity are the obſervatory and the botanic garden. The latter contains about five Engliſh acres of ground; its collection of plants is very large. The obſervatory is ſituated on the top of Calton hill. It was completed in 1792, but in a ſtyle far inferior to what its utility deſerved. Aſtronomy has made very little progreſs at Edinburgh. The library of the univerſity is valuable and extenſive.

The grammar ſchool of Edinburgh, called the High ſchool, was eſtabliſhed in the year 1578; the number of ſcholars, by whom it is annually attended, is upwards of 600.

But it is not only to its ſcholaſtic inſtitutions that Edinburgh owes its literary celebrity. Several courſes of lectures are delivered during both the winter and ſummer ſeſſions, by individuals who have no immediate connection with the univerſity. There are alſo ſeveral learned ſocieties, among which the Royal Society aſſumes the firſt place. It was founded in 1783, and publiſhed the firſt volume of its Tranſactions in 1788. The Society of Antiquaries was likewiſe eſtabliſhed in 1713, and publiſhed its firſt and only volume in 1792.

Societies eſtabliſhed for the verbal diſcuſſion of queſtions of literature and ſcience are numerous at Edinburgh. They are attended not merely by the ſtudents, but by many reſpectable and well-informed inhabitants of the place. The principal are the Medical Society, remarkable for a large and valuable medical library, and the Speculative Society, where the ſubjects diſcuſſed are of a more general nature.

The advocate's library, which is by far the moſt conſiderable in Scotland, is chiefly ſupported by the money paid by advocates on their admiſſion into the faculty. It has valuable collections of manuſcripts, prints, coins, and medals. Of printed books there are upwards of 60,000 volumes.

Theatrical entertainments, muſic, and dancing, conſtitute the principal public amuſements at Edinburgh. The theatre ſtands at the north end of the North bridge, in the middle of a ſmall ſquare, called Shakeſpeare-ſquare. Contraſted with the other public edifices it has but a mean appearance. Subſcription concerts are performed in the aſſembly rooms and at Corri's, formerly the royal circus. The equeſtrian company, which annually reſorts to Edinburgh, performs in a temporary wooden building erected on the north ſide of the college.

The police of Edinburgh is well conducted. A new court of police was opened on the 15th of July, 1805. It is under the ſuperintendance of a judge of police and a clerk. There are ſix inſpectors for the different wards, into which the city is divided. All offenders under the police act are proſecuted by theſe inſpectors. The old priſon, in the building called the Tolbooth, is, however, deficient in thoſe accommodations which the benevolent Howard has ſo humanely recommended. The new Bridewell, or houſe of correction, finiſhed in 1796, is on a larger and more liberal ſcale, and particularly well ſituated, being on a high hill on the eaſt of the ſuburb, named the Calton.

Edinburgh is ſupplied with excellent ſpring water, which is conveyed in pipes. The markets afford all the neceſſaries, and many of the luxuries of life, in conſiderably variety. The fruit, greens, veal, poulty, butcher, and fiſh markets, on the north ſide of the High-ſtreet, occupy part of the declivity of the hill on which the old diviſion of the city is built. They are diſpoſed in terraces, which communicate with one another by flights of ſtairs; and being all in one place, they are very convenient for the inhabitants. There are, beſides, butcher's ſhambles and ſhops in different parts of the city and ſuburbs.

The want of a proper regard to cleanlineſs in the inhabitants of Edinburgh, and the abominable practice of diſcharging filth from the windows into the ſtreets, have been ſeverely and frequently noticed. The New Town, however, is not liable to theſe animadverſions, and by the ſtrict attention of the police, the nuiſance is in a great meaſure removed in the Old Town. Edinburgh is lighted in winter by cryſtal lamps, but their number is far from being ſufficient for the convenience of the inhabitants.

Manufactures of different kinds are carried on at Edinburgh and in its neighbourhood. The manufacture of ſhawls and kerſeymeres, and that of printed cottons and linens, are very extenſive. For the latter Edinburgh is reported to be indebted to thirteen French proteſtant families from Picardy. In the environs are many large paper mills, manufactures of glaſs, and ſeveral caſt-iron founderies. The diſtillation of malt ſpirits occupies large capitals, and candles and ſoap are manufactured on an extenſive ſcale.

Edinburgh is ſurrounded with many fine walks, the principal of which are, the Caſtle-hill, the King's park, the meadows and the Calton-hill, on the weſtern ſide of which is a burying ground, in which are depoſited the remains of the celebrated David Hume. A large rotund monument, with a ſimple inſcription, marks the ſpot. This hill is alſo remarkable for a naval monument in honour of the hero of Trafalgar. J. Stark's Picture of Edinburgh, 1806. Aikin's Athenæum, vol. ii. 1807.

EDINBURGHSHIRE. See Mid Lothian.

EDINGTON, or Eddinton, anciently *Æthendune*, a pariſh in the hundred of Whorlſdon, and county of Wilts, England, contains 170 houſes and 334 inhabitants. This place is noted in the annals of Engliſh hiſtory, for a conqueſt, which king Alfred obtained over the Danes here. On the ſummit of a hill near Edington is a large encampment, called Bratton caſtle, where it is ſtated that Alfred beſieged his enemies for fourteen days, when they capitulated. The caſtrametation covers an area of about 24 acres; is nearly of an oval form, and has very deep ditches. On the ſouth-weſt face of the ſame hill is a monument of antiquity, ſaid to have been cut, or formed by the Saxons, in commemoration of the event already noticed. It is a repreſentation of a large white horſe, which is formed by cutting off the ſurface of the ground, and laying bare the ſubſtratum of chalk.

The church at Edington was built by biſhop de Edington, who was a native of this place, and who alſo founded here a college for ſecular canons. This prelate was treaſurer and chancellor to king Edward III. For further particulars relating to Edington and the biſhop, ſee Beauties of Wiltſhire, vol. ii. 8vo.

EDISTO, or Pompon, a navigable river of America, in S. Carolina, which riſes in two branches from a remarkable ridge in the interior part of the ſtate. Theſe branches, meeting below Orangeburgh, form Ediſto river, which is navigable for 100 miles.—Alſo, a poſt town of Orange county, in S. Carolina; 577 miles from Waſhington.

EDITOR, of *edo*, I publiſh, in the commonwealth of learning, a perſon who takes care of publiſhing the work of another author, frequently an ancient author.

Eraſmus was a great editor of ancient writings; the Louvain doctors, Scaliger, Petavius, Fa. Sirmond, biſhop Walton, Mr. Hearn, &c. are learned editors; the Benedictines, of the fathers; the Dauphins, of the claſſics; Hardouin, of the councils, &c.

EDMER, in *Biography*, a learned Engliſh Benedictine monk, who flouriſhed about the end of the eleventh century. He belonged to the order at Canterbury; was abbot of the monaſtery of St. Alban's, and afterwards raiſed to the ſee of St. Andrew's, in Scotland. He was a voluminous writer, chiefly in biography; and from his pen we have the lives of St. Anſelm, archbiſhop of Canterbury; of St. Oſwald, archbiſhop of York; of St. Dunſtan, archbiſhop of Canterbury, with a letter to the monks of Glaſtonbury; of the bleſſed Bregwin, archbiſhop of Canterbury; and of Odo, archbiſhop of Canterbury. He wrote likewiſe "A Treatiſe on the Liberty of the Church," in vindication of Anſelm, in his conteſts with king William Rufus; and the hiſtory of his own times from 1066 to 1122, which was publiſhed by the learned Selden, with notes, in folio, 1623. Moreri has mentioned the titles of his other works, which, however, being of leſs repute, need not be noticed here.

EDMONDES, *Sir* Thomas, was born at Plymouth, in Devonſhire, where his father was chief officer of the cuſtoms. He was introduced to court by his nameſake, ſir Thomas Edmondes, comptroller of the queen's houſehold, and being initiated into public buſineſs by ſir Francis Walſingham, ſecretary of ſtate, he was, through his means, employed by the illuſtrious queen Elizabeth in ſeveral embaſſies. In 1592 he was appointed her reſident or agent at the court of France, with a ſalary of twenty ſhillings a-day; and on the 17th of May, 1596, ſhe made him a grant of the office of ſecretary to her majeſty for the French tongue. Between this and the ſpring of 1603, he was employed in divers foreign embaſſies. At this period he received the honour of knighthood from king James I. and, upon the concluſion of the peace with Spain, was appointed ambaſſador to the archduke at Bruſſels. He was about the ſame time choſen one of the repreſentatives for the borough of Wilton, in the parliament which was to have met at Weſtminſter Nov. 5, 1605, but was prevented by the diſcovery of the gunpowder-plot. He was, in 1608, ſent ambaſſador into France, where he continued, with ſome intervals of abſence, till the year 1617, when he returned, and was appointed ſucceſſively to the offices of comptroller of the king's houſehold, privy counſellor, and treaſurer of the houſehold. In 1625 he was elected one of the burgeſſes for the city of Oxford, but on the meeting of parliament his election was declared void, and he was choſen for another place. In June 1629 he went out again ambaſſador to the French court, and with this concluded all his foreign employments. The remaining ten years of his life he ſpent in privacy. He died Sept. 20, 1639. Sir Thomas was a man of ſound underſtanding, uncommon ſagacity, and indefatigable induſtry; he was firm and unſhaken in the diſcharge of his duty, beyond the influence of terror, flattery, or corruption. Some of his parliamentary ſpeeches have been printed. His letters and papers, in 12 vols. folio, were once in the poſſeſſion of ſecretary Thurloe, and afterwards of lord chancellor Somers. The ſtyle of them is clear, ſtrong, and maſculine; free from the pedantry and puerilities which infected ſome of the beſt writers of that age. Biog. Brit.

EDMUND I. king of England, was ſon of Edward the elder, and ſucceeded his brother Athelſtan. This was in the year 941, but the Northumbrians, ever reſtleſs and ſeeking for opportunities of rebelling, threatened the peace of Edmund's reign. The king marched ſuddenly againſt them, and reduced their leaders to the moſt abject ſubmiſſion. As a ſurety for future good behaviour, they offered to embrace Chriſtianity, "a religion," ſays Hume, "which the Engliſh Danes had frequently profeſſed, when reduced to difficulties, but which, for that very reaſon, they regarded as a badge of ſervitude, and ſhook off as ſoon as a favourable opportunity offered." Edmund, however, was a man of ſpirit and penetration; he put it out of the power of the Northumbrians to become his enemies, and conquered Cumberland, conferring its government on Malcolm king of Scotland, on condition that he ſhould do him homage, and protect the north from all future incurſions of the Danes. This prince was young and full of ſpirit, but his reign was ſhort, and his death violent. At a feſtival in Glouceſterſhire he ſaw Leolf, a notorious robber, who had been condemned to baniſhment to expiate his crimes. Enraged at his inſolence in joining the royal party, he bid him depart, and not complying with the order, Edmund ſeized him with his own hand, when the villain, taking advantage of the ſtruggle, ſtabbed the monarch to the heart. This event happened in the year 946, before he had completed the ſixth year of his reign. Hume, Hiſt. vol. i.

Edmund II. ſurnamed Ironſide, king of England, was eldeſt ſon of Ethelred II. He obtained the name of Ironſide from the hardy valour which he diſplayed in the conteſts maintained between his father and the Daniſh kings, Sweyn and Canute. Edmund had no ſooner ſucceeded to the crown, than he found himſelf obliged to contend for it in the field. In a battle with Canute, which he meant to be-

be deciſive, he was defeated, in conſequence of the defection of Edric, duke of Mercia. Edmund was not deſtitute of reſources, but aſſembling a new army at Glouceſter, he felt himſelf capable of diſputing the field, when the Daniſh and Engliſh nobility, equally harraſſed with theſe convulſions, obliged their kings to come to a compromiſe, and to divide the kingdom between them by treaty. To Canute were ceded the northern and midland parts of the kingdom, while the ſouthern provinces were left to Edmund. This prince ſurvived the treaty only a ſhort month, being murdered at Oxford by two of his chamberlains, who were inſtigated to the bloody deed by Edric. Canute now became ſole maſter of the kingdom, but the line of Edmund was again introduced by the marriage of his great grand-daughter Matilda to Henry I. Hume, vol. i.

EDOIA, in *Ancient Geography*, a town of Arabia Felix, placed by Diodorus Siculus in the iſle of Panchæa.

EDOLO, in *Geography*, a town of Italy, in the Breſſan; 15 miles N.N.W. of Breno.

EDOM, in *Scripture Hiſtory* and *Geography*, a name given to Eſau, the eldeſt ſon of Iſaac, and ſignifying *red.* (See Gen. xxv. 24—34.) He was the progenitor of the Edomites, afterwards called Idumæans. The place of their firſt habitation was mount Seir (Gen. xxxv. 6—9.) which had been originally occupied by a people called Horites, and the mountain itſelf was denominated Hor. (See Numb. xx. 22—28. Deut. ii. 12.) Some time before Eſau's ſettlement in this place, this region had taken the name of Seir, probably from that of a conſiderable perſon among the Horites, and retained it afterwards to the excluſion of Hor, which was reſtricted to a part of this mountainous diſtrict. (Numb. xx.) This country was ſituated on the ſouth of the Salt, or Dead ſea, extending from this ſea to the Red ſea, or Arabian gulf. (1 Kings, ix. 26.) From this circumſtance we deduce the origin of the appellation of Red ſea, which was given to the Arabian gulf, as it denoted the ſame with the ſea of Edom, or Idumæan ſea. Some of the Greeks, in alluſion to the ſignification of the Hebrew word Edom, called it the Erythrean ſea, from the term which denoted red in their language. This country, when firſt inhabited by the Horites, was probably governed by patriarchs, or heads of families, which was the moſt ancient form of government, afterwards by kings, elected into their office, and, in proceſs of time, by governors, ſtyled dukes, and ſucceeding one another by primogeniture. The Edomites, who occupied the country after the Horites, were firſt governed, like them, by dukes, and afterwards by kings; which change, in the form of their government, ſeems to have taken place, with a view to their greater ſecurity againſt the hoſtile attacks of invaders, during the emigration of the Iſraelites in the wilderneſs. The king of the Edomites refuſed to grant theſe emigrants from Egypt, towards Canaan, a free paſſage through their country, though they requeſted it in a very reſpectful manner; and firſt threatened to oppoſe them with the whole force of his kingdom, if they made an attempt for this purpoſe, and afterwards, upon their renewed ſolicitations, actually took the field, and marched to oppoſe them. At length, however, he furniſhed them, for money, with ſuch ſupplies as his country afforded. (Numb. xx. 14. 21. Deut. ii. 28, 29.) After this tranſaction, we find no account of the Edomites, till the reign of king David. In the mean time, however, they appear to have extended their dominion, to have applied themſelves to trade and navigation, and to have ſeized on the empire of the ſea, at leaſt in the Arabian gulf. They trafficked in very rich commodities, ſuch as pure gold, gold of Ophir, the topaz of Ethiopia, coral, and pearls, (Job, xxviii. 15—20.) and eſtabliſhed a very conſiderable kingdom. But, in the height of their proſperity, their country was invaded by the victorious arms of Iſrael, about the year 1040 B. C., and Edom began to feel the effects of Iſaac's prophecy, that "the elder ſhould ſerve the younger." For David, after having gained ſeveral victories over the Syrians, Moabites, and Ammonites, finiſhed his conqueſts with Idumæa. Hadad, their king, being a minor, and the party that accompanied him, ſought the protection of Pharaoh, and the young prince was kindly received by him, and ſupported with the dignity becoming his royal rank; and the queen's ſiſter was given to him in marriage. (1 Kings, xi. 15—20.) Whilſt Hadad made his way into Egypt, others of the Edomites took different routes; ſome fled to the Philiſtines and the ſea ports, and fortified Azoth, or Azotus. Accordingly, they contributed to improve the inhabitants of thoſe parts in the arts of navigation and commerce, and laid the foundation of the future celebrity of the Phœnicians, who are known to have migrated from the Red ſea, about the time when David conquered and diſperſed the Edomites. Hence it was, that the Philiſtines called many places Erythra, in memory of their being Erythræans, or Edomites, and of their coming from the Erythræan ſea. Edom, Erythra, and Phœnicia, it is ſaid, are names of the ſame ſignification, the words denoting a "red colour;" and hence, it is probable, that the Erythræans, who fled from David, ſettled in great numbers in Phœnicia, that is, in all the ſea-coaſts of Syria, from Egypt to Zidon; and by calling themſelves Phœnicians, in the language of Syria, inſtead of Erythræans, gave the name of Phœnicia to that whole ſea-coaſt, and to that only. Other Edomites, who dealt in ſhipping, eſcaped the rage of the conqueror, by taking a longer route, and went towards the Perſian gulf. In a word, the Edomites diſperſed into all parts, when they found that they could have no ſecurity in their native country. Hadad, after remaining for a conſiderable time in the court of Pharaoh, obtained a diſmiſſion, and, returning to Idumæa, made ſeveral unſucceſsful attempts to regain his dominions. In the mean time, the kingdom of Edom remained under the houſe of David till the days of Jehoſhaphat, being governed by deputies, or viceroys, appointed by the kings of Judah. At length, about the year 889 B. C. the Edomites, anxious to recover their ancient liberty, embraced an opportunity which offered itſelf for this purpoſe, and ſucceeded. For, in the days of Jehoram, the ſon of Jehoſhaphat, the whole nation aroſe, and, aſſaſſinating, or expelling their viceroy, appointed for themſelves a king; and, having gained a conſiderable advantage over Jehoram's army, they were afterwards defeated with great ſlaughter, and obliged to retire within their intrenchments. After this period, the Edomites remained ſecure from any attempts againſt them on the part of the kings of Judah for 60 years. At length they became ſubject to the king of Babylon; and when the captivity of the Jews commenced, they retaliated upon them, with ample vengeance, the ſufferings they had endured in the days of king David, cut off many of them who were endeavouring to make their eſcape, and conſumed with fire the remains of the temple, as ſoon as the Chaldæans, or Babylonians, had withdrawn. They even attempted to level the whole city with the ground, and inſulting the God of Iſrael with horrid blaſphemies, triumphed in the proſpect of beholding the utter end of the Jewiſh nation. For this cruelty, they were threatened by the prophets with a ſevere retaliation, importing, that, for the devaſtation they had made in Judah, they ſhould behold their land become deſolate, when thoſe of their now-oppreſſed enemies ſhould flouriſh. (Ezek. xxv. xxxii. xxxv. xxxvi. Joel, iii. Amos, i. ix.) Theſe predictions were ſpeedily accompliſhed: for their country was diſtracted with violent commotions and perſecutions; inſomuch, that many of them abandoned it, and ſettled in the vacant land of Judæa, particularly in the ſouth-weſtern parts; and probably at this time, they made an end of the temple of Jeruſalem. Thoſe, who remained in Edom, joined the children of Nebaioth, and were ever afterwards called Nebatæans; and thus the ancient kingdom of Edom loſt its name, which was transferred to that part of the land of Judea which the refugees occupied, and which had never been part of their old kingdom, but the lot of the tribes of Simeon and Judah. This is the Idumæa, and theſe are the Idumæans, mentioned by Pliny, Ptolemy, Strabo, and other ancient writers.

Having traced the Edomites from their origin to the downfal of their kingdom, we ſhall terminate this article with a brief account of thoſe Edomites, who ſettled in Judea. Of theſe it is only known with certainty, that a decree was iſſued againſt them by Darius Hyſtaſpes, commanding them to deliver up all they had belonging to the Jews. (1 Eſdr. iv. 50.) Upon the decline of the Perſian monarchy, and after the days of Alexander, they were under the power of the Seleucidæ, when their ancient averſion from the Jews being revived, they warred againſt that nation, under the conduct of Gorgias, their governor, for Antiochus Epiphanes; but they were conſtantly worſted by Judas Maccabæus, who, at laſt, took and ſacked their chief city, Hebron. (1 Maccab. v. 65. 68.) Having loſt their ſtrong holds, and many of their number, the ſurvivors fled to two ſtrong towns, whence many of them eſcaped by bribery and treachery. At length theſe two ſtrong caſtles were forced, and 20,000 Idumæans were put to the ſword. The Edomites in Idumæa were afterwards agitated by continual broils and wars, till about the year 130 B. C., they were conquered by John Hyrcanus, who reduced them to the neceſſity of embracing the Jewiſh religion, or of quitting their country. They choſe the former alternative, ſubmitted to be circumciſed, and became incorporated with the Jews. Accordingly in the firſt century after Chriſt, the name of Idumæan was loſt, and quite diſuſed.

EDON, a mountain of Thrace. Plutarch ſpeaks of a town, called *Edonide*, near the river Strymon. Steph. Byz. on the authority of Ariſtotle, gives this name to Antandros, which was ſituated at the foot of mount Ida.

EDONI, a people of Thrace, who inhabited the banks of the river Strymon; and their country was called Edonis, on the frontiers of Thrace and Macedonia, ſeparated from Odomantice by the Strymon.

EDOSA, a town of Ethiopia, ſituated W. of the Nile. Pliny.

EDRAI, a town of Paleſtine, in the tribe of Judah, mentioned in the book of Joſhua, and alſo by Euſebius.—Alſo, a town of Paleſtine, near the torrent Jabok, called *Eſdraei* by Euſebius and Jerom, who ſay that it is the ſame with *Adara* in Arabic, 24 miles from Boſtra. It was ſituated in the half-tribe of Manaſſeh, on the other ſide of Jordan.

EDRED, in *Biography*, the brother of Edmund I., ſucceeded to the throne in the year 946. His reign, like that of his predeceſſor, was diſturbed by the rebellions and incurſions of the Northumbrian Danes, who, though quelled, were never entirely ſubdued, nor had ever paid a ſincere allegiance to the crown of England. They attempted to ſhake off the yoke in the early part of Edred's reign, but he was ſufficiently powerful to reduce them to ſubmiſſion, and having laid waſte their country by fire and ſword, as a puniſhment for their rebellion, he forced them to renew their oaths of allegiance. After this he fixed Engliſh garriſons in their moſt conſiderable towns, and placed over them an Engliſh governor, who might watch all their motions, and ſuppreſs any inſurrection on its firſt appearance. Notwithſtanding the energy of this prince's mind in matters of ſtate policy, he was the ſlave of Dunſtan in the ſuperſtition of the times, which obtained the name of religion. To the guidance of this prieſt, whom he advanced to the higheſt offices, he blindly and implicitly delivered over his conſcience, and at length the management of his civil affairs. Through his influence, a ſet of foreign monks of the Benedictine order were introduced, who affected an extraordinary purity of doctrine and auſterity of manners, and proved formidable rivals to the ſecular clergy of the kingdom. Edred died after a reign of nine years, leaving children too young for the cares of government, and the crown accordingly devolved on Edwy, nephew of the deceaſed king. Hume.

EDRISITES, the denomination of a dynaſty of the Arabian empire, who erected the kingdom and city of Fez, on the ſhores of the Weſtern ocean. This dynaſty was founded by Edris, who died in the year of the Hegira 214 (A. D. 829.) in the prime of manhood, and terminated in the year of the Hegira 307. A. D. 919.

EDRON, a port of Italy, in Venetia, formed by the two rivers Medoacus, according to Pliny, and ſuppoſed by Hardouin to be the modern *Chioza*.

EDROS, or HEDROS, a deſert iſle, placed by Ptolemy on the weſtern coaſt of Hibernia; named Andros by Pliny; and ſuppoſed by Camden to be the iſle of Bardſey.

EDSAN, in *Geography*, a river of Ruſſia, which runs into the Lena; 20 miles S.E. of Ziganſk.

EDSWOL, a town of Norway; 18 miles S.W. of Berga.

EDUCATION, in a general ſenſe of the term, may be defined the art of bringing up, forming, and inſtructing children.

Education, in the limited acceptation of the term, may be conſidered as that regulation of the external impreſſions by which the developement and cultivation of the various faculties and affections of the mind are affected. In this definition very general expreſſions are uſed, becauſe the term education is applicable to that direction of the external impreſſions by which the progreſs of the mind is checked, by which its faculties are rendered inactive, or its affections deadened or perverted; as well as to that by which its faculties and affections are developed and cultivated. But though general, our definition is ſcarcely ſufficiently comprehenſive, for we ſometimes hear of the *education of circumſtances*, and, *accidental education*; and no ſufficient objection preſents itſelf to this application of the term to caſes in which there is no direct intentional interference for the purpoſe of regulating the impreſſions. To comprehend theſe caſes of the application of the term, we muſt define education to be, that ſeries of impreſſions, whether intentional or accidental, by which the developement, &c. See above.

We here ſpeak of education in the way in which the term appears to be uſually employed, with reference to the effects produced on the mind by external agency, without conſidering the direct efforts of the individual object of it. But no one who has watched the proceſſes of the mind, particularly where it is vigorous, and its education (in the moſt limited ſenſe) neglected, can heſitate in the belief, that more is often done by the expreſs voluntary exertion of the individual towards the cultivation of his faculties and affections, than by any external agency. This ſelf-culture ought to be conſidered as one ſpecies of education; and in order to include it under the term, we muſt once more extend our definition, and ſtate, that education, in the moſt comprehenſive acceptation of the term, is that ſeries of impreſſions, or of voluntary exertions of the mind, by which the developement and cultivation of the various faculties and affections are affected.

Though we allow it to be frequently convenient to apply the term to a ſeries of what are to us caſual impreſſions, yet our concern with education, except merely as a branch of mental philoſophy, is limited to the caſes in which the interference of man may modify or controul the effects of external circumſtances on the mental faculties and affections. But theſe are much more numerous than would at firſt be ſuppoſed, by thoſe who have had no practical acquaintance with the object: and herein appears the almoſt incalculable importance of mental philoſophy, as a foundation for the *art* of education, that it ſerves to diſcloſe the effect of external impreſſions in the culture of the mind, and (where they are under human controul) ſhews what are to be employed, and what are to be avoided, according to the various differences of ability or diſpoſition, in order to remedy or ſupply the effects of original conſtitution on the mental ſyſtem. It is true, mental philoſophy is yet imperfect and limited; but, even in its preſent ſtate, it renders moſt important aid in the buſineſs of education.

To enter into the ſubject of education in its wideſt extent, would be to ſhew how every claſs of circumſtances, whether caſual or intentional, operates in affecting the developement and culture of the powers and affections of the mind;—our object is much more limited; and we ſhall be ſatisfied if we ſucceed in laying before our readers a tolerably extenſive and accurate view of thoſe means, the employment of which may be expected to aſſiſt ſuch developement and culture, without attempting to inveſtigate thoſe minutiæ which are not of general occurrence.

Without aſcertaining whether there can be any clearly defined diſtinction between the moral and the intellectual powers, it is obvious, that the difference between thoughts and feelings, between the underſtanding and the affections, and alſo between the means by which the powers of the underſtanding are to be developed and improved, and thoſe by which the affections are to be produced and regulated, is ſufficiently diſtinct to allow of our dividing the buſineſs of education, according to its objects, into *intellectual* and *moral*. In order to bring the ſyſtem of thought and feeling into its due ſtate of perfection, both as to comprehenſiveneſs and vigour, and to proper direction, the organs of ſenſation muſt have vigour and ſenſibility: much, too, of intellectual improvement and of moral culture depends upon the ſtate of the muſcular and nervous ſyſtem in general. The education of the human being, as far as reſpects theſe objects, may be termed *phyſical*.

Under the article Physical Education, then, we ſhall, without encroaching upon the ſcience of pathology, give a view of thoſe means by which the external organs of the mind, the organs of ſenſation, and the muſcular and nervous ſyſtem, ſo far as the mind is directly concerned with their operations, are to be preſerved in a ſound and healthy ſtate, and improved in activity and vigour. In Intellectual Education we ſhall enter into the conſideration of the cultivation of thoſe powers of the mind which come under the head of underſtanding. And in Moral Education we ſhall conſider the methods of cultivating and regulating the affections. Under the topic of intellectual education, the various branches of knowledge, which form the objects of inſtruction in different departments of education, will of courſe receive ſome attention.

As there will be ſufficient opportunity, under theſe three ſeparate articles, to enter as fully as the nature of our work will admit, into all the particular topics connected with the ſubject of education, we ſhall not enlarge much here, and we ſhall only ſubjoin a few obſervations of a general nature, reſpecting the importance of attention to the object,—what has hitherto been publicly done with a view to the improvement of the art of education, and, the education of the poor. Reſpecting the ſecond of theſe topics, we ſhall have an opportunity of ſaying more in our ſeparate articles, and ſhall content ourſelves here with a very ſummary view. Reſpecting the firſt, it is unneceſſary to enlarge, for we conſider it as a prominent and very pleaſing feature of the age, that the buſineſs of education is pretty generally conſidered as of primary importance, and is made much more an object of ſcientific attention, than it has been at any former period. The long agitated queſtion, whether and in what caſes public or private education is to be preferred, will be beſt conſidered under the ſeparate heads of Intellectual and Moral Education.

The opinion that every thing in the intellectual and moral ſyſtem is the reſult of education, has had ſome ingenious ſupporters, but it can never ſtand the teſt of accurate obſervation. If every human being could be placed in preciſely the ſame circumſtances for the firſt few months after birth, and could be expoſed to exactly ſimilar impreſſions in every reſpect, there is no room for reaſonable doubt, that ſtill great diverſities would be manifeſt in their diſpoſitions and capacities. We infer this, becauſe the rudiments of diſpoſition and capacity are obviouſly different when we have firſt the power of diſcerning them; and it is inconceivable that the few impreſſions which are received within two weeks after birth, ſhould of themſelves produce all that diverſity, which, even then, is, in many inſtances, clearly perceptible to the accurate obſerver. In ſome, even at that early period, it may be diſtinctly perceived that the ſenſitive powers are quick and lively; in others, they are dull and ſluggiſh: and this early aptitude to receive ſenſations with different degrees of vividneſs, muſt ariſe from a difference in the original ſyſtem, over which education will ſeldom be found to triumph. Greater or leſs degrees of phyſical ſenſibility, are the foundation of greater or leſs degrees of mental ſenſibility; and it is, in a great meaſure, upon the vigour of our early ſenſations, that the furniture of the mind, the thoughts and affections, depend for their ſtrength and durability. Beſides, ſuppoſe what we will with reſpect to the preciſe degree in which the mental ſyſtem depends upon the conformation of the brain, more or leſs the former muſt be affected by the latter; and while the external ſtructure, and the external organs of the mind, ſo eſſentially differ in different children, as ſoon as mind is at all perceptible, it is reaſonable to ſuppoſe that the internal ſtructure, and the more concealed corporeal ſyſtem on which the offices of the mind depend, muſt alſo be eſſentially different.

But though education cannot do every thing, it can do a great deal. It cannot implant an aptitude to receive vivid and vigorous ſenſations where it is not, but it can render the ſenſations actually received more efficacious. It can call into action, or greatly repreſs, the ſenſibilities of the frame. It can enliven the powers of the mind, and exerciſe and ſtrengthen them. It can extend, refine, and invigorate the affections.

Probably the advocates for the opinion that the intellectual and moral ſyſtem owes its peculiarity entirely to education, do not themſelves underſtand their poſition in that extent in which it is underſtood by their opponents: and both, in general, ſeem almoſt equally willing to admit the only valuable practical inference from the diſcuſſion, *viz.* that an early, well-directed, and perſevering attention to the buſineſs of education, is of the higheſt importance, and that it is the duty of all who have it committed to them, to diſcharge it fully and faithfully. It muſt, however, be allowed, that the opinion that there is no original intellectual difference between man and man, though founded upon a very curſory examination and incomplete induction, is more likely to ſtimulate to exertion than that which ſome of its opponents have maintained, *viz.* that where there are certain inherent natural tendencies, it is in vain to attempt to free the mental conſtitution from them. The principal practical injury reſulting from the former is, that when perſons find, as inevitably they muſt, that their efforts are often unavailing, and that it is totally out of the power of any individual to have under his command all the impreſſions by which the diſpoſitions and powers of the mind are to be exerciſed, and their peculiar caſt given to them, they are apt to ſit down in deſpair reſpecting the efficacy of what is in their power. Happily the great work of education can, in the earlieſt periods of life, go on without the direct interference of man; and if he will only permit the powers of the mind to be unfolded as occaſion calls for them, and keep off improper impreſſions which might debaſe and pervert the affections, almoſt every thing will be done well. We are, however, well aware that this cannot be thoroughly done without ſkilful care and attention; but an exceſs of care and attention is, in many inſtances, the bane of both the mental and moral powers. In the early period of education, our buſineſs is to watch the opening intellect, and ſometimes to preſent opportunities and excitements for its exertion;—to allow the kindly affections materials for their growth, and to check thoſe which injure the moral ſyſtem. In the later periods a great deal is of courſe to be done by the direct methods of inſtruction. All we wiſh to maintain is, that one grand ſecret of education is to temper our direct interference, and to reſt ſatisfied without forcing the progreſs either of the intellect or of the affections.

The foundation of a true and comprehenſive ſyſtem of education muſt be laid in right views as to the laws of the human mind. It is true, that in many reſpects a practical acquaintance with theſe laws is ſufficient to guide us wiſely in the buſineſs of education; and numbers, poſſeſſing nothing but good ſenſe, accurate obſervation, and right diſpoſitions, have ſucceeded in conducting the intellectual and moral culture of others beyond what might at firſt be expected; and partial ſyſtems of education may be formed, by thoſe who have only ſuch practical knowledge, which may prove of eminent utility: but a full, comprehenſive, and juſt ſyſtem of education, can be founded only upon an enlightened and extenſive acquaintance with the principles of the human mind, with the characteriſtic features of intellectual and moral excellence, and with the manner in which the powers of the mind are expanded and perfected, and in which the diſpoſitions are formed and properly directed. In fact, the theory of education is nothing more than the extenſion of one grand branch of mental philoſophy. If any eſſential change ſhould take place in the condition of men, and the viſions of a benevolent philoſophy ſhould ever be realized as to the diffuſion of knowledge and moral worth, it will only be through the extenſion of practical knowledge as to the objects of education, and the means by which they are to be effected. It is much to be wiſhed that the reſults of individual obſervation, as to the effects of certain diſcipline or other circumſtances, on peculiar diſpoſitions or intellectual biaſſes, were to be more frequently regiſtered for public notice. Perhaps it requires ſome conſiderable degree of mental culture, and of acquaintance with the principles of the human mind, to determine theſe effects with any tolerable preciſion; but if the object were more attended to, by degrees a large fund of obſervations would be collected, from which the more philoſophic mind might produce an approximation towards a rational and comprehenſive ſyſtem of education, ſuch as would ſerve materially to accelerate the progreſs of the community towards its utmoſt degree of improvement.

It is earneſtly to be wiſhed that a judicious view of the chief practical principles of mental philoſophy were acceſſible to all the thinking part of the public; and that to impart them to the female ſex in particular, and familiarize their minds with them, formed an eſſential branch of their education from the period when their underſtandings had been prepared by the acquiſition of the more uſual objects of education, (we ſpeak of courſe of thoſe caſes in which female education has been directed beyond exterior accompliſhments,) to that in which they themſelves enter upon the buſineſs of education. The education of the nurſery, at leaſt maternal education, has indiſputably the greateſt ſhare in the determination of the future character, particularly in a moral point of view.

One female writer, (Miſs Hamilton,) has the high praiſe of rendering acceſſible to her ſex, ſome of the moſt important principles of the philoſophy of the mind. Her work on education, as far as it reſpects the affections, is of very great value; and there is reaſon to hope that it has had, and will have, great influence in judiciouſly guiding maternal inſtruction. Her hints reſpecting the cultivation of the intellect are not equally valuable. They are founded on an erroneous claſſification, and often are themſelves inaccurate and indiſtinct. But even from this part perſons who have paid but little attention to the ſubject may learn much; and as to the cultivation of the affections, her work is yet unrivalled. As far as reſpects early education, this point is firſt in importance; for every one knows that the affections are the grand ſpring by which the whole ſyſtem is animated; and where this is active and well-regulated, there is a principle on which the future culture of the intellect may be founded with the beſt proſpect of ſucceſs.

We do not mention Miſs Hamilton as having alone been guided by mental philoſophy in her views on education, but ſimply bring forwards her work as containing more of the philoſophy of the mind than is acceſſible perhaps in any other form, to thoſe who have not received conſiderable culture of intellect. Her contemporaries, Miſs Moore and Miſs Edgworth, have furniſhed many exceedingly important remarks reſpecting the principles of education: and, except in the examination, arrangement, and correction of the principles which have already been detailed by them, and their predeceſſors, Locke, Prieſtley, &c. and in the accumulation of new facts, little more, probably, will be done, till ſome one, early impreſſed with the importance of the object, diſciplined to habits of correct obſervation, and of cautious and accurate induction, and poſſeſſed of ſound views of the philoſophy of the mind, and of the effects of external circumſtances upon different diſpoſitions and intellectual biaſes, and different periods of mental and moral culture, ſhall devote himſelf to the undertaking; when it may reaſonably be expected, that a ſyſtem will be produced which may ſerve as a clear, ſteady, and ſecure guide to the well informed parent or preceptor.

It is not probable that in uncivilized ſtates any direct attention can have been paid to education, except ſo far as relates to inſtruction in the arts of gaining ſuſtenance and clothing, and in providing means of defence, and to the cultivation of courage and fortitude. In ſome of the ancient ſtates which had made conſiderable advances towards civilization, education was made the care of the ſtate. Sparta preſents the moſt complete ſyſtem. It has been well obſerved, that all the plans of Lycurgus had in view to keep ſociety

Juſt as it then was: certainly the mode of education adopted by that legiſlator had this object as its guide and principle. But however much we may admire the ſyſtem of Lycurgus, conſidered as cultivating a ſpirit of heroiſm, and of excluſive patriotiſm, ſurmounting alike all regard to the intereſt of other ſtates, and their own individual intereſts, it is obvious that it was narrow and confined, and had no tendency to elevate the human intellect, or to ſtimulate into activity any noble and generous affections which had not the love of their country as their baſis. Could the inſtitutions of Lycurgus have been preſerved in their vigour and efficacy, the Spartans might have continued preciſely the ſame, deſtitute of all knowledge of the arts and ſciences which adorn and improve ſociety.

Wherever the ſpecific education of the people has been under the guidance of the ſtate, it has hitherto (with little exception) been calculated only to mould them all into one form; to produce habitual ſubmiſſion to the will of one, or to the will of many. No doubt can exiſt which is to be preferred, the total neglect of education, or that artificial and forced method of which we now ſpeak; but all that the ſtate has to do is, to take care that none ſhall be without the means of inſtruction, and to leave every individual to follow the bent of his own inclination, or to the peculiar direction of his employment of them. Further than this, the interference of the ſtate is as injurious to education, as it is to commerce.

It is to be ſuppoſed, that where individuals poſſeſſed any ſtrong ſenſe of moral, and eſpecially of religious obligation, the attention would be paid to the training up of thoſe habits and diſpoſitions, which are favourable to virtue and religion. In thoſe nations which were firſt civilized, the power of the parent was conſidered as abſolute; and as implicit ſubmiſſion was, from the firſt, inculcated upon the young, the labour of education was greatly diminiſhed, and the limited knowledge and ſentiments of the parent were very eaſily communicated to youth. The round of duty was leſs extenſive, and its parts leſs complicated than at preſent. Among the Iſraelites, where moral education appears to have made the greateſt advances, the ſyſtem of duty was completely laid down in the written law; ſo that all the knowledge which the age and country poſſeſſed, was certainly to be gained, and the moral principles certainly to be regulated aright, where the parent employed wiſely that authority which the law enforced, and which the cuſtoms of the times would otherwiſe have allowed. One grand object of moral education, ſo far as it reſpects rectitude of diſpoſitions and affections, is to cultivate the habit of ſelf-controul. Religious people, of all periods, who have poſſeſſed the light of revelation, have, in a particular manner, been ſenſible that this habit lies at the foundation of moral worth; and where the authority of the parent is generally preſerved, the cultivation of this habit follows as a matter of courſe. It requires a wiſe choice of means to prevent filial ſubmiſſion from being the ſubmiſſion of a ſlave, rather than of a child; but where it is acquired, and rightly directed, the foundation is laid for ſubmiſſion and obedience to the will of God; and where this principle takes a firm hold on the mind, almoſt every thing is done that could be wiſhed, to further the progreſs of the individual towards moral worth. Freedom from improper biaſſes of affection, or the poſſeſſion of power to correct them, is abſolute excellence.

The neceſſity of a tolerably correct direction of the early propenſities, in order to promote domeſtic comfort, muſt in a great number of caſes have led to ſuch direction of them, without any view to the future advantage of the individual. But with reſpect to thoſe who were to come forwards in the employments of the ſtate, or in any other way to be expoſed to the notice of their countrymen, the advantages of early inſtruction in knowledge, and of the early cultivation of thoſe qualities which the wants of the age and country made of great eſtimation, were ſo obvious, that they appear to have led, in a great variety of caſes, to great attention to the work of education; and though we have not, in any inſtances, any account of the procedures of the ancients, yet, in the few circumſtances which have been recorded, we perceive that, long before any thing like a ſyſtematic plan of education was adopted, individuals made education an object of primary concern. The principal ſyſtematic work of antiquity, on the ſubject of education, is indiſputably that of Quintilian. This writer was poſſeſſed of great good ſenſe, excellence of diſpoſition, and extenſive information; and from his work, though it had a particular object in view, much may be learned by the modern inſtructor, reſpecting education in general. Various excellent principles are to be found ſcattered up and down in thoſe general parts, which amply repay our peruſal, though we are ſeldom invited to proceed by elegance of language, or brilliance of imagination. From different facts which he mentions, we have reaſon to ſuppoſe that, in his time, education was in a moſt degraded ſtate at Rome: and his reflections have, probably, been more uſeful to the moderns, than to his contemporaries.

In our own country, within the laſt two centuries, much has been written on the ſubject of education; and among others, the great Milton produced a work, which had principally as its object to correct the plans of inſtruction then prevalent. But the firſt writer who had in view to deliver a ſyſtem of education in general, was Mr. Locke. One would naturally expect that a man, who had ſeen ſo much of the world, and known ſo much of human nature, would at once advance the buſineſs of education to the rank of ſcience. He did a great deal; and though what is excellent is mixed with much that is exceptionable, and though his ſyſtem, if followed implicitly, would not fully accompliſh the objects of education, yet he laid the foundation for national attention to education, in like manner as he firſt properly developed the mode of examining the faculties and diſpoſitions of the mind.

Since the time of Locke, various writers have come forward to the public notice, with obſervations and diſcuſſions on the ſubject of education. Several have had in view merely to detail plans of inſtruction in the different branches of commercial, literary, or philoſophical education: others have taken a wider range, and have inveſtigated the principles of education. Some of their peculiarities of opinion will probably come under examination in our ſeparate articles; and we ſhall only add on this point, that all which detail the reſults of experience, are in themſelves conſidered valuable; but that there are many writers, who ſeem to have had in view rather to captivate the imagination with any airy ſyſtem, and to ſtrike out new and ſhorter roads of education, than to trace out thoſe plans which alone can lead to ſatisfactory reſults, by being founded on juſt views of human nature.

We ſhall now conclude our article by a few words reſpecting the education of the poor. Taken in a religious point of view, no one can reaſonably doubt, that it is our duty to afford to the children of the poor the means of knowing their duty; but we ſhall not enlarge upon the ſubject in that view, but attend to it as a national conſideration, as an object in which national welfare is intimately concerned.

It may be truly ſaid, that there is no direction of benevolence, in which national and individual benefit more clearly go hand in hand. And the reaſon is obvious. Wherever induſtry, frugality, and obedience to the laws form the decided character of the poor, there the rich will have their rights reſpected, and, at the ſame time, the poor will be contented and happy. Perhaps, for this purpoſe, national induſtry muſt be principally directed in the channel of agriculture; but however this may be, there can be no doubt that whatever conſtitutes national wealth, the induſtry of the poor muſt have a principal ſhare in the acquiſition of it; and that whatever be the true ſource of national happineſs, the good conduct of the poor is eſſential to it. Few, who have thought cloſely on the ſubject, can doubt, that, among all claſſes of ſociety, the only general and permanent ſource of good conduct is a good education; that training up of right habits, and inſtilling of uſeful knowledge, which, together, may give the individual true views as to duty, and a decided bias towards the practice of it. We would not be underſtood to mean, that no one who has not had the benefits of a right education, can be expected permanently to poſſeſs thoſe qualities which render a man a good member of ſociety, but maintain it, as a certain general principle, that a good education is the only permanent ſource from which good conduct can be expected. And this is peculiarly the caſe among the poor, ſo far as civil and political duties are concerned. The crimes of the rich, againſt ſociety at leaſt, are uſually ſo much the object of general notoriety, that a man is almoſt conſtrained to keep within thoſe limits which the law impoſes, and thoſe few additional limits which a ſenſe of honour ſometimes ſets where better principles are wanting. But among the poor, ſuch a variety of opportunities occur, for the almoſt unobſerved practice of petty fraud and deceit, and the preſſure of circumſtances is ſo much felt, that if you can truly ſay of a poor man, that he is thoroughly and ſtrictly honeſt, you at once eſtabliſh his character. And can any one doubt, that the foundation of ſuch honeſty, to ſay nothing of other virtues, is laid in a right education? And is there ſufficient reaſon to believe, that the poor, unaided by the rich, unnoticed, neglected by them, will, as a general caſe, communicate to their children ſuch habits and knowledge as may render them upright characters, and, in their reſpective ſituations, truly worthy members of ſociety. Let us take the great maſs of the uneducated poor in large and crowded cities, and conſider their ſituation, and that of their children. "Every child," ſays the Philanthropic Society, "brought up in the reſort of vicious and profligate people, muſt almoſt inevitably imbibe the contagion of moral turpitude, and become an enemy to thoſe laws on which the general good depends. Lying is the firſt leſſon of their tongues, and theft of their hands; every object they ſee is at war with decency, and every impreſſion they receive is a vice." Such a picture, one would hope, cannot often be, in all its parts, correctly drawn out of the metropolis; but of its leading features too many originals may be found in every populous place, among thoſe who have had none of the now common advantages of education. And can any one doubt that ſuch dreadful ignorance of even the common duties of ſociety, is, as far as it extends, a moſt ſerious national injury; that every approach to it is, in its degree, baneful; and that the only general, ſecure, and permanent preventative, is the putting of the means of inſtruction in the power of all.

When contemplating the importance of early education in raiſing the character of ſociety at large, it is highly ſatiſfactory to perceive that we are fully borne out by an appeal to facts; and we ſhall here bring forwards to the attention or recollection of our readers, ſome invaluable ſtatements from the writings of the late philoſophic and benevolent Dr. Currie, (Burns's Life and Works, vol. i. p. 351.) which we wiſh to become familiar to every individual who has the power, either by his influence, wealth, or perſonal exertion, of aiding the highly-important cauſe of the education of the poor. "The influence of the ſchool-eſtabliſhment of Scotland on the peaſantry of that country," ſays Dr. Currie, "ſeems to have decided, by experience, a queſtion of legiſlation of the utmoſt importance—whether a ſyſtem of national inſtruction for the poor be favourable to morals and good government."

In the year 1698, Fletcher of Saltoun declared as follows: "There are at this day in Scotland two hundred thouſand people begging from door to door. And though the number of them be perhaps double to what it was formerly, by reaſon of this preſent great diſtreſs," a famine then prevailed, "yet in all times there have been about one hundred thouſand of thoſe vagabonds, who have lived without any regard or ſubjection either to the laws of the land or even to thoſe of God and nature; fathers inceſtuouſly accompanying with their own daughters, the ſon with the mother, and the brother with the ſiſter." He goes on to ſay, "that no magiſtrate could diſcover that they had ever been baptiſed, or in what way one in a hundred went out of the world." He accuſes them as frequently guilty of robbery, and ſometimes of murder. "In times of plenty," ſays he, "many thouſands of them meet together in the mountains, where they feaſt and riot for many days; and at country weddings, markets, burials, and other public occaſions, they are to be ſeen, both men and women, perpetually drunk, curſing, blaſpheming, and fighting together." This high minded ſtateſman, of whom it is ſaid by a contemporary, "that he would loſe his life readily to ſave his country, and would not do a baſe thing to ſave it," thought the evil ſo great, that he propoſed as a remedy, the revival of domeſtic ſlavery, according to the practice of his adored republics in the claſſic ages! A better remedy has been found, which, in the ſilent lapſe of a century, has proved effectual. The ſtatute of 1696, the noble legacy of the Scottiſh parliament to their country, began ſoon after this to operate; and happily, as the minds of the poor received inſtruction, the union opened new channels of induſtry, and new fields of action to their view."

"At the preſent day," continues Dr. Currie, "there is perhaps no country in Europe, in which, in proportion to its population, ſo ſmall a number of crimes fall under the chaſtiſement of the criminal law, as Scotland. We have the beſt authority for aſſerting, that on an average of thirty years preceding the year 1797, the executions in that diviſion of the iſland did not amount to ſix annually; and one quarter ſeſſions for the town of Mancheſter only, has ſent, according to Mr. Hume, more felons to the plantations than all the judges of Scotland uſually do in the courſe of a year. It might appear invidious to attempt a calculation of the many thouſand individuals in Mancheſter and its vicinity who can neither read nor write. A majority of thoſe who ſuffer the puniſhment of death for their crimes, in every part of England, are, it is believed, in this miſerable ſtate of ignorance!"

It is, perhaps, worth while to add to the foregoing view the following ſtatements from Mr. Howard's works, (vol i. p. 9. and 484.) He informs us, that the number of executions in London, for twenty-three years preceding 1772, amounted to 678, or between 29 and 30 annually: that in the twelve following years, including 1783, there were 467 executed in London, on an average of 39 annually; and in the four laſt years preceding 1784, the average of the London executions was 49 nearly each year. In Scotland, during thirteen years and a half, preceding 1782, only 76 were capitally condemned, of them 54 only were executed.

Dr. Currie goes on to inform us, that ſchools have long been eſtabliſhed and ſupported for the education of the poor in New England, in the Proteſtant cantons of Switzerland, and in certain diſtricts in England, particularly in the northern parts of Yorkſhire and Lancaſhire, and in the counties of Weſtmoreland and Cumberland. "The ſimilarity of character between the Swiſs and the Scotch, and between the Scotch and the people of New England, can ſcarcely be overlooked. That it ariſes in a great meaſure from the ſimilarity of their inſtitutions for inſtruction cannot be queſtioned." Dr. Currie admits, however, that it is increaſed by phyſical cauſes, on which he makes ſome judicious remarks, and thus concludes: "how much ſuperior in morals, in intellect, and in happineſs, the peaſantry of thoſe parts of England are, who have opportunities of inſtruction, to the ſame claſs in other ſituations, thoſe who inquire into the ſubject will ſpeedily diſcover. The peaſantry of Weſtmoreland, and of the other diſtricts mentioned above, if their phyſical and moral qualities be taken together, are, in the opinion of the editor, ſuperior to the peaſantry of any other part of the iſland."

Happy had it been for Britain, if the "warning counſels, the prophetic page" of Currie, had been liſtened to and followed by her ſtateſmen. As far as our relation with other nations is concerned, the time is paſt; but we may yet profit by thoſe repreſentations which ſhew us what is to be done in order to raiſe the intellectual and moral character of the nation at large. It is not improbable that national reformation will begin with national diſtreſs; but it is not too much to ſay, that a permanent reformation in the condition and character of the poor, can only be brought about by well-directed attention to their education, in connection with a proper regulation of the laws relative to the indigent poor. Whether in the counſels of an all-wiſe Providence it is decreed that Britain ſhould be thrown from that lofty pinnacle to which ſhe has elevated herſelf, time only can determine; but it appears clear, that the ſureſt way of avoiding national judgments is by endeavouring, each in his ſtation, to reform thoſe evils which affect our conduct and character as a nation; and in this point of view alſo, the communication of knowledge to the poor, may be conſidered as a national benefit, and as a probable means of leſſening national puniſhment. We ſhall cloſe this article with the following general obſervations.

The plan of education, whether it be domeſtic or collegiate, ſhould be ſuited to the ſtation and views of parents, and to the genius of their children; and it is alſo right to conſult their conſtitution and inclination. It is of great importance, that thoſe who are deſtined to occupy ſuperior ſtations in ſociety, ſhould enjoy the benefits of an enlarged and liberal education; that they ſhould be furniſhed with every ſubſtantial and ornamental accompliſhment; and thoſe that are intended for any particular profeſſion or employment ſhould be principally directed to thoſe ſtudies which are appropriated to their reſpective views; and in every rank of life, an attention to the morals of youth ſhould be a primary object. Though the municipal laws of moſt countries have made no proviſion for conſtraining a parent to beſtow a proper education on his children; yet in the caſe of religion they are under peculiar reſtrictions in our country. Some of theſe reſtrictions, as they affect thoſe who diſſent from the religion of the ſtate, may be thought both impolitic and injurious, and have, therefore, lately been conſiderably relaxed; and there is room for farther enlargement. See DISSENTERS, PAPISTS, and TOLERATION.

EDULCORATION. This term is applied, in *Chemiſtry*, to the proceſs of freeing a difficultly ſoluble ſubſtance from one that is eaſily ſoluble, by means of diſtilled water. In fact, it differs little from lixiviation, except that the former term reſpects the inſoluble reſidue, and the latter the ſoluble portion. Thus we ſay, to lixivate wood aſhes, becauſe the object of the proceſs is to procure the ſoluble alkaline ingredient ſeparate from the earth and other impurities with which it is mixed; and on the other hand we ſay, to edulcorate the precipitate from alum, when the intention of the operation is to obtain the earth quite pure from ſoluble matter. Hence ariſes a practical difference between the two proceſſes; lixiviation is carried on no longer than the water runs off charged with a ſufficient quantity of ſoluble matter to defray the expence of boiling down, and hence a minute portion of ſoluble matter is always left in the inſoluble reſidue. Edulcoration is not reckoned compleat till the water returns as pure as when it was firſt added; hence the latter runnings are never ſufficiently charged with ſoluble matter, to make it worth while to boil them down.

The uſual method of edulcorating, is to place the ſubſtance on a filter, and continue to add ſucceſſive portions of hot or cold water, till the runnings indicate, by the common teſts, that they hold nothing in ſolution. This, however, is always tedious, and often not perfectly effectual, as the contents of the filter are in many caſes very apt to clot together, ſo as to obſtruct the thorough percolation of the water. It will be found, on the whole, a much more expeditious and ſatisfactory proceſs, to place the precipitate in a large ſilver crucible with abundance of water, and heat it more or leſs according to circumſtances; then withdraw it from the fire, allow it to ſettle for a few minutes, and pour off the clear ſupernatant liquor; then add freſh water to the reſidue, and proceed as before, till all ſoluble impurities are got rid of. A ſingle hour thus employed will finiſh more work than a whole day in the common method; and the neceſſary loſs on the precipitate is conſiderably leſs, which is a circumſtance of no ſmall importance to the accuracy of an analyſis.

EDULCORATION, of *edulco*, *I ſweeten*, in *Pharmacy*, is the dulcifying or ſweetening of any food, or remedy, by means of honey, ſugar, or ſyrups.

EDULIUS, in *Ancient Geography*, a mountain of Spain, in the Tarragoneſe territory, ſuppoſed to be the modern Montſerrat in Catalonia.

EDUS, a ſmall river of Italy, in Liguria, ſaid to be the preſent Sadodela.

EDWARD, in *Biography*, ſurnamed the Elder, king of England, was ſon of Alfred, whom he ſucceeded in the year 901. The reign of this prince was diſturbed by an inſurrection, at the head of which was Ethelwold, ſon to king Ethelbert, Alfred's elder brother, who claimed the crown as his right. Edward, after much contention, ſubdued his enemies, and reduced them to ſubmiſſion. He afterwards repelled an incurſion of the Northumbrians, and completely defeated them at Tetenhall in Staffordſhire. During the remainder of his life, he was engaged in many conflicts, but was uſually ſucceſsful. He fortified many of the inland towns of England; vanquiſhed Thurketill, a Daniſh chieftain, and obliged him to retire with his followers into France. He ſubdued ſeveral tribes of Britons, and by his activity proved himſelf, in ſome reſpects, worthy of his deſcent from the immortal Alfred. On the death of his ſiſter Ethelfleda, he aſſumed the government of Mercia, which had been before independent of the crown. He died in the year 925, and was ſucceeded by his natural ſon Athelſtan. Hume.

Edward, king of England, and ſurnamed the Martyr, was about fifteen years of age when he ſucceeded his father Edgar, A.D. 975. Though the eldeſt, he was oppoſed in his claims by his mother-in-law Elfrida, who wiſhed to raiſe her own ſon Ethelred to the throne. Edward was ſupported by Dunſtan, who overcame every obſtacle, cauſed the young king to be crowned, and then obtained the ſubmiſſion of the whole kingdom. Edward appears to have poſſeſſed little energy of mind, and to have chiefly employed himſelf in the amuſements of the chace, and in this ſort of paſtime he ſpent four years very innocently. Incapable of any treacherous intention himſelf, he was unſuſpicious of others, of whom he ought to have been perpetually on his guard. His mother-in-law had vehemently oppoſed his ſucceſſion, yet Edward ſoon forgot her conduct, and behaved towards her with the greateſt reſpect, and on all occaſions expreſſed for his brother Ethelred a true affection; but being hunting in Dorſetſhire, and fatigued with the ſport, he left his attendants and rode to Corfe caſtle, the reſidence of Elfrida, with a view, perhaps, of ſhewing reſpect to his relation, and of obtaining ſome refreſhment. He requeſted, while on horſeback, ſomething to aſſuage his thirſt; the liquor was brought, but while he was in the act of drinking, a ſervant of the infamous Elfrida gave him a deep ſtab from behind. He ſet ſpurs to his horſe, but becoming faint with the loſs of blood, he fell, and was dragged in the ſtirrup till death put an end to his ſufferings. He was buried at Wareham, and the tragical fate to which he had been expoſed obtained for him the title of Martyr. Hume.

Edward, the Confeſſor, younger ſon of Ethelred II. ſucceeded to the crown of England in 1041; though not the true heir, he was called to the throne in preference to the ſons of Edmund Ironſide, who happened to be on the continent at the death of Hardicanute, the former king. The impatience of the Engliſh to free themſelves from the Daniſh yoke, cauſed them to unite in favour of Edward, and the Danes in the iſland acquieſced in the choice. It was feared that this ſucceſſion to the crown would be oppoſed by earl Godwin, the moſt powerful nobleman in the kingdom, who was on ill terms with Edward; but a reconciliation was brought about, and Godwin agreed to acknowledge the king, on condition that he would marry his daughter Editha. The external forms of marriage the king readily complied with, but either through an averſion to the perſon who was forced on him as queen, or through ſome ſuperſtitious notions that cannot be juſtified, he abſtained from all nuptial commerce, a circumſtance which obtained for him the applauſe of the monks, and contributed not a little to his acquiring the title of ſaint and confeſſor. Having been educated in Normandy, he introduced many of the natives of that country to his court, and French language and manners prevailed throughout the country. Godwin made uſe of this as a popular reaſon for exciting diſcontent among the people, though the uſage of his daughter was probably the real cauſe of his enmity. The rebellion of Godwin was unſucceſsful, and he was obliged to ſeek refuge in Flanders, where, however, he recruited his force, and returned with a powerful fleet, with which he ſailed to London. Edward was now glad to enter into a compromiſe with him, and baniſh the Normans. By this treaty the danger of a civil war was for the preſent averted, but the authority of the crown was conſiderably impaired, or nearly annihilated. Godwin, indeed, ſhortly after died, but he was ſucceeded by his ſon Harold, who in the end became a more dangerous enemy to the king than even his father. About the year 1055 Edward reſtored to the throne of Scotland Malcolm, the ſon of Duncan, by the defeat and death of the uſurper Macbeth. Edward was now faſt advancing in years, and was anxious to appoint a ſucceſſor; with this view he ſent for his nephew Edward, ſon of Edmund Ironſide, who died in a ſhort time after his arrival in England. He next, with the hope of depriving the family of Godwin of all hopes, turned his attention to William, duke of Normandy, and took ſome meaſures to ſecure his ſucceſſion, but he was incapable of acting with that deciſion which the nature of the caſe required, and while he was conſidering what ſhould be done, he died on the 5th of January, 1066, in the ſixty-fifth year of his age, and the twenty-fifth of his reign. He was the laſt of the Saxon line that ruled in England. His reign was on the whole peaceable and fortunate, but he was more indebted for the proſperity which he enjoyed, to the conjunctures of the times, than to his own abilities. The Danes gave him little trouble, and the mildneſs of his own diſpoſition, with a love of peace, led him to acquieſce in the power aſſumed by Godwin and Harold. The talents and power of theſe noblemen enabled them, while they were entruſted with authority, to preſerve domeſtic peace and tranquillity. Edward is deſerving of high commendation for his attention to the adminiſtration of juſtice, and his compiling for that purpoſe a body of laws, which he collected from thoſe of Ethelbert, Ina, and Alfred. The compilation, though now loſt, was long an object of affection to the Engliſh. This prince, who, on account of his piety, obtained the reputation of being able to cure diſeaſes, was the firſt who touched for the king's evil; and "his ſucceſſors," ſays Hume, "regarded it as a part of their ſtate and grandeur to uphold the ſame opinion. It has continued down to our time, and the practice was firſt dropped by the preſent royal family, who obſerved, that it could no longer give amazement even to the populace, and was attended with ridicule in the eyes of all men of underſtanding." Hume, vol. i.

Edward I. ſo denominated as being the firſt of that name of the Norman line, was eldeſt ſon of Henry III. and born at Wincheſter in 1239. He was called early into active life, and his talents were of the greateſt ſervice to his country in the conteſts between his father and the diſcontented barons. At the battle of Lewes he routed the Londoners, but purſuing them too far, he found, on his return, that the royal army had been defeated, and the king made priſoner. He himſelf fell into the power of the earl of Leiceſter, but obtaining a releaſe, he became in his turn victorious, and put an end to all further reſiſtance to the royal authority. In 1270 he made an expedition againſt the Saracens, but on his arrival at Tunis he found the French king dead, at whoſe deſire he undertook the project, and was obliged to proceed with his forces to the holy land, where he performed many exploits of valour, and rendered himſelf illuſtrious by his heroiſm. So much terror did he excite among the Saracens, that they bribed an aſſaſſin to murder him, who miſſing his blow, only wounded the prince in the arm, and fell himſelf a ſacrifice to the love of gain. This abſence of the prince from his native country was attended with the moſt diſaſtrous conſequences. The laws were not executed; the barons oppreſſed the common people with impunity, and the populace of London returned to the practices of licentiouſneſs, common in thoſe times. The old king, unequal to the affairs of government, called aloud for his gallant ſon to return, to aſſiſt him in ſwaying the ſceptre which was ready to drop from his feeble and irreſolute hands. Edward returned, but before he could reach his native land his father was dead, and himſelf, without oppoſition, proclaimed ſucceſſor. His firſt acts, after he aſcended the throne, were to reſtore order, and re-animate juſtice in the execution of her decrees. He repreſſed the violence of the great, and puniſhed corrupt judges; but his motives have been much queſtioned, inaſmuch as he ſcrupled not to fill his own coffers by the fines which he exacted upon the guilty. The Jews felt the weight of his anger, and under the pretence of puniſhing uſury he executed multitudes of that unfortunate race, and baniſhed the others from his realm. He next began to inquire by what title the nobility held their eſtates; the queſtion was firſt put to earl Warenne, a man of as much courage as himſelf, who replied, "By this," drawing his ſword at the ſame moment; and he added, in a tone not to be trifled with, "that William the baſtard had not conquered the kingdom for himſelf alone; his anceſtor was a joint adventurer in the enterprize; and he himſelf was determined to maintain what had from that period remained unqueſtioned in his family." The king, feeling his danger, deſiſted from all farther inquiries of this nature. He next ſummoned Llewellyn, native prince of Wales, to do him homage, which demand being refuſed, the king prepared to compel him to ſubmiſſion by the terror of his arms, and in 1283 he completely deſtroyed the independence of that country. It was thenceforward annnexed to the Engliſh crown, by a community of laws and government; "an important and mutually uſeful acquiſition, which has conferred glory on the king, though ſullied by his barbarous maſſacre of the Welſh bards, of the effect of whoſe animating ſtrains in reviving the national ſpirit he was jealous." According to hiſtorical tradition, Edward aſſembled the leaders of the Welſh, promiſed to give them a prince of unexceptionable manners, a Welſhman by birth, and one who could ſpeak no other language. Captivated with the deſcription, they poured forth violent acclamations of joy, and promiſes of the moſt implicit obedience; the king accordingly inveſted in the principality his ſecond ſon Edward, then an infant, who had been lately born at Carnarvon. The death of his eldeſt ſon ſoon after, made young Edward heir of the monarchy. The principality of Wales was fully annexed to the crown, and henceforth gives a title to the eldeſt ſon of the kings of England.

Edward then ſpent three years abroad, endeavouring to mediate a peace between the kings of France and Arragon. Having ſucceeded he returned, and avenged himſelf on all thoſe who had been guilty of high crimes during his abſence. He ſoon after began his attempt to deſtroy the independency of Scotland; with this view he projected a marriage between Margaret, on whom the Scottiſh crown devolved, and his eldeſt ſon Edward, which he would probably have accompliſhed but for the untimely death of the young queen. Several competitors now aroſe, but the claims of John Baliol and Robert Bruce were conſidered as the moſt valid, and upon theſe it was agreed that Edward ſhould decide. In 1292 he decreed in favour of Baliol, and cauſed him to be proclaimed king of Scotland. A war now broke out between England and France, and during the conteſt Baliol formed a ſecret alliance with the French, which was the commencement of that union between the two countries, which ſo long prevailed to the diſadvantage of England. Edward found great difficulties in raiſing ſupplies, and was forced to the expedient of ſummoning to parliament repreſentatives from all the boroughs in the kingdom, an event which is thought to be the true foundation of a houſe of commons in England. When he had obtained the money which he required, he marched with a powerful army into Scotland and obliged the king to reſign his crown: he then returned, taking with him the famous ſtone of inauguration, kept at Scone, as the palladium of the Scottiſh monarchy. Not contented with this, he ordered all the records and monuments of antiquity to be deſtroyed, broke the ſeal of Baliol, and carried him away as his priſoner. When they arrived in London Baliol was committed to the Tower, and kept priſoner two years, and then baniſhed to France, where he died in a private ſtation. Edward was next involved in a quarrel with the clergy, who refuſed to ſubmit to a tax impoſed upon them, but were afterwards glad to agree to the terms which the ſovereign exacted. Foreign wars and domeſtic troubles kept the king always poor, and to ſupply his wants he was forced to grant to the people a ſolemn confirmation of the great charter, and the charter of the foreſts, and to make other conceſſions in favour of public liberty. Edward died of a dyſentery at Carliſle, on the 7th of July, 1307, as he was leading a very large army into Scotland, againſt the inhabitants of which he had vowed the moſt dreadful vengeance on account of new diſturbances which the oppreſſions of the Engliſh probably excited. He was ſucceeded by his ſon Edward II. whom he charged, with his dying breath, to proſecute the war againſt Scotland, and never to deſiſt till he had finally ſubdued that kingdom.

The enterprizes finiſhed by this prince, and the projects which he formed, were more prudent, more] regularly conducted, and more advantageous to the ſolid intereſts of the kingdom, than thoſe which were undertaken in any reign, either of his anceſtors or his ſucceſſors. He reſtored authority to the government: he maintained the laws againſt the efforts of his turbulent barons: he fully annexed to his crown the principality of Wales, and he took vigorous meaſures for reducing Scotland to a like condition. Nor was he leſs attentive to the internal improvement of his kingdom, than to promote its conſequence among its neighbours. The laws of the realm obtained ſo much additional order and preciſion during his reign, that he has been called the Engliſh Juſtinian. He firſt inſtituted the office of juſtice of the peace, and he made various alterations in the executive part of the law, which have continued to modern times. He was inclined to arbitrary meaſures himſelf, but took care that his ſubjects ſhould not act unjuſtly towards each other. He prevented all clerical uſurpations as much as poſſible, and is reckoned the firſt Chriſtian prince who paſſed an act of mortmain. He protected and encouraged commerce, and from him the ſociety denominated "Merchant Adventurers" had its origin, which was inſtituted for the improvement of the woollen manufacture, and the vending of the cloth abroad, particularly at Antwerp. He granted protection and privileges to foreign merchants, and alſo aſcertained the cuſtoms and duties which thoſe merchants were, in return, to pay on merchandize imported and exported. He promiſed them ſecurity, and on all trials reſpecting them or their property a jury was allowed, conſiſting half of natives and half of foreigners. The manners of this prince were courteous: his perſon was majeſtic, though the length and ſmallneſs of his legs gave him the appellation of "Longſhanks." Edward had by his firſt wife Eleanor, four ſons and eleven daughters; three of the ſons and moſt of the daughters died before him. He was married a ſecond time to Margaret of France, by whom he had three children. For queen Eleanor he left many durable tokens of his gratitude and affection, by erecting at every ſtage where her body reſted, in its way from Lincolnſhire to Weſtminſter, a ſtone croſs of elegant Gothic architecture. Of theſe a fine one, in perfect preſervation, is ſtill extant near Northampton; and another in a leſs complete condition exiſts at Waltham Croſs, a village eleven miles north of the metropolis. Hume. See CROSS.

EDWARD II. ſucceeded his father in 1307, but was little inclined to follow the advice given him on his death bed: he was indolent and inclined to pleaſure rather than to the ſerious cares of government. One of his firſt acts was to recall to his court Piers Gaveſton, a licentious young man whom his father had baniſhed, but who by him was made earl of Cornwall, and married to his niece. He next went to France to marry the princeſs Iſabella, to whom he had been ſome time contracted, but who was ill calculated to render him happy. His barons were exaſperated at his conduct with reſpect to Gaveſton: they remonſtrated, and he promiſed to diſmiſs him for ever from his councils; but in a ſhort time he broke his engagement, which excited an open rebellion. Gaveſton fell into the hands of his enemies, and was executed as a public enemy. After the death of Gaveſton, he adopted, as a favourite, Hugh Spencer, who was ſoon as much the object of popular diſpleaſure as Gaveſton had been, and the king was compelled to ſign againſt him a ſentence of attainder, and perpetual exile. Edward, however, recovered from the conſternation into which he had been thrown, and immediately prepared to attack the barons, who were led on by Thomas, earl of Lancaſter, his near relation. He obtained over them a ſignal victory, and Lancaſter, who had fled into the north, was taken priſoner and executed at Pomfret in 1322. Many others ſuffered, and Spencer was enriched with their ſpoils. In 1324 queen Iſabella went over to Paris, where ſhe connected herſelf with ſeveral Engliſh fugitives, who agreed with her in hatred of Spencer, and, among the reſt, with Mortimer, a baron in the Welſh marches. Here a conſpiracy was formed againſt Edward, and Iſabella returned in the character of an open enemy of her ſovereign and huſband. She landed on the coaſt of Suffolk, and was ſoon joined by many perſons of rank and diſtinction. Their party became in a ſhort time irreſiſtible: they gained poſſeſſion of the tower of London and other ſtrong fortreſſes, ſeized and put to death, without trial, both the Spencers, and at length made the king priſoner. He was at firſt confined in Kenilworth caſtle: he was then depoſed by a vote of parliament, and compelled to ſign an inſtrument of reſignation. This was not ſufficient: his enemies ſent him to Berkeley caſtle, where he was inhumanly murdered, by thruſting up a red-hot iron into his bowels, in ſuch a way as to prevent any marks of external violence from being ſeen. His ſhrieks, however, betrayed the bloody deed to the guards and other attendants in the caſtle. He died September 21, 1327, having reigned twenty years, and lived forty-three; and was ſucceeded by

Edward III. who was then only in his fourteenth year, and was proclaimed king under a council of regency, while Mortimer really poſſeſſed the principal power of the ſtate. After ſome fruitleſs attempts made on the liberties of Scotland, Robert Bruce was acknowledged lawful king, and his ſon and heir David was contracted to Edward's ſiſter Jane. Mortimer by this act became very unpopular in England, and after enriching himſelf by fines and confiſcations levied on his enemies, he was ſeized and hanged in the caſtle at Nottingham. After this, Iſabella was confined to her houſe, with a reduced allowance, and though treated with decency never recovered any degree of authority. Edward now aſſumed the reins of government, and his firſt concern was to reſtore order and ſubmiſſion to the laws. He then undertook the aſſiſtance of Baliol king of Scotland, and levying a well appointed army, marched to the borders and took Berwick from thoſe who had got poſſeſſion of the greater part of the kingdom, and who had driven Baliol to England.

By a bloody battle at Halidown hill, July 19, 1333, in which the Scots were defeated with the loſs of 30,000 men, Baliol was reſtored, who, in gratitude to Edward, recogniſed the ſuperiority of the Engliſh crown, and put into Edward's hands ſeveral important fortreſſes, with all the ſouth-eaſt counties of Scotland. Edward now, owing to an interruption in the lineal ſucceſſion to the crown of France, which had fallen to Philip de Valois, put in his claim to that crown, in right of his mother Iſabella, ſiſter of the late king Charles of France, and prepared to juſtify his claims by force of arms. With this view, in 1339, he appeared on the north-eaſt frontiers of France, with an army of 30,000 men chiefly foreigners. Philip was not leſs active, and met him with one double that number, and after ſome time ſpent in mutual defiances, Edward wiſely withdrew into Flanders, and diſbanded his troops. Next year he renewed his attempts, but was obliged to call his parliament together for new aids, who demanded of him certain conceſſions, which he readily granted to obtain his object. To prevent the attack, Philip fitted out a large fleet of 400 ſail, manned with 40,000 men, which he ſtationed off Sluys, in order to intercept the king in his paſſage. The Engliſh navy conſiſted of only 240 ſhips, but was completely victorious, deſtroying the greater part of the French fleet, and their crews. The king himſelf commanded in perſon, and it has been ſaid, that this naval fight may contend in glory with any of the moſt celebrated triumphs in the maritime records of England. Notwithſtanding the victory, Edward returned, without attaining the object of his ambition, deeply in debt, and much diſconcerted; and to obtain further ſupplies, he was obliged to make more conceſſions to parliament. In 1342, new proſpects opened upon him, and he again attacked France, but ſhortly after agreed to a truce for three years. In 1346, the king himſelf, with all his chief nobility, his eldeſt ſon Edward (the famous black prince) and an army of 30,000 men landed at La Hogue in Normandy. He over-ran and ravaged great part of the province, took and pillaged Caen, ſtruck an alarm even into Paris, and then proceeded into Picardy followed by the king of France with 100,000 men. He forded the Somme, and arrived at the village of Crecy. Here he drew up his army in three lines, and awaited the attack of the enemy. Edward, the prince, was then only 16 years of age, yet to him did the king leave the honour of obtaining the firſt part of the victory with his line unaſſiſted. The rout was afterwards completed with the ſlaughter of 36,000 of the enemy, though the loſs of the Engliſh was incredibly ſmall. This victory was followed by the ſiege of Calais, which occupied the Engliſh arms nearly a year. During this period, the Scots under David Bruce made an incurſion into England, and penetrated as far as Durham. Here he was met by an inferior force, raiſed by queen Philippa, and commanded by lord Percy, which gave him a total and ſignal defeat. David was taken priſoner with many of his principal nobles. Philippa having achieved this noble act, went over to her royal ſpouſe, where ſhe was received with deſerved triumph. Calais was now reduced to the greateſt difficulties, and the governor offered to capitulate, but Edward would liſten to no terms, unleſs ſix of its principal citizens were delivered to him with cords about their necks, as ſacrifices to his rage. Euſtace de St. Pierre and five others offered themſelves as voluntary victims. They were led to the Engliſh camp, and the entreaties of the queen alone prevented the king from putting to death, men, whoſe only crime was love to their country and fidelity to their ſovereign. Edward cauſed all the French inhabitants to quit Calais, and ſubſtituted an Engliſh colony which long poſſeſſed it, as one of the keys of France. In 1348, a truce was concluded, but during the truce, the French made an attempt to recover Calais by ſurprize, which proved unſucceſsful. On this occaſion, the king himſelf fought on foot as a private ſoldier, and engaging in combat with a French knight, took him priſoner, whom he almoſt inſtantly liberated without a ranſom, throwing, at the ſame time, with much courteſy, a ſtring of pearls about his neck. In the year 1349, Edward inſtituted the noble order of the Garter, which ſoon became one of the moſt illuſtrious orders of knighthood in Europe. See GARTER, KNIGHT, &c. In 1355, Edward invaded France on the ſide of Calais, while the black prince did the ſame from Gaſcony, but after much plunder and devaſtation, the king was recalled by a threatened invaſion of the Scots, which he not only repelled, but carried the war into their own country from Berwick to Edinburgh. In the year 1356, was the famous battle of Poictiers, and in a ſhort time Edward had the good fortune to poſſeſs as priſoners, his two moſt inveterate enemies the kings of France and Scotland. In 1359, Edward paſſed over to Calais with an army of 100,000 men. He deſolated the provinces of Picardy and Champagne, and appeared before the gates of Paris; but notwithſtanding all his ſucceſs, he ſeemed to have no chance of obtaining the crown of France, and conſented to a peace, which was concluded in the year 1360, highly in favour of Edward. In the reign of Charles V. he had the mortification to witneſs the loſs of all his ancient French provinces except Bayonne and Bourdeaux, and all his conqueſts except Calais. But he had to experience ſtill greater afflictions, by the death of his heroic ſon Edward, and by the diminiſhed attachment of his people. He died June 21, 1377, in the 65th year of his age, and fifty-firſt of his reign, and the people were then ſenſible, though too late, of the irreparable loſs which they had ſuſtained. The reign of Edward has been eſteemed not only one of the longeſt, but alſo one of the moſt glorious that occurs in the annals of our nation. Edward was great as a warrior, but the domeſtic government of this prince is more admirable than his foreign victories, and England enjoyed, by the prudence and vigour of his adminiſtration, a longer interval of domeſtic peace and tranquillity than ſhe had been bleſſed with in any former period, or than ſhe experienced for many ages after. He gained the affections of the great, yet curbed their licentiouſneſs. He made them feel his power, without their daring, or even being inclined to murmur at it. His affable and obliging behaviour, his munificence and generoſity made them ſubmit with pleaſure to his dominion; his valour and conduct made them ſucceſsful in moſt of their enterprizes, and their unquiet ſpirits, directed againſt a public enemy, had no leiſure to breed thoſe diſturbances to which they were naturally ſo much inclined, and which the frame of the government ſeemed ſo much to authorize.

Edward left behind him a numerous poſterity by his queen Philippa. The line of his eldeſt ſon ceaſed in his unfortunate ſucceſſor Richard II. The two rival houſes of Lancaſter and York were derived from John of Gaunt duke of Lancaſter, the third ſon of Edward, and from Edmund earl of Cambridge, afterwards duke of York, the fourth ſon of Edward.

One of the moſt popular laws enacted by any prince, was the ſtatute which paſſed in the twenty-fifth year of this reign, and which limited the caſes of high treaſon, before vague and uncertain, to three principal heads, *viz.* conſpiring the death of the king; levying war againſt him, and adhering to his enemies; and the judges were prohibited, if any other caſes ſhould occur, from inflicting the penalty of treaſon without an application to parliament. It was alſo ordained, that a parliament ſhould be held once a year, or oftner, if need be; "A law," ſays Mr. Hume, "which like many others, was never obſerved, and loſt its authority by diſuſe." Edward granted above twenty parliamentary confirmations of the Great Charter, which is ſtrong preſumptive evidence, that he occaſionally made no ſcruple in violating it. The uſe of the French language in law proceedings was laid aſide in this reign, as a badge of the conqueſt which it was time to aboliſh. Legiſlation and the laws of police were much improved in this reign; and though commerce ſtill lay under many impolitic reſtrictions, yet the ſtaple of the nation, the woollen manufacture, was promoted by encouragement given to foreign weavers, and by enacting a law which prohibited every one from wearing any cloth but of Engliſh fabric.

Edward was a prince of great capacity, and deſirous of keeping on good terms with his people; "yet on the whole," ſays the hiſtorian, "it appears that the government, at beſt, was only a barbarous monarchy, not regulated by any fixed maxims, or bounded by any certain undiſputed rights, which in practice were regularly obſerved. The king himſelf governed by one ſet of principles, the barons by another, the commons by a third, the clergy by a fourth. All theſe ſyſtems of government were oppoſite and incompatible: each of them prevailed in its turn, as incidents were favourable to it." Hume.

EDWARD IV. was born in 1441. His father, Richard, duke of York, was grandſon of Edmund, earl of Cambridge and duke of York, to whom we have already, in the preceding article, referred. He ſucceeded his father, in the title of York, ſlain at the battle of Wakefield in 1460; and after the battle of St. Alban's, gained by queen Margaret over the earl of Warwick, Edward, collecting the relics of Warwick's forces, advanced, and obliged the queen to retire to the north. He then entered London, where, by popular acclamation, he was declared king, in March, 1461, but he did not ſucceed without a ſtruggle; he had to fight for his crown againſt an army of 60,000 Lancaſtrians, aſſembled in Yorkſhire; a deciſive victory confirmed his title. After this he loſt no time in aſſembling a parliament which recognized his right, and paſſed the ſevereſt laws againſt his opponents. Margaret, however, was not ſubdued, ſhe appeared again in arms; but, being defeated, was obliged to take refuge in Flanders, while her huſband, Henry VI. fell into the hands of his enemies, and was committed to the Tower. Edward was now eaſy on the ſcore of a rival, and began to indulge himſelf in pleaſures that ſeemed ſuited to his age; but a marriage of love, which he contracted with Elizabeth Woodville, widow of a Lancaſtrian, whoſe eſtate had been confiſcated, produced very ſerious conſequences. This lady took the opportunity of an accidental viſit at her father's houſe, to throw herſelf at the king's feet, and implore compaſſion for her ruined children. The ſight of her beauty won the heart of Edward, who privately married her. This circumſtance gave ſo great offence to ſome foreign courts, and to the powerful lords of England, that Edward was at length driven from his own country, and the Lancaſtrians became again triumphant. Henry was once more acknowledged king, and all the attainders of his party were taken off and transferred to the Yorkiſts. Warwick and Clarence were declared regents of the kingdom under Henry, and Margaret, with all the exiles, prepared to return. In 1471, Edward was enabled, by the aſſiſtance of the duke of Burgundy, to land with 2000 men, and to theſe were ſoon added great numbers who flocked to his ſtandard. He marched to London, obtained entrance, and Henry was again made priſoner. Warwick advanced againſt him as far as Barnet, where, on April 14th, a great battle was fought, which terminated in a complete victory to Edward. On the ſame day, queen Margaret and her ſon landed at Weymouth. She advanced as far as Tewkeſbury, was defeated, and, with her ſon, made priſoners. The king ordered them to be brought before him, and aſking the prince how he dared to invade his dominions, received a very ſpirited reply, for which Edward baſely ſtruck him in the face with his gauntlet. At this ſignal, the creatures of the king dragged the heroic young man into an adjoining apartment, and infamouſly murdered him. Margaret was thrown into the Tower, where ſhe witneſſed the death of her huſband. Edward, now ſecure by the deſtruction of his foes, reſigned himſelf to thoſe pleaſures to which he had been ever addicted: in 1475, he made an attempt at French conqueſts, but was bought off by a preſent payment of money, and a promiſed penſion, and from this period he ceaſed to interfere in continental politics. He was chiefly engaged with examining into ſome charges brought againſt his brother Clarence, who was, at length, capitally arraigned before the houſe of peers, and convicted. The commons concurred in a bill of attainder againſt him; and, finding that his life muſt be ſacrificed, he begged to be drowned in a butt of Malmſey wine, a requeſt in which he was indulged. An expedition of the duke of Glouceſter to the borders of Scotland, in which he took Berwick, and forced the Scots to make peace, was the remaining event of this reign. This ſucceſs encouraged the king to think more ſeriouſly of a French war; but while he was making preparations for that enterpriſe, he was ſeized with an illneſs that put an end to his life, in the forty-ſecond year of his age, and the twenty-third of his reign. He left two ſons and five daughters. He was, according to Hume, “A prince more ſplendid and ſhowy, than either prudent or virtuous; brave though cruel; addicted to pleaſure, though capable of activity in great emergencies; and leſs fitted to prevent ills by wiſe precautions, than to remedy them after they took place, by his vigour and enterpriſe.” Hiſt. Eng. vol. iii.

Edward V. ſucceeded the father, Edward IV. when he was only in his 13th year; and ſcarcely had he reigned two months, when, by the ambition of his uncle, the duke of Glouceſter, he and his brother Richard were lodged in the Tower, where they were preſently murdered, and privately interred at the foot of the ſtairs of the apartments which they inhabited. (See Richard III.) In the reign of Charles II. when ſome ſtones were removed, and the ſpot dug up which was mentioned as the place of their burial, the bones of two perſons were found, which, by their ſize, exactly correſponded to the age of Edward and his brother. They were, of courſe, concluded to be the remains of thoſe princes, and were interred under a marble monument by order of the king.

Edward VI., ſon of Henry VIII., by queen Jane Seymour, was born in 1538. When Henry died, he was but nine years old, and as he lived only till he was ſixteen, two years before his father's will allowed him to govern for himſelf, his acts are to be regarded as thoſe of the counſellors appointed to ſuperintend the affairs of government during the minority, and as ſuch, will require but a ſhort notice in this place. He was celebrated for an amiable diſpoſition, and for conſiderable talents in the acquirement of learning. His maternal uncle, the earl of Hereford, afterwards duke of Somerſet, notwithſtanding the will of Henry, (ſee Henry VIII.) aſſumed the title of protector, and under him great care was taken to inſpire the young king with juſt principles, with regard to the Proteſtant religion, by which he was induced to favour the reformation. One of the earlieſt public events that happened in this reign, was a quarrel with Scotland, reſpecting a projected marriage between Edward and the young queen Mary. The protector marched an army into the country, and gained a decided battle, which, however, proved of no uſe to his main purpoſe; Mary was ſent to France, where ſhe was contracted to the dauphin. During the abſence of the protector, his own brother plotted againſt him, of which he was afterwards convicted and executed. This was but the commencement of troubles; inſurrections broke out in various parts of the kingdom, which were not ſuppreſſed without much bloodſhed, and which raiſed up ſo many enemies to the adminiſtration of Somerſet, that he was at length brought to the ſcaffold. Theſe ſeverities muſt have been very repugnant to the mild and benevolent ſpirit of Edward, who could ſcarcely be brought to ſign the death-warrant of a worthy woman accuſed of hereſy. (See Cranmer.) After the death of Somerſet, Dudley, duke of Northumberland, became all-powerful, and governed the king and kingdom with equal deſpotiſm. (See Dudley.) Through the influence of this nobleman, Edward was induced to ſet aſide from the ſucceſſion his ſiſters Mary and Elizabeth, and to ſettle the crown upon lady Jane Grey. The young king had in the courſe of one year, been ſeized with the meaſles, and afterwards with the ſmall-pox, the effects of which he probably never quite recovered; and as he was making a progreſs through ſome parts of the kingdom, he was afflicted with a cough, which proved obſtinate, and which gave way neither to regimen nor medicines. Several fatal ſymptoms of a conſumption appeared, and though it was hoped, that as the ſeaſon advanced, his youth and temperance might get the better of the malady, his ſubjects ſaw, with great concern, his bloom and vigour ſenſibly decay. After the ſettlement of the crown, which had been effected with the greateſt difficulty, his health rapidly declined, and ſcarcely a hope was entertained of his recovery. His phyſicians were diſmiſſed by Northumberland's advice, and the young king was entruſted to the hands of an ignorant woman, who undertook to reſtore him to health in a very ſhort time. Death had, however, pronounced his irreverſible decree: the medicines preſcribed were found uſeleſs: violent ſymptoms were greatly aggravated; and on the 6th of July he expired at Greenwich, in the ſixteenth year of his age, and the ſeventh of his reign. The excellent diſpoſition of this young prince, and the blow ſuſtained by the Proteſtant cauſe, have rendered his memory dear to the nation. He poſſeſſed mildneſs of diſpoſition, application to ſtudy and buſineſs, a capacity to learn and judge, and an attachment to equity and juſtice. He is alſo advantageouſly remembered as the founder of ſome of the moſt ſplendid charities in the metropolis. Hume's Hiſt. vol. iv.

Edward, prince of Wales, denominated, from the colour of his armour, the Black Prince, one of the greateſt military heroes of his age, eldeſt ſon of Edward III., was born in 1330. He accompanied his father on his invaſion of France when he was but fifteen years of age; and in 1346, at the battle of Crecy, this young man fought with ſo much intrepidity, united to the moſt exact ſkill, that he was deſervedly held up as an example to the braveſt men in the army. Being, however, very hardly preſſed, a meſſage was ſent to the king, who was poſted on an adjacent hill, deſiring ſuccour, to which his father replied, “I reſerve to my ſon the honour of this day's victory; I am confident that he will prove himſelf worthy of the truſt repoſed in him.” Animated by the king's expectations, he redoubled his efforts, routed the French, and decided the conteſt. When the battle was won, the king flew to his arms, and rendered him all the praiſe and honour which his proweſs merited. On this occaſion the prince of Wales aſſumed the creſt of oſtrich feathers, and the motto “Ich dien,” (I ſerve,) belonging to the king of Bohemia, who fell in the battle, which all his ſucceſſors have ſince borne. In 1355, and following year, he penetrated into the heart of France, till he was at length oppoſed by John the king of the country, at the head of 60,000 men, and was reduced to a ſituation that would have obliged him to ſurrender for want of proviſions, had not the French king reſolved upon an attack. This battle, which was fatal to the French army and their king, who was taken priſoner, was fought Sept. 19, 1356, near Poictiers. The monarch, when led to the victor's tent, was met by the prince with every expreſſion of ſympathy and reſpect. So great was the conduct of Edward in this inſtance, that he not only cauſed a noble repaſt to be prepared for the fallen king, but waited upon him in perſon, and in every inſtance treated him as a ſuperior rather than a captive. "Here," ſays the hiſtorian, "commences the real and truly admirable heroiſm of Edward: for victories are vulgar things in compariſon of that moderation and humanity diſplayed by a young prince only twenty-ſeven years of age, not yet cooled from the fury of battle, and elated by as extraordinary and as unexpected ſucceſs as had ever crowned the arms of any commander. He came forth to meet the captive king with all the marks of regard and ſympathy, and adminiſtered comfort to him amidſt his misfortunes; paid him the tribute of praiſe due to his valour, and aſcribed his own victory merely to the blind chance of war, or to a ſuperior providence, which controuls all the efforts of human force and prudence. All his father's pretenſions to the crown of France were now buried in oblivion: John, in captivity, received the honours of a king, which were refuſed him when ſeated on the throne. His misfortunes, not his title, were reſpected; and the French priſoners, conquered by this elevation of mind, more than by their late diſcomfiture, burſt into tears of admiration, which were only checked by the reflection, that ſuch genuine and unaltered heroiſm in an enemy muſt certainly in the iſſue prove more dangerous to their native country."

Edward conducted his priſoner to Bourdeaux, concluded a truce with France for two years, and then conducted the captive monarch to England. He landed at Southwark, and was met by a vaſt concourſe of people of all ranks and ſtations. The king was clad in royal apparel, and mounted on a white ſteed, diſtinguiſhed as well for its beauty as for the richneſs of its furniture. The conqueror rode by his ſide in a meaner attire, and was carried by a black palfry. In this ſituation he paſſed through the ſtreets of London, and preſented the king of France to his father, who advanced to meet him, and received him with the ſame courteſy as if he had been a neighbouring potentate that had voluntarily come to pay him a viſit. In 1361 the prince married Joan, daughter of Edmund, earl of Kent, his father's uncle; and he then took up his reſidence in France, where his father had many conquered provinces which he had formed for his ſon, under the title of the principality of Aquitaine. Here he undertook the defence of Peter the Cruel, king of Caſtile, in oppoſition to Henry, count of Traſtamare, whom he entirely defeated. Peter, in juſtification of the bloody character for which he was famed, would have maſſacred in cold blood all the priſoners, but was reſtrained from the ſavage act by the noble minded Edward. Peter, when placed on the throne by the Black Prince, refuſed the ſtipulated reward to the Engliſh troops, and Edward returned with the glory of having ſucceſsfully accompliſhed his enterprize, but with a ruined conſtitution. The government of this prince, notwithſtanding his noble qualities, became unpopular, owing to the taxes which he was obliged to levy to pay the expences of his wars. Appeals were made by the nobles to Charles, their ſuperior lord, the new king of France, who ſummoned Edward, as his vaſſal, to appear before him at Paris. "I will come," ſaid the prince, "but it ſhall be at the head of 60,000 men." The ſtate of his health was become too delicate to admit of any farther exploits: and after a lingering illneſs he died in the forty-ſixth year of his age, leaving behind him a character illuſtrious for every eminent virtue, and from his earlieſt youth, till the hour in which he expired, unſtained by any blemiſh. His valour and military talents formed the ſmalleſt part of his merit. His generoſity, humanity, affability, and moderation, gained him the affections of all men, and he was qualified to throw a luſtre, not only on that rude age in which he lived, and which nowiſe infected him with its vices, but on the moſt ſhining periods of ancient or modern hiſtory. Hume's Hiſt. vol. ii.

Edwards, in *Geography*, a fort in Nova Scotia, in the town of Windſor, in Hants county, large enough, as it is ſaid, to contain 200 men. It is ſituated on the river Avon, navigable to this place for veſſels of 400 tons: thoſe of 60 tons can proceed two miles further.

Edwards, George, in *Biography*, celebrated for his knowledge in natural hiſtory, was born at Weſtham, in Eſſex, about the year 1693. He was deſigned for trade, but the acceſs which he had, while he was purſuing the elementary parts of a commercial education, to the library of a deceaſed phyſician, gave him a turn to literature and ſcientific purſuits, which detached him from the courſe for which he was originally intended. Having ſpent ſome years in foreign travel, he returned to his native country, and applied himſelf to the ſtudy of natural hiſtory. He practiſed the art of drawing and colouring birds from nature, and obtained, by the ſale of his works, a good ſubſiſtence. He was, in the year 1733, appointed librarian to the college of phyſicians, a ſituation which afforded him ample opportunity for purſuing his favourite ſtudies. Between the years 1743 and 1751, he publiſhed his "Hiſtory of Birds," in 4to. with coloured plates and deſcriptions in Engliſh and French. In addition to his hiſtory of birds were given ſome plates of ſerpents, fiſhes, and inſects. The laſt volume, as a teſtimony of piety and gratitude to his maker, who had enabled him to complete his work, he dedicated "To God." As a ſupplement, he publiſhed, in parts, his "Gleanings of Natural Hiſtory," conſiſting of coloured plates of birds, fiſhes, inſects, and plants. His reputation as a naturaliſt gained him the acquaintance of the celebrated Linnæus, who kept up a conſtant correſpondence with him, and completed the general index to his works according to his own ſyſtem. He received, for his hiſtory of birds, ſir Godfrey Copley's medal, voted to him by the Royal Society, of which body he became a member in the year 1757. He was alſo elected a member of ſeveral of the learned ſocieties in Europe. In the year 1769, he reſigned his office at the College of Phyſicians, having ſold his collections of drawings to lord Bute, and retired to a ſmall houſe at Plaiſtow in Eſſex. In the courſe of the following year, he publiſhed his "Eſſays," in 8vo. which were chiefly collected from the prefaces or introductions of his former works, to which were added inſtructions for drawing, painting, and etching. The remainder of his life was ſpent in privacy among his friends, towards the cloſe of which he was grievouſly afflicted with the ſtone and a cancer in his eye. He bore his ſufferings with manly fortitude and patience, and died at the age of eighty, in July 1773. His temper was cheerful, open, and benevolent; his diffidence and humility prevented him from ſhining in mixed company, but he was entertaining and very inſtructive in a ſmall and private circle. Biog. Brit.

Edwards, Jonathan, an American divine of conſiderable celebrity, was born at Windſor, in Connecticut, in the year 1703, and was educated at Yale college, where he took his degree of B. A. before he was quite 17 years of age. He made a rapid progreſs in the natural ſciences, but was particularly attached to moral philoſophy and theology, as connected with the profeſſion for which he was deſigned. Having continued at his college two years after he took his firſt degree, he was examined, and licenſed to preach the goſpel as a candidate. In the year 1722, he went to New York, and preached among the Engliſh Preſbyterians for about eight months with conſiderable ſucceſs; but not thinking the circumſtances of the ſociety ſuch as to juſtify him in making choice of this ſituation for a ſettlement, he returned to his father's houſe, where he purſued his ſtudies with much diligence. In 1723, he was admitted to the degree of M. A. and in the following year was choſen tutor of the college in which he had been educated. In the year 1726 he reſigned his ſituation as tutor, and was ordained paſtor of a congregation at Northampton, which he continued to ſerve with much ſucceſs till the year 1744, when, from ſome diſputes occaſioned, perhaps, by the aſſumption of too much authority on the part of the miniſter, he fell into diſrepute. His uſefulneſs and his comfort were now nearly at an end, but he continued in this connection till the year 1750, when he was formally diſmiſſed by a vote of the congregation, having only twenty perſons in his favour, and more than two hundred againſt him. In 1751, he became Indian miſſionary at the town of Stockbridge, in the province of Maſſachuſetts, where he diſcharged the duties of the office devolved upon him to the entire ſatisfaction of all concerned, and was honourably ſupported by the commiſſioners of the ſociety in London for propagating the goſpel in foreign parts. He was, in the year 1757, induced to decline this buſineſs, on his election to the preſidency of the college of New Jerſey. Scarcely, however, had he entered upon this honourable office, when he was adviſed to be inoculated for the ſmall-pox, on account of the ravages that the natural diſeaſe was then making all around him; to the effects of this diſorder he fell a victim in the month of March 1758, being in the 55th year of his age. Mr. Edwards was author of many works, but of theſe the moſt important, and that by which he is moſt known, is his "Careful Enquiry into the modern prevailing Notion of that Freedom of Will which is ſuppoſed to be eſſential to moral agency." This was publiſhed in the year 1754, and has obtained a high character as a moſt able and acute juſtification of the doctrine of philoſophical neceſſity. Mr. Edwards was allowed, by all capable of appreciating his talents, to be a man of conſiderable and deep learning, extenſive reading, and ſound judgment. He was eager for the acquiſition of knowledge, and diligent in the purſuit of it. His piety towards God was ardent, and his benevolence towards his fellow-creature was extenſive and liberal. He was a Calviniſt in principle, and an able defender of the doctrines which he eſpouſed. Gen. Biog.

Edwards, Thomas, a zealous divine, according to the principles of Preſbyterian church diſcipline, was born towards the cloſe of the 16th century, and was educated at Trinity college, Cambridge, where he took his degree in 1609. He entered into the eſtabliſhed church, though he was a puritan in principle. He wrote againſt toleration, and yet, from his own account of his conduct and character, no one required the latitude granted by toleration more than himſelf. He never properly conformed to the manners and habits of the church of which he was a member, and ſpeaking of a ſermon which he preached on a faſt day in July 1640, at Mercer's chapel, he ſays, he preached "againſt the biſhops and their faction, ſuch a free ſermon, as I believe never a ſectary in England durſt have preached in ſuch a place and at ſuch a time." He chiefly officiated at Hertford as lecturer, and alſo in ſome places in London, and more than once incurred the rebukes of his ſuperiors, for the puritanical ſtyle of preaching which he adopted, and the offences which he committed againſt the rules and orders of the church. When the long parliament declared againſt king Charles I., he became a zealous advocate for the changes in civil and eccleſiaſtical matters which were gradually introduced, and ſupported, by every method in his power, the views of the ruling party againſt the favourers of epiſcopacy and royalty. He was author of many pieces, which are now well nigh forgotten, and which do not merit a mere enumeration. They diſplay much violence and bitterneſs as well in the matter as in their manner, and there can be no doubt, but that if Mr. Edwards had poſſeſſed the power he would not have wanted the will of being a rigid perſecutor of thoſe who thought and acted differently from himſelf. He died in 1647 in Holland, whither he fled to avoid the reſentment of the independents, after Cromwell had overturned the power of parliament. Biog. Brit.

Edwards, John, was ſon of the preceding, and born at Hertford in the year 1637. He received his grammatical learning at Merchant Taylors' ſchool, and purſued the more advanced ſtudies at St. John's college, Cambridge. He diſtinguiſhed himſelf for his diligence and ſuperior talents. In 1661, he took the degree of M. A. and was ſoon after ordained deacon and then prieſt, by Dr. Sanderſon, biſhop of Lincoln. In 1664, he undertook the duty of Trinity church, in Cambridge, and greatly diſtinguiſhed himſelf as an eloquent and popular preacher; but in the following year, when the plague raged at Cambridge, he removed from the college into the town, that he might devote his whole time to the conſolation of his pariſhioners in the time of their calamity. After this, he refuſed a good living in Glouceſterſhire, and choſe to continue in his ſtation at Cambridge. About 1688, he was admitted to the degree of bachelor in divinity, and about the ſame period was choſen one of the lecturers of Bury St. Edmund's, whither he removed, but returned to college in about a year after. He went through many changes, and obtained preferment in Norfolk and Eſſex. In 1699, he was admitted to the degree of doctor in divinity, and after this, he ſpent his life in ſtudious retirement. Though a diligent ſtudent, and the author of many publications, he never poſſeſſed a library, and had indeed few books except bibles, lexicons, dictionaries, and works of a ſimilar nature. He borrowed books from the univerſity libraries; and from bookſellers to whom he paid a ſtipulated ſum for the loan. He died in 1716, having attained to his ſeventy-ninth year. His works are very numerous and very voluminous, moſtly on theological ſubjects; in defence of Chriſtianity, and of the eſtabliſhed church of which he was a zealous member. Dr. Edwards was a man of extenſive learning, of ardent piety, and exemplary moral conduct. Biog. Brit.

Edwards, Thomas, a divine of the church of England, was born at Coventry in the year 1729, where he received the early parts of his education. In 1747, he was entered at Clare Hall, Cambridge, where he graduated in 1750 and 1754, and was at length choſen fellow of his college. He was ordained to prieſts' orders in the year 1755, and about this period he publiſhed "A new Engliſh Tranſlation of the Pſalms from the original Hebrew, reduced to metre by the late Biſhop Hare, with Notes critical and explanatory: illuſtrations of many Paſſages drawn from the Claſſics, &c." His object was to make biſhop Hare's ſyſtem of Hebrew metre better known, and to ſhew the utility of a judicious application of it in elucidating the poetical parts of the Hebrew ſcriptures. He was, in 1758, appointed maſter of the free ſchool at Coventry, and preſented to the rectory of St. John the Baptiſt; ſoon after this, he publiſhed a work, entitled "The doctrine of irreſiſtible grace proved to have no foundation in the writings of the New Teſtament." He then engaged in a controverſy, reſpecting Hebrew metre, with Dr. Lowth, which was carried on till the year 1766. It was in this year that Mr. Edwards was admitted to the degree of doctor in divinity. He continued to write on uſeful and important ſubjects, till almoſt the cloſe of his life. In 1770, Dr. Edwards was preſented by the crown with the valuable vicarage of Nuneaton in Warwickſhire, to which he went in the year 1779, having reſigned his ſchool and rectory at Coventry. His laſt publication was entitled "Selecta quædam Theocriti Idyllia recenſuit, variorum notas adjecit, ſuaſque animadverſiones, partim Latine, partim Anglice, ſcriptas immiſcuit Thomas Edwards, S. T. P. 8vo. 1779." He died at Nuneaton in 1785, in the fifty-ſixth year of his age, having been ſome time incapacitated from performing the duties of his ſtation by a paralytic ſtroke. He was a man of much mildneſs in his manners; benevolent and humane. He was particularly noted for inflexible integrity. As an inſtructor of youth he obtained a high reputation. He was fond of retirement, and his connection with the learned world was maintained more by correſpondence, than by perſonal intimacy with its members. Biog. Brit.

Edwards, Thomas, was born in London in the year 1699, and educated for the bar. A heſitation in his ſpeech prevented him from ever engaging much in profeſſional practice. He was, beſides, too much attached to poetry, and the belles lettres to find amuſement in the ſtudy of the law. Shakeſpeare was his favourite author, and on the appearance of Warburton's edition of that dramatiſt, Mr. Edwards publiſhed "A letter to the Author of a late Epiſtolary Dedication, addreſſed to Mr. Warburton." This came out in 1744, and in 1747 he followed it by "A ſupplement to Mr. Warburton's edition of Shakeſpeare," a work which paſſed through many editions, and became famous under the title of "The Canons of Criticiſm." The idea of this work was derived from a hint given by Warburton, that he had once intended to draw up a body of canons for literary criticiſm. Mr. Edwards pretends to take up the deſign, and has framed a ſet of canons drawn from Warburton's notes upon Shakeſpeare and illuſtrated by the examples they afford. "The canons," ſays a good writer, "in the laſt edition amount to 25 in number; and it is impoſſible to read them and their illuſtrations without extraordinary mirth at the expence of the reverend annotator, who, as a critic, has perhaps contrived to be more ingeniouſly and ſingularly in the wrong than any other of the profeſſion." An "Eſſay towards a Gloſſary," another of Warburton's deſigns, is annexed and drawn up in the ſame ironical ſtyle. The work has much value, as tending to diſcredit the raſh and fanciful mode of correcting and explaining authors, which has been countenanced by critics of reputation. Mr. Edwards was diſtinguiſhed as a poet, and printed about 50 ſonnets in Dodſley's and Pearch's collections. He was a ſkilful critic in the Engliſh language. He paſſed his life in literary leiſure, and was reſpected by many of the moſt reſpectable characters of his time. He died in the year 1757. The edition of his canons of "Criticiſm," publiſhed in 1765, contained his ſonnets; and an "Account of the Trial of the letter *γ*, alias *y*," in which are diſcuſſed the principles of Engliſh orthography. Theſe he founds on etymology. A work on predeſtination was publiſhed after his death.

Edward's, *Prince*, *Iſland*, in *Geography*, a Britiſh North American iſland, near the coaſt of Nova Scotia, in the gulf of St. Lawrence, remarkable for a colony of highland emigrants from Scotland, ſettled there by the earl of Selkirk, in 1803.

The ſettlers, to the number of 800 perſons of all ages, reached the iſland in Auguſt, 1803. The ſpot ſelected upon the coaſt was almoſt deſert, being ſeparated by an arm of the ſea, and an interval of ſeveral miles from any older ſettlement. Before the middle of September, the people were diſperſed upon their ſeparate lots, which were laid out in ſuch a manner, that four or five families built their hamlets in a little knot together. This ſocial plan of ſettlement reſembled their ſtyle of living in their native country. They were allowed to purchaſe in fee-ſimple, and to a certain extent on credit. From 50 to 100 acres were allowed to each family, at a moderate price, which they were not required to pay in full before the third or fourth year of their poſſeſſion. Every aſſiſtance in proviſions was likewiſe a loan under ſtrict obligations of repayment with intereſt. They conſtructed their firſt houſes upon the model of thoſe of the American woodmen. Lord Selkirk returned to the ſettlement twelve months after. He found the ſettlers engaged in ſecuring their harveſt; their crop of potatoes would alone have been ſufficient for their entire ſupport. Round the different hamlets, the extent of land in cultivation was, at an average, in the proportion of two acres to each able working hand: and ſeveral boats had been built, by means of which a conſiderable ſupply of fiſh had been obtained. The further progreſs of the coloniſts was left to their own guidance. Obſervations on the preſent State of the Highlands of Scotland, with a View of the Cauſes and probable Conſequences of Emigration, by the Earl of Selkirk, 1807.

Edward's, *Prince*, *Iſlands*, two iſlands in the ſouthern Indian ocean, S.E. of the Cape of Good Hope. E. long. 37° 46′. N. lat. 46° 53′. The largeſt and moſt ſoutherly is about 15 leagues in circuit, the other nine; they are about five leagues diſtant from each other, and there is a paſſage between them at mid-channel.

EDWARDSBURGH, a townſhip of Upper Canada, in the county of Grenville, being the ſeventh townſhip in aſcending the river St. Lawrence.

EDWARDSIA, in *Botany*, ſo named after Mr. Sydenham Edwards, a highly deſerving botanical draughtſman, whoſe merits are conſpicuous in the numerous plates marked with his name in Curtis's Magazine, and whoſe ſkill and ſcientific knowledge extend no leſs to zoological ſubjects. This genus is founded by Mr. Saliſbury in the Tranſactions of the Linnæan Society, v. 9. 296, on the *Sophora microphylla*, *tetraptera*, and a third ſpecies, likewiſe from the South Seas, all which we heſitate to ſeparate from the original and genuine genus *Sophora* of Linnæus and Juſſieu, though aware of the heterogeneous aſſemblage ſubſequently referred to it, which we have long ſince taken ſome pains to reform. S.

EDWAY, in *Geography*, a river of South Wales, which runs into the Wye, 4 miles S.E. of Builth, in the county of Radnor.

EDWITH, a river of Wales, in the county of Monmouth, which joins the Uſk, at its mouth.

EDWY, in *Biography*, king of England, ſon of Edmund I., ſucceeded, at the age of 16, his uncle Edred, in the year 955. He was, at this period, poſſeſſed of an amiable figure, and endowed with the moſt promiſing virtues. He would have been a favourite of the people, had he not unhappily, at the commencement of his reign, been engaged in a controverſy with the monks, who purſued him with unrelenting vengeance during his ſhort reign. His marriage with Elgiva, a beautiful princeſs of the royal blood, and within the prohibited degrees of kindred by the canon law, was a ſource of misfortune that only terminated with his life. The ſavage Dunſtan was his principal enemy, who, at the head of the monks, declared war againſt the king. On the day of his coronation, when the nobles were aſſembled at a feaſt, Edwy withdrew from the company to his queen's apartment, where he indulged his fondneſs for his wife, which was only checked by the preſence of her mother. Dunſtan, ſuſpecting the cauſe of the king's abſence, burſt into the chamber, rudely upbraiding the young couple, and forcibly dragged the ſovereign to the banquet. Edwy could not forget the affront; he challenged Dunſtan with a mal-adminiſtration of public affairs: the haughty monk refuſed to anſwer the accuſation, and was baniſhed. (See Dunstan.) His party excited diſaffection againſt the king: they ſeized the queen, and, by the order of archbiſhop Odo, branded her in the face with a red hot iron, hoping thereby to deſtroy her beauty: they then carried her away by force into Ireland, there to remain in perpetual exile, and Edwy conſented to a divorce, which was pronounced by the infamous Odo. Elgiva having completely recovered of her wounds, and time having almoſt obliterated the ſcars, was haſtening to the arms of her huſband, when ſhe fell into the hands of her blood-thirſty enemies, and was by them barbarouſly murdered. The torments which ſhe endured could only have been inflicted by demons in the ſhape of prieſts. Theſe deeds were, however, ſanctioned by a barbarous and ſuperſtitious people, who roſe againſt Edwy, drove him from the throne, and placed on it his brother Elgar in his ſtead. The fallen monarch was obliged to take refuge in the ſouthern part of the kingdom, when he was excommunicated, and purſued with unrelenting hatred, till death terminated his calamities, in the year 959. Hume, vol. i.

EDYLIUM, in *Ancient Geography*, a mountain of Greece, in Bœotia, called *Hadylius* by Pliny.

EDYMA, a town of Aſia, in Caria. Steph. Byz.

EDYSTONE, in *Geography*. See Eddystone.

EECLOO, a ſmall town of France, in the department of l'Eſcaut, (the Scheldt,) chief place of a canton, in the diſtrict of Gand, with a population of 5827 individuals. The canton contains five communes, with 15,153 inhabitants, on a territorial extent of 112 kiliometres and a half.

EED, a town of Norway, 24 miles N.N.W. of Drontheim.

EEDT, a town of Germany, in the archduchy of Auſtria; 14 miles E.S.E. of Ens.

EEL, a lake of North America. N. lat. 49°. W. long. 98° 50'.

Eel-*Town*. See Kenapacomaqua.

Eel-*Cove* and *River*, lie on the ſouth ſide of Chaleur-bay, in Lower Canada, about three leagues W. from Maligaſh. The cove abounds with ſalmon, which are taken annually in great quantities by the inhabitants who are ſettled near it.

Eel *River Indians*, are thoſe who occupy the lands on Eel river, a head branch of Wabaſh river. (See Wabash.) Theſe Indians, at the treaty of Grenville, in 1795, ceded ſome land at the mouth of the river to the United States; the government paying them a ſum of money, and engaging to pay them in goods to the value of 500 dollars annually for ever.

Eel, *Anguilla*, in *Ichthyology*, a ſpecies of the *Murena*; which ſee.

Eel-*fiſhing*. See Fishing.

Eel, *Electrical*. See Gymnotus.

Eel, *Indian*, a ſpecies of *Trichiurus*; which ſee.

Eels, *Microſcopic, in ſour paſte.* The long-bodied animalcules, diſcovered by the microſcope in vinegar, ſour paſte, and many other ſubjects, have, from their figure, been generally diſtinguiſhed from the reſt of the microſcopic animalcules, by the name of eels. Theſe, and the other kinds, have been, by the moſt judicious naturaliſts, ſuppoſed to be produced of the eggs of other animalcules of the fly kind, floating in the air. But thoſe in paſte are diſcovered to be viviparous animals, producing living creatures of their own ſhape. In order to be always furniſhed with theſe minute eels ready for the microſcope, take ſuch paſte as bookbinders commonly uſe, of a moderate conſiſtence, and expoſe it to the air in an open veſſel, and prevent its becoming hard, or mouldy, by occaſionally ſtirring it. After ſome days, it will turn ſour; and, if examined attentively, you may diſcern multitudes of exceedingly ſmall, long, ſlender, wriggling animalcules, which grow larger daily, till you will be able to ſee them with the naked eye. In order to promote their coming forward, pour now and then a drop of vinegar on the paſte, and then they may be preſerved all the year; the continual motion of theſe animalcules will contribute to prevent any mouldineſs in the paſte, which is beſt kept in ſome glaſs veſſel. Apply them to the microſcope on a ſingle talc, or iſinglaſs, after having firſt put upon it a ſmall ſpot of water for them to ſwim about in, the internal motion of their bowels may be plainly perceived; and when the water is almoſt dried away, and they are nearly expiring, their mouths may be ſeen opening to a conſiderable width. On cutting one of theſe paſte-eels in two acroſs the middle, a long and ſlender tube is ſeen to ſhoot out from each of the divided ends, and a number of ſeeming ova iſſue from this; but theſe, examined ſtrictly, appear to be living eels of different growths, and all included in their proper membranes; ſome move themſelves but ſlowly, while others coil and uncoil themſelves pretty briſkly; and the moſt mature are ſeen to make ſtrong efforts towards the diſengaging themſelves of their enveloping membranes, and at length ſucceed, and ſwim at liberty like their parent animal. The tube thruſt out each way, on dividing the body, is properly the uterus of the animal, which, in the larger eels, is ſeen to be full of dark ſpots that are the embryo eels; and theſe dark ſpots are alſo to be obſerved in the young ones, as ſoon as produced. Phil. Tranſ. N° 478. § 13, and vol. xliv. p. 67, and Baker's Microſ. 1743. p. 81, &c. See Animalcule.

Eel-*fares* is uſed for the fry, or brood of eels. Stat. 25 Hen. VIII.

Eel-*pout*, in *Ichthyology*, the Engliſh name of the muſtela fluviatilis, a fiſh of the *Gadus* kind. See Gadus.

The name is derived from the German *ael put*, which is, in that language, the name of the ſame fiſh, and is compounded of the words *ael*, *an eel*, and *puit*, or *pud*, *a frog*; ſo that the Engliſh word ſhould properly be the *eel-frog*. It is commonly, when full grown, about fourteen inches long, and is ſlender in proportion to its length, and ſomething of the eel-ſhape, but too ſhort for its thickneſs, to be truly ſo. It is very ſoft and ſlippery to the touch, like the eel, and is covered either merely with a ſlimy matter, or elſe with extremely minute ſcales. It is of the colour of a tench; its head is large and flat, its noſtrils ſmall and round, and its jaws beſet with very ſmall teeth, which make them feel rough like a file; and there is, beſide theſe, a ſemi-circular ſpot in the palate, rough in the ſame manner. There are two fins on the back, and one on the belly, reaching from the anus to the tail; and it has a little beard from the extremity of the lower jaw, and between the noſtrils and end of the ſnout, two others, and ſeven gills. Willughby's Hiſt. Piſc. p. 125.

p. 125. There is another variety of eel-pout, which Linnæus has made a ſpecies of *Blennius*; theſe are viviparous, and bring forth two or three hundred young at a time, a little after the depth of winter. They are common in the Eſk, at Whitby, in Yorkſhire, and are a coarſe fiſh.

EEL-*ſpear*, a forked inſtrument with three or four jagged teeth, uſed for catching eels; that with four teeth is the beſt. This is ſtruck into the mud at the bottom of the river; where, if it ſtrikes againſt eels, it is ſure to bring them up.

EEL-*backed*, a term uſed by the dealers in horſes, for ſuch as have black liſts along their back.

EELWYCK, in *Geography*, a town of Norway; 20 miles W. of Romſdal.

EEMBARG, or EMBARG, a town of Utrecht, ſeated on the Ems; 5 miles N.N.W. of Amersfort.

EEMS, a river of Holland, which runs into the Zuyder ſea, below Eembarg, in the ſtate of Utrecht.

EERSEL, a town of Brabant; 6 miles S.W. of Eyndhoven.

EERSTE RIVER, a river of Southern Africa, which forms one of the diviſions of the Droody, or diſtrict of Stellenboſch, lying between it and Falſe bay.

EFESE, a town of Aſiatic Turkey, in the province of Natolia; 32 miles S.S.E. of Smyrna.

EFFAIRE, or EFFRAYE, in *Heraldry*, a term applied to a beaſt, when rearing on its hind legs, as if it were affrighted.

EFFECT, the reſult, or conſequence, of the application of a cauſe, or agent, on ſome ſubject.

It is one of the great axioms of philoſophy, that full, or adequate effects, are always proportionable to the powers of their cauſes.

EFFECT, in the *Manege*, is applied to the motions of the hand which direct the horſe.

They diſtinguiſh four effects of the hand, *viz.* in uſing the bridle to put a horſe forwards, draw him backwards, and ſhifting it out of the right hand into the left, or *vice verſâ*.

EFFECT, in *Muſic*. This word became technical in England about the middle of the laſt century; and we believe that it was Abel who brought it hither.

The great bands of ſovereign princes in Germany, before the revolution, ſuch as thoſe of Manheim, Dreſden, Wirtenberg, Eſterhazi, &c. inſeparably attached to the ſame orcheſtra, under the immediate direction of the compoſer, had leiſure to try effects; and it was at the beginning of the cultivation of ſymphonies on the new plan of Stamitz, Holzbauer, Canabich, Ditters, Vanmaldere, Toeſchi, and Filtz, different from the light opera overture, which had ſuperſeded thoſe of Lulli and Handel, that experiments of this kind were tried. The effects of *creſcendo* and *diminuendo* were ſucceſsfully produced in theatrical orcheſtras, even in ſongs; and we remember the firſt air in which we noticed this effect, was compoſed by Jno. Chriſt. Bach, and ſung by Ciprandi: *Non ſo donde vieni*, &c.

To produce an effect, is to cauſe an agreeable and powerful impreſſion in the ear and the mind of the hearer, by unuſual muſical combinations: ſo that the word *effect*, in muſic, means ſomething uncommonly excellent; and effect is not only applied to a ſingle paſſage, but to ſuch whole movements or works, as are full of effects which produce ſenſations that appear ſuperior to the means employed to excite them.

Long practice and obſervation may teach a muſical ſtudent how to diſcover paſſages of effect upon paper; but genius alone inſpires them. It is the defect of bad compoſers, and of all beginners, to heap parts on parts, and crowd inſtruments on inſtruments to produce that effect which flies their graſp; and as an ancient ſaid, "to open a wide mouth to blow a ſmall flute." You would expect, in ſeeing their crowded and laboured ſcores, that you ſhould be ſurprized by prodigous effects, but if you are ſurprized at all, it will be at hearing ſo meagre, mean, and confuſed a compoſition, without effect, and more likely to ſtun than delight good ears. On the contrary, the eye ſeeks in the ſcores of great maſters, thoſe ſublime and raviſhing effects which their muſic is ſure to produce when well executed. Frivolous fillings up are either unknown, or deſpiſed by men of fine genius, who never call our attention to a crowd of ſmall and puerile objects, but move us with great effects, the reſult of that force and ſimplicity united, which always conſtitute their character.

EFFECT, in *Painting*, is, properly ſpeaking, the name of that impreſſion which the firſt momentary glance of a picture produces on the eye and the mind of an obſerver: but artiſts have adopted it as indicative of the *cauſe* of that impreſſion, and hence, with them, it becomes a technical term, ſignifying the arrangement of the component parts of a picture.

In its moſt extenſive ſenſe, thus employed, it deſignates the *mode of relievo* in which the objects of a picture are wrought. Its greateſt excellence conſiſts in making the ſubject of a picture at once familiar to the underſtanding in an intereſting and pleaſing manner; and when produced by the hand of taſte and ſkill, it leads irreſiſtibly the imagination of the obſerver, and enforces a more cloſe inſpection of the work.

Very many are the maſters whoſe pictures poſſeſs excellent qualities, ſuch as drawing, compoſition, and expreſſion; yet they remain unattractive for want of union and harmony in their various parts; they are, therefore, paſſed by unnoticed, till accident renders their beauties obſervable: while works of leſs intrinſic merit, but poſſeſſing a better arrangement, or in other words, a better general effect, are conſtantly impoſing themſelves on the eye; and it is only when theſe qualities unite, that a perfect work can be produced.

Effect depends entirely upon the management of chiaroſcuro and colour: that is, the mode in which they are arranged, and the degree of oppoſition in which they are applied. It has little or no relation to the execution or finiſhing of the work; the ſlighteſt ſketches, wrought in the enthuſiaſm of feeling, generally poſſeſs this quality in a more perfect degree than highly finiſhed works.

The effects of pictures are denominated according to their different kinds; vigorous, powerful, weak, rich, or mean, bright, gloomy, pleaſing, &c. &c. but no poſitive rules for producing effect can embrace the infinite varieties under which it pleaſes. Rubens in many of his pictures gratifies us with the brilliancy and breadth of effect of broad daylight ſpread almoſt equally over every part of them; the local colours alone producing the chiaro ſcuro; whilſt, on the contrary, we behold with pleaſure many works of Rembrandt, whoſe ſurfaces bear the repreſentation of light upon only $\frac{1}{16}$th or even $\frac{1}{30}$th part of them, and have very little local colour of courſe, and between theſe two extremes all the intermediate degrees may be made attractive.

A *vigorous*, or *powerful* effect, is produced by uſing bright lights and colours with ſtrong dark oppoſitions to them; in whatever degree as to quantity they may be employed. In general a ſmall portion of light, with broad and ſtrong dark ſhadows, is the moſt certain mode of obtaining it. Of this claſs are moſt of the works of Rembrandt: thoſe of Rubens ſometimes; particularly in his candle-light pieces.

Michael Angelo Caravaggio generally employed it, and ſo alſo did Spagnoletto, and many painters who have followed them. Correggio, however, appears to have been the father of this ſtyle of effect moſt obſervable in his pictures of the Birth of Chriſt, called "La Notte," which was in the gallery at Dreſden, and in his ſmall picture of the Magdalen, alſo in the ſame place; in both theſe pictures it is managed with the utmoſt ſweetneſs of tone, much more than any of the above-mentioned maſters have ever arrived at; though, perhaps, not with ſo much brilliancy as Rembrandt has ſometimes obtained.

The works of the late profeſſor of painting in our Royal Academy, J. Opie, eſq. are alſo excellent examples of power and vigour of effect, gained by ſtrength of oppoſition in the chiaro-oſcuro and colour. In the more confined ſenſe of the word (of which we ſhall preſently ſpeak) *viz.* the *degree* of relievo of the individual objects of the picture, no artiſt ever ſurpaſſed him. Many of his figures appear abſolutely round, and fully to project from the canvas.

A more pleaſing, though leſs powerful kind of effect, is produced, by making uſe of leſs violence of oppoſition; leſs ſudden tranſition from light to dark, and from colour to colour; by blending the lights and ſhades with a greater breadth of half teint; and inſtead of giving the ſhadows a great depth of tone, allowing them to partake of reflections from the atmoſphere, as well as from ſurrounding objects.

It is alſo neceſſary to take care that no colours, which violently oppoſe each other (ſuch as bright reds and blues,) ſhould come in cloſe contact; but that they ſhould be united by the help of ſome intermediate teint, or their tones ſhould be blended with each other, and each participate of the general hue of the picture; of this claſs are the greater part of the works of Correggio; thoſe of Guido Rheni in his beſt ſtyle; Murillio, Vandyke, ſir Joſhua Reynolds, and almoſt all the painters of the Dutch and Flemiſh ſchools; who, after Correggio, are the moſt perfect maſters of this kind of effect.

Rubens united very much of it with the ſtyle of Venetian compoſition; but the range of his genius is ſo large, and his works of courſe ſo various, that it is difficult to aſſign him as an examplar of effect in any particular branch: he diſplays in his works all its different ſpecies. His picture of the "Deſcent from the Croſs," now in the gallery of the Louvre, at Paris, is an inſtance of the grave and ſerious, wrought with great ſtrength and brilliancy; and it is obtained by uſing one light only, and that about one-third of the picture. His ſeries of pictures, known as thoſe of the gallery of the Luxemburgh palace, are ſpecimens of the gay and luxurious effect of broad lights and bright colours; and his portraits are a medium between theſe different degrees.

Among the Venetians, Titian may almoſt alone be ſaid to have poſſeſſed (and that not till his later time) the magic power of producing (without the appearance of art,) the true effect of nature in its happieſt combinations, by ſo admirable a management of the chiaro-oſcuro and colours, as immediately to lead the eye to the principal object, and yet maintain the whole ſurface of his picture rich and brilliant; as in his "Diana and Acteon," at the marquis of Stafford's. Sir J. Reynolds has admirably followed him in this particular, but too often with an admixture of the ſtyle of effect uſed by Rembrandt, wherein the artifice, being more apparent, weakens the claim to ingenuity in the artiſt.

An effect, termed claſſical, is obtained by the adoption of lines and forms ſimilar to thoſe found in the works of the ancient painters and ſculptors; by working upon the ſame ſeries of thought which appears to have engaged their attention, and alſo by ſelecting for repreſentation, the grand features of nature, as N. Pouſſin has done in his landſcapes, and leaving out the more minute parts. The adoption of the reverſe; ſelecting the ordinary forms and ſcenes of nature, and repreſenting them in a laboured and coarſe manner, produces an effect juſtly denominated *vulgar*.

It has been ſaid before, that the effect of a picture ſhould convey an impreſſion of the nature of its ſubject; that correſpondence is the beſt teſt of the merit of the painter, as it proves a comprehenſion of mind not confined to detail, but exerting itſelf on the whole together. A picture, the ſubject of which is *grand*, ſhould have an effect at once impoſing and ſublime, by its ſimplicity and power. "The Death of St. Peter, Martyr," by Titian, now at Paris, is a beautiful inſtance of this happy adaptation of effect to ſubject. The firſt impreſſion made on ſeeing it is awful, and creates in the mind of the beholder ſomewhat of horror. The parts are large, the tone of colour is deep and ſombrous, ſomething like that of twilight, and produces a ſeriouſneſs of mind inſtantly on obſervation, and notwithſtanding every part is found; by continued examination, to be wrought with great finiſh, yet the whole only ſtrikes at firſt ſight.

The portrait of Leo X., by Raphael, with the cardinals de Medici and Roſſi attending him, is another inſtance of this: the character of the perſonage is grand; the effect of the picture is ſerious; and to produce this, the actions of the figures are ſimple, and the tone of colouring is low.

If a pleaſing ſubject be choſen for repreſentation the effect ſhould be gay. Great variety of tints, a bright tone of colour, and ſparkling lights and darks, amongſt a broad general maſs of light, are the requiſites for producing this. The beſt examples of it are the works of Rubens and Watteau; and Paul Veroneſe among the Venetians adopted it. The French ſchool have generally wrought upon this principle, till, in fact, they have proved that it is as dangerous to puſh a ſyſtem too far, as to proceed entirely without one.

Sir Joſhua Reynolds, in one of his diſcourſes, has ſaid, (and every painter purſuing anxiouſly the higher qualities of his art acknowledges the truth of his remark,) that the production of a good *general effect*, that is, a complete combination of all the parts of a picture in ſuch a manner as pleaſingly to attract the eye of the obſerver, and at once to convey the full intereſt and nature of the ſubject; is, when the work is compoſed of many parts, the moſt difficult branch of the art of painting. It becomes ſo, from the neceſſity of maintaining vigour and brilliancy in every part; yet, under the obligation of ſubduing ſome, in order to give more relief or more intereſt to the main point of the work, and by that means attracting and fixing the attention of thoſe who regard it.

In a more confined ſenſe, *effect in painting* is uſed to ſignify the *degree of relievo* of the objects of a picture, and the abſolute truth of repreſentation of nature in its individual parts. A painting is ſaid to be wrought to great effect when every object appears to project ſtrongly from the canvas; being rounded up with great care, and cloſe imitations of the thing itſelf, whatever it may be; and thus effecting a degree of deception in the relievo. This kind of effect, however eſteemed by ſome, is a great enemy to that more extended ſenſe of it, in which it has been already deſcribed; as it is extremely difficult, if not impoſſible, to make every object ſo relievo, and yet maintain but one principal.

This inferior uſe of the word extends only to poſitive imitation, within the compaſs of an ordinary mind by diligent ſtudy to obtain. The other is in great meaſure ideal; and the painter is obliged, in order to produce it, to aſſiſt nature by art. It requires great ſcience in the nature and effect of colours, of forms, and the chiaro-oſcuro; ſo to arrange them that as little recourſe as poſſible may be had to artificial or ideal ſhadows; and, when neceſſary to introduce them, to give them their proper places, ſo as to make the principal maſs of a pleaſing form, and more agreeably to exemplify the ſubject of the work, and cauſe the obſerver to dwell with more conſtancy on thoſe parts that are immediately neceſſary for that purpoſe: thus, acting on that difficult, though requiſite principle of art, that of ſacrificing a part for the good of the whole.

Many painters are fully adequate to this latter and more confined ſenſe in which effect is underſtood, who are totally unequal to the production of works poſſeſſing that quality in its more general application. For inſtance, thoſe who paint dead game hanging againſt a deal board, may, and do, repreſent almoſt to deception thoſe objects of their ſtudy; but ſet them to produce a picture containing many groups of theſe ſame objects, and ſtill repreſenting the individual parts truly, with their uſual force and ſpirit; yet, for want of taſte and knowledge in the due ſubordination of parts requiſite to produce a perfect whole, they muſt of courſe preſent only a heap of confuſion, on which the eye finds no reſting place, but wanders from part to part, each having as much power to detain it as its neighbour; till at laſt the obſerver retires with fatigue and diſguſt, inſtead of dwelling on the work with pleaſure, as it does when a more ſkilful attention to general effects, inſtead of that of individual objects, takes place, and gives it repoſe by an union of harmony and propriety.

This abſolutely neceſſary quality in a perfect picture, taken in the ſenſe in which we firſt conſidered it, there is little or no reaſon to conclude, was ever in the contemplation of the ancient painters. The deſcriptions remaining of their works convey no idea of it, unleſs what Pliny ſays of the union and harmony of thoſe of Apelles may lead us to imagine they participated of it. But it is probable that he alludes only to the colouring, which, though a neceſſary part of a good effect, yet to be complete, it muſt have a ſufficient portion of judicious management of the chiaro-oſcuro united with it. In general, thoſe deſcriptions alluded to lead us to conclude, that their ſtudy was rather to give each figure its appropriate action and character in its full force, and that they generally produced ſomething more like the imitation of a bas-relief in ſculpture, than that of a picture poſſeſſing a good general effect, as at preſent underſtood.

On the revival of the art of painting, in the 13th century, it was quite as little, moſt probably ſtill leſs underſtood; till Fra. Bartolomeo and Lionardo da Vinci laid the foundation of the future attention ſo juſtly beſtowed on this valuable part of the art, as they were alſo, in fact, thoſe to whom we owe the firſt advancement of all that is valuable in it. Michael Angelo and Raffaelle caught ſomewhat of the feeling of effect from them, but not happily, and it never flouriſhed in the Roman or Florentine ſchools. The Carracci obtained more of it; and the Venetians improve upon it, particularly Giorgione and Titian, who raiſed highly the taſte for its beauties, by the truth and propriety of their works. The latter in a more ſuper-eminent degree, as the ſhort life of the former prevented him from carrying the great abilities he poſſeſſed ſo far as they appear to have been fully equal to, had he been longer ſpared to pleaſe and inform mankind.

The large work of Titian, the "Death of St. Peter, Martyr," has already been mentioned as an inſtance of grandeur and ſublimity of effect, which, in a greater or leſs degree, is the general characteriſtic of his pictures; but he ſometimes choſe the gay and luxuriant claſs of ſubjects, and in managing them produces, by his brilliancy of colour, by his clearneſs and brightneſs of chiaro-oſcuro, and the excelling power of his pencil in expreſſing his thoughts, great perfection in this branch alſo: a beautiful inſtance of which is the large picture of "Bacchus and Ariadne," now in poſſeſſion of the earl of Kinnaird.

It, however, was Correggio who carried the artifice of effect to its ultimate point. He had not the ſtrength of oppoſition of Titian, but his effects are more ſweet, more chaſte, more inviting, than thoſe of the latter. One general hue more abſolutely prevails, and the eye is more determinately led to the ſubject, not having that confuſion to contend with, which it neceſſarily finds where there is a greater variety of tones to diſturb its enjoyment. The artifice of Correggio is, however, more apparent than Titian's in his beſt works.

The Carracci, and their followers, by endeavouring to unite the valuable parts of both with the ſtyle of deſign of the Roman ſchool, fell gradually from good, to indifferent and bad; and it was with the Flemings and Dutch that effect was retrieved from the diſgrace the Italians were unable to prevent its falling into. Rubens, after ſeveral others who had great ſkill, burſt forth with aſtoniſhing ſplendour in his effects, and Rembrandt ſeconded him with a vigour till then unknown even by Correggio, but not, as has already been ſaid, with his grace and ſweetneſs. Many of Rembrandt's works are of extreme difficulty and beauty in their effects, and have a brilliancy of light almoſt rivalling that of nature. Many of his followers diſtinguiſhed themſelves by treading in his ſteps, and ſucceeded happily in their arrangements; and moſt of the painters of that country, notwithſtanding the vulgarity of the ſubjects they choſe, faſcinate, by the ſkilfulneſs of their general effects, no leſs than by their laborious imitation of the ſubject-matter of their pictures.

In England the art of painting was reſcued, and in this part more particularly by ſir Joſhua Reynolds, from the low ſtate in which it was grovelling: the ſkill and taſte of this great man enabled him to produce effects inferior to none in beauty, grace, and elegance. His pictures ſeldom or never fail to attract and gratify, at a caſual view, however ſlight and unfiniſhed they may appear on a cloſer inſpection; and in ſome of his moſt highly ſtudied works he is equal to the beſt, having made the happieſt imitations of the beauties of others, and ſuperadded a grace peculiarly his own.

EFFECTS, in *Commerce*, &c. the goods poſſeſſed by any perſon, whether moveable or immoveable; particularly thoſe which merchants and dealers acquire by trade. See Chattels.

The effects of merchants are uſually diſtinguiſhed into three claſſes, good, bad, and doubtful. By an ordonnance of the French court in 1673, every merchant is obliged to take an inventory or review every year of all his effects of every kind.

Effects, *Vacant*. See Vacant.

EFFECTIONS, in *Geometry*, the geometrical conſtructions of propoſitions.

The term is alſo uſed in reference to problems and practices; which, when they are deducible from, or founded upon, ſome general propoſitions, are called the *geometrical effections* thereof.

EFFECTIVE, in a *Military Senſe*, applies to ſuch individuals in a company, regiment, or body of troops, as may be capable of acting efficiently in their ſeveral ſtations: thus, we ſay, four thouſand ſix hundred and forty-five *effectives;* meaning ſuch as are fit for ſervice, and totally excluding all who from wounds, ſickneſs, or other cauſes, are not qualified to appear in the ranks. In the returns of battalions, a diſtinction is made between ſuch as are included in the numeral ſtrength of the corps, and ſuch as are enrolled beyond the ordinary number of rank and file. Thus, when an adjutant or a quarter-maſter is attached to any particular company, wherein he occupies the place of lieutenant, or enſign, he is ſaid to be *effective ſtaff;* that is to ſay, he is on the *numeral-effective* ſtrength of that company, and not enrolled abſtractedly from any company in the regiment. Conſequently, he ſtands in the way of promotion, and cauſes that in which he is enrolled to have one efficient officer leſs than any other company. On the other hand, when ſuch a ſtaff officer appears only on the liſt of ſtaff in a regiment, without being enrolled in any company, he is ſaid to be *non-effective*, becauſe he forms no part of the complement of any company, all being completed with efficient officers, to the total exemption of ſuch ſtaff-officers. When there are officers, or men, beyond the regulated number, ſuch are called *ſupernumeraries*. Whether an officer be *effective*, *non-effective*, or *ſupernumerary*, his promotion proceeds alike; ſuch matters having no relation whatever to his army, or to his regimental rank. Hence, *ſupernumerary* officers are a great detriment to the promotion of the *effectives;* and this was at one time ſo ſeverely felt, that in order to do away the uneaſineſs felt by the latter, the ſeveral regiments had an additional number of field officers appointed, partly tellers from the *ſupernumerary* liſt, and filled up from the *effective* officers. Theſe were called *en ſecond*, a term taken from the French ſervice, in which thoſe officers who diſtinguiſhed themſelves were promoted over the heads of ſeniors of their reſpective ranks in the ſame regiments, but had no additional pay. In ſome inſtances, thoſe who had been thus ſuperſeded regained their priority of rank, on being promoted to the ſame claſs with their ſuperceſſors. Of late this has been diſcontinued, owing to its being conſidered a grievance, and ſuch meritorious individuals as pre-eminently diſtinguiſh themſelves, are removed to the legion of honour; thus rewarding the brave, and opening a channel for the promotion of the *effective* officers of the corps. When a battalion is weak in officers, it is common to appoint the adjutant and the quarter-maſter, if they are old officers, to the charge of companies; but this by no means alters their deſignation of *non-effectives;* in fact, temporary derangements in the economy, or in the ſtrength of a regiment, cauſe no change in the eſtabliſhments of the ſtaff.

EFFELDER, anciently called *Affaltern*, in *Geography*, a ſmall town of Germany, in the duchy of Saxe Cobourg, with an old caſtle belonging to the duke of Saxe Gotha. It reckons about 300 inhabitants, and has a conſiderable manufacture of tiles.

EFFEMINATE, EFFEMINATI, according to the Vulgate, are mentioned in ſeveral places of ſcripture. The word is there uſed to ſignify ſuch as were conſecrated to ſome profane god, and proſtituted themſelves in honour of him.

The Hebrew word, *kadeſh*, tranſlated *effeminatus*, properly ſignifies *conſecrated*, and hence was attributed to thoſe of either ſex, who publicly proſtituted themſelves in honour of Baal and Aſtarte.

Moſes expreſsly forbids theſe irregularities among the Iſraelites; but the hiſtory of the Jews ſhews, that they were notwithſtanding frequently practiſed. Levit. xxiii. 18.

EFFENDI, in the *Turkiſh Language*, ſignifies *maſter;* and accordingly it is a title very extenſively applied; as to the mufti and emirs; to the prieſts of moſques, to men of learning, and of the law. The grand chancellor of the empire is called *rei-effendi*. See KODJA.

EFFERDING, or EFERTING, in *Geography*, a ſmall town of Auſtria, not far from the Danube, in that part of Upper Auſtria which is called the Hauſruck quarter, in the diſtrict which goes by the name of Donauthal, or valley of the Danube; nine miles W. of Lintz. It has an ancient caſtle.

EFFIAT, a ſmall town of France, in the department of the Cantal; ſix miles S E. of Montpenſier.

EFFERVESCENCE, is popularly uſed for a light ebullition, or a briſk inteſtine motion produced in a liquor by the firſt action of heat, without any notable ſeparation of its parts. See BOILING.

Effervеſcence is a ſudden and rapid diſengagement of gas, taking place within a liquid and ſeparating from it with a hiſſing noiſe. The gas of efferveſcence is produced by ſimple or compound elective affinity, and is always a ſign of chemical action. In the former caſe, it is, for the moſt part, carbonic acid, and in the latter it is either nitrous gas or hydrogen. It is manifeſt that the gas muſt have little or no affinity with the fluid in which it is immerſed, in order to produce efferveſcence: hence it is, that though carbonic and muriatic acids are each of them, when dry, in the form of gas, and are both extricated from their alkaline combinations by ſulphuric acid, yet a ſolution of carbonat of potaſh in water ſhall produce with ſulphuric acid a vehement efferveſcence, while muriat of potaſh, in the ſame circumſtances, ſhall produce none at all, the carbonic acid having little or no affinity for water acidulated by ſulphuric acid, while the muriatic acid will combine with the ſame very readily.

EFFICACIOUS, EFFECTUAL, in *Theology*. Within theſe two centuries there have been great diſputes on the ſubject of efficacious grace. Grace is uſually divided into ſufficient and efficacious; though the Janſeniſts hold that there is no grace ſufficient but what is efficacious, *i. e.* but what effectually determines the will to act.

Efficacious grace is that which enlightens the mind, and touches the heart, in ſuch a manner, as always to produce its effect, however it be oppoſed or reſiſted by the will. See GRACE.

Some divines maintain that efficacious grace is efficacious of itſelf. Efficacious grace of itſelf, if there be any ſuch thing, is that which produces its effect merely of itſelf, and not in virtue of any conſent of the will. Calvin is the firſt that uſed the term, *gratia efficax per ſe*, "grace efficacious of itſelf."

A late divine holds the efficacy of grace in itſelf to conſiſt in this: that efficacious grace is always joined with a moral neceſſity of doing the thing it inclines to; and ſufficient grace, joined with a moral impotence of doing it. The Arminian and Popiſh way of conceiving the neceſſity of efficacious grace, is, that this grace is never wanting, at leaſt to the righteous, except through their own default; that they always ſtand in need of other inner graces truly and properly ſufficient, in order to draw down this efficacious grace; and that theſe do infallibly draw it down, when they are not rejected, though they often remain without effect, becauſe men reſiſt, inſtead of yielding their conſent to it.

F. Malebranche maintains, that the mutual commerce between ſoul and body, *i. e.* life, has no other vinculum or principle but the efficacy of God's decrees; and that ſecond cauſes have no proper efficacy, &c.

EFFICIENT, in *Philoſophy*. An efficient cauſe is that which produces an effect. See CAUSE.

Philoſophers uſually diſtinguiſh four kinds of cauſes in nature; the *efficient*, *final*, *formal*, and *material*. See each under its proper article.

The ſchool philoſophers are exceedingly divided as to the nature and eſſence of an efficient cauſe. Ariſtotle defines it, *id unde*, "that from which;" or the firſt principle of change and reſt, *i. e.* of production and conſervation.

The efficient is called *id unde*, "that from which;" as the end or final cauſe is that *propter quod*, "for which;" the exemplar, *ad quod*, "that to which;" the matter *ex quo*, "that out of which;" and the form, *per quod*, "that by which." Others of the ſchoolmen define efficient to be "principium per ſe influens in aliud ſine mutatione ſui." The Ramiſts, after Plato and Cicero, define an efficient to be that, *a qua res eſt*, "from which a thing is;" to which a great author objecting, that a thing may be alſo from its end, adds that an efficient is that, "a qua res vera cauſalitate proficiſcitur." Others define efficient to be, *quæ per actionem cauſat*, "that which cauſes by acting;" for to effect, every body knows is to act. Laſtly, others define an efficient to be a cauſe, *a qua aliud producatur*, "from which ſomething is produced:" conſequently what ariſes from ſuch a cauſe is called an effect; and thus God is the efficient cauſe of the world, and the world the effect of God: to which definition of an efficient, all the former definitions are reducible.

An efficient cauſe, which moſt properly deſerves the name of a cauſe, becauſe it produces the effect by ſome ſort of active power or natural agency, is either phyſical, as the fire is the efficient cauſe of heat; or moral, as an adviſer is the cauſe of a murder; or univerſal, which in various circumſtances produces various effects, as God and the ſun; or particular, as a horſe which produces a horſe; or univocal, which produces an effect like itſelf, as a horſe begets a horſe; or equivocal, according to the old doctrine, as the ſun producing a frog: or natural, which acts not only without precept in oppoſition to artificial, but alſo from within, and according to its own inclination, in oppoſition to violent, as fire acts when it warms; or ſpontaneous, as a dog eating; or voluntary and free.

Others conſider efficient cauſes, either as principal, or as inſtrumental: others, either as next or remote, or as mediate or immediate; others, in fine, divide efficient cauſes among all the kinds of beings, natural and ſupernatural, ſpiritual and corporeal, ſubſtantial and accidental, vital and not vital, &c.

But the moſt celebrated diviſion of efficients is that into *firſt* and *ſecond*.

A firſt efficient cauſe is that between which and the effect there is ſome neceſſary connection: of which kind there is none but God alone.

A ſecond efficient cauſe is that from which an effect follows in conſequence of the will or conſtitution of the Creator, and which the Carteſians call an *occaſional cauſe*.

But theſe precarious or occaſional cauſes are, in reality, no cauſes at all, but only antecedent effects. This is eaſily ſhewn; for, 1. All action, at leaſt all corporeal action, is contained in motion; but motion can only reſult from the firſt cauſe, it being an allowed principle, that body of itſelf is inert and inactive. The true cauſe of motion, therefore, is a ſpiritual not a corporeal nature. 2. But neither can a finite ſpiritual nature be the chief cauſe of motion; for there is no neceſſary connection between the will, *e. gr.* of an angel, and the motion of a body, nor between that of any other being except God. Thus, when an angel wills, a ſtone moves, becauſe God has conſtituted ſuch a law between the will of the angel and the motion of the ſtone; and thus we move our hands when we pleaſe; not that the ſoul is the principal cauſe of motion, but only the occaſional cauſe. See CAUSE.

EFFICIENTS, in *Arithmetic*, the numbers given for an operation of multiplication, called alſo the *factors*. See FACTOR and COEFFICIENT. The efficients are the multiplicand and multiplier.

EFFIGY, EFFIGIES, a portrait or repreſentation of a perſon to the life. See PORTRAIT.

EFFIGY, is alſo uſed for the print or impreſſion of a coin, repreſenting the prince's head who ſtruck it.

EFFIGY, *to execute or degrade in*, denotes the execution or degradation of a condemned, contumacious criminal, who cannot be apprehended or ſeized.

In France, they hang a picture on a gallows or gibbet, wherein is repreſented the criminal, with the quality or manner of the puniſhment: at the bottom is written the ſentence of condemnation. Such perſons as are ſentenced to death are executed in effigy.

EFFINGHAM, in *Geography*, formerly *Leavitſtown*, a townſhip of America, in Strafford county, New Hampſhire, S.E. of Oſſipee pond, in Oſſipee river, incorporated in 1766, and containing 451 inhabitants.

EFFINGHAM, a county of America, in the lower diſtrict of Georgia, bounded by Savannah river on the N.E., which ſeparates it from S. Carolina, by Ogechee river on the S.W. which divides it from Liberty county. It contains 2072 inhabitants, including 762 ſlaves. Its chief towns are Ebenezer and Elberton.

EFFLORESCENCE, of *ex*, *out*, and *flos*, *flower*, in *Botany*, denotes the blooming of a flower.

EFFLORESCENCE, is the formation of a powdery cruſt, or of minute ſpicular cryſtals on the ſurface of any ſubſtance. It is applied in *Chemiſtry* to two diſtinct, and, in ſome degree, oppoſite phenomena, which it is of conſequence to be aware of. Thoſe ſalts, which, during cryſtallization, combine with a large proportion of water, are very apt, on expoſure to a dry air, to loſe a part of their moiſture, in conſequence of which they are at firſt ſuperficially, and afterwards entirely reduced to powder. This effect, at leaſt in its commencement, is called effloreſcence. But there is another kind of effloreſcence wholly diſtinct from this, as when we ſpeak of the effloreſcence of iron pyrites or of new mortar: in theſe caſes it implies the appearance of a ſuperficial covering of minute hair-like cryſtals, and is occaſioned by the chemical changes that take place on the ſurface of the ſubſtance where theſe cryſtals appear. Thus ſulphuret of iron is changed by effloreſcence into ſulphat of iron, or green vitriol: whereas ſulphat of ſoda, when ſubjected to the kind of effloreſcence firſt mentioned, although changed in form, remains the ſame in compoſition, except that it has loſt part of its water. The one deſtroys cryſtals, the other produces them.

EFFLORESCENCE, in *Medicine*, a redneſs, or eruption on the ſkin, from *flos*, *a flower*. It is ſynonymous with *Exanthema*, which is from the Greek ἄνθος, alſo ſignifying *a flower*. See EXANTHEMA.

EFFLUI, in *Geography*, a town of Norway; 32 miles N. of Chriſtianſand.

EFFLUVIA, fluxes, or exhalations of minute particles from any body: or emanations of ſubtle corpuſcles from a mixed ſenſible body, by a kind of motion of tranſpiration.

Odoriferous bodies, every one knows, are continually emitting ſubſtantial effluvia, by means of which they excite in us the ſenſe of ſmelling. Theſe minute effluvia are ſometimes perceived by the eye, in form of fumes and vapours.

Some bodies are found to emit effluvia for a great number of years, without any conſiderable loſs, either as to bulk or weight; as different odorous bodies, the tenuity of whoſe emanent corpuſcles is incredible; not but that the loſs they ſuſtain by the continual emiſſion of effluvia may be made up to them by the reception of other ſimilar effluvia of the ſame kind of bodies diffuſed through the air.

It is added, that theſe effluvia are emitted in manner of *radii*, rays, *in orbem;* and the circumference or bound of the activity of the radiation exhibits the ſame figure as is that of the radiant. This the aſtronomers ſufficiently prove, from the ratio of the refraction of the atmoſphere. For the law of the emiſſion of theſe effluvia, ſee QUALITY.

The effluvia may conſiderably operate upon and have great effects on bodies within the ſphere of their activity, is proved by Mr. Boyle, in an expreſs Treatiſe on the Subtilty of Effluvia; where he ſhews, 1. That the number of corpuſcles, emitted by way of effluvia, is immenſely great. 2. That they are of a very penetrating nature. 3. That they move with vaſt celerity, and in all manner of directions. 4. That there is frequently a very wonderful congruity, or incongruity, in the bulk and ſhape of theſe effluvia, compared with the pores of the bodies they penetrate into and act upon. 5. That in animal and organical bodies particularly, theſe effluvia may excite great motions of one part of the frame upon another, and thereby produce very conſiderable changes in the economy. Laſtly, that they have ſometimes a power of procuring aſſiſtance in their operations from the more catholic agents of the univerſe, ſuch as gravity, light, magnetiſm, the preſſure of the atmoſphere, &c.

That effluvia are emitted to very great diſtances, we have a notable proof in odoriferous effluvia being in many caſes perceived at the diſtance of many leagues. Again, that the generality of effluvia retain the proper colour, ſmell, taſte, and other properties and the effects of the bodies whence they proceeded, and this even after they have paſſed through the pores of other ſolid bodies, we have abundant proof. And the ſame we ſee confirmed in ſympathetic inks and powders, and in the ſagacity of bloodhounds, &c.

The wonderful extenſion of effluvia, and the ſmall diminution of the body they iſſue from, is one of the ſtrangeſt problems in phyſics.

The determinate natures of effluvia, according to the principal inſtances we have of them, are reducible to theſe three heads: 1. That theſe effluvia being by condenſation, or otherwiſe reunited, they appear to be of the ſame nature with the body that emitted them. 2. Their determinate nature may be ſometimes diſcovered by the difference that may be obſerved in their ſenſible qualities; foraſmuch as thoſe effluvia which are endowed with them proceed from the ſame ſort of bodies, and yet thoſe afforded by one kind of bodies being in many caſes manifeſtly different from thoſe which fly off from another; this evident diſparity in their exhalation argues, that they retain diſtinct natures, according to the nature of each body from which they proceed. 3. We may diſcover this different nature of effluvia from their effects upon other bodies than the organs of our ſenſes; conſidering that the effects which certain bodies produce on others by their effluvia, being conſtant and determinate, and always different from thoſe which other agents produce by their emiſſions on the ſame or other ſubjects, the diſtinct nature of the corpuſcles, emitted on this occaſion, may be ſufficiently judged of, were it only from this. Boyle "On Effluvia."

EFFLUVIA, in *Medicine*, are thoſe animal and vegetable exhalations which give riſe to various diſeaſes of the febrile kind.

Theſe effluvia ariſe, as we have juſt ſtated, from two different ſources, and produce different diſeaſes, according to their origin from the animal body, when they are termed *contagious* effluvia; or from the remains of vegetable matter, eſpecially in combination with moiſture, as in fens and marſhes, when they are uſually termed *marſh miaſmata*. The effluvia from the animal body, or contagious effluvia, produce *continued* fevers; as the typhus, the ſhip, gaol, hoſpital, and other malignant fevers; or the various eruptive fevers, as ſmall-pox, meaſles, ſcarlet-fever, chicken-pox, &c. The effluvia of vegetable origin, as the marſh miaſmata, give riſe to fevers of the *intermitting* and *remitting* claſs; as the tertian, quartan, and quotidian ague; and the remittent fevers occurring in camps, and in hot and moiſt climates.

With reſpect to the animal, or contagious effluvia, it has already been obſerved, that they are produced in three ways. 1. The natural and healthy effluvia, or inſenſible perſpiration of the human body, when accumulated and confined in a cloſe and ill-ventilated place, become vitiated, and acquire a contagious property. 2. Where people, labouring under any diſeaſes, eſpecially of the febrile kind, are crowded together in great numbers, or in cloſe apartments, the effluvia ariſing from their bodies are more readily rendered contagious, than in the former caſe; and the effluvia from the bodies of thoſe already affected with malignant, or eruptive fevers, are always contagious. And, 3. Contagious effluvia are ſaid to have been occaſionally ſent forth from putrefying animal matter. Of all theſe modes, in which contagious effluvia originate, examples were formerly adduced. See CONTAGION.

Of the vegetable effluvia, or marſh miaſms, we ſhall have occaſion to ſpeak in detail, under the head of *Intermittent* FEVER. See alſo MIASMATA.

It may be obſerved, that, after the diſcovery of the compoſition of the atmoſphere, and of the chemical means of inveſtigating the properties of every ſpecies of gas, or air, great hopes were entertained by ſome ſpeculative phyſicians, that the power of detecting the preſence of theſe contagious effluvia, which contaminated the air with contagion, would be by thoſe means attained; and Dr. Mitchell, an American, imagined that he had detected this principle of contagion in the nitrogen, or azotic gas, which he thence denominated *ſepton*, conſidering it alſo as the principle of putreſcency. But theſe hopes and ſpeculations were premature and viſionary. It has been found, that, ſo long as the atmoſphere retains the due proportion of its component parts, of oxygen and azote, it may, nevertheleſs, be greatly impregnated with contagious effluvia, which eſcape the detection of chemical teſts, and are not cognizable by the eudiometer: it has been found, too, that even chemiſtry does not enable us to diſcover any very material difference between the air abroad, and that in a heated and crowded room, nor any whatever between the air of the country and of the town. In ſhort, the ſalubrity, or inſalubrity of the air we breathe does not depend ſo much, in general, upon that arrangement of its component parts, which chemiſtry alone enables us to detect, (we except the occurrence of damps in mines, &c.) as upon the intermixture of thoſe effluvia, which do not change its chemical properties.

EFFLUXION, a flowing out, from *ex*, *out of*, and *fluere*, *to flow*.

EFFOYES, in *Geography*, a town of France, in the department of the Aube; 3 leagues E. of Bar-ſur-Seine.

EFFRACTURA, (from *effringo*, *to break down*,) a kind of fracture, in which the bone is much depreſſed by the blow.

EFFRONTES, in *Church Hiſtory*, a ſect of heretics, in 1534, who ſcraped their forehead with a knife till it bled, and then poured oil into the wound. This ceremony ſerved them inſtead of baptiſm. See BAPTISM.

They are likewiſe ſaid to have denied the divinity of the Holy Spirit.

EFFUSION, the pouring out of any liquid thing with ſome degree of force.

In the ancient heathen ſacrifices there were divers effuſions of wine, and other liquors, called *libations*.

EFFUSION, or *Fuſion*, in *Aſtronomy*, denotes that part of the ſign Aquarius, repreſented on celeſtial globes and planiſpheres, by the water iſſuing out of the urn of the water-bearer. See AQUARIUS.

EFFUSION, in *Medicine*, relates to various fluids which are poured out into the different cavities of the body, and upon the ſurfaces of different parts. Effuſions of coagulable lymph are uſually the reſult of inflammation, eſpecially of membranous parts, and the appearance of layers of this portion of the blood after death is generally deemed a ſufficient criterion of the previous exiſtence of inflammation. This effuſion is diſcovered on the membranes of the brain, in phrenitis; on the pleura and lungs, after pleuriſy; in the wind-pipe, after croup; and ſo on: and it is through the medium of this effuſion, that adheſions between inflamed membranes, and other parts, are effected. Thus, when the peritonæum is inflamed, it ſometimes becomes glued to the inteſtines; the lungs to the ribs, in pneumonia, or catarrh; and ſometimes ſuffocation is produced, in peripneumony, from the quantity of this effuſion into the ſubſtance of the lungs. In a word, it is by this effuſion of lymph that nature unites recent wounds, ſuppreſſes hæmorrhages, obliterates veſſels bound by ligature, and effects other important changes in the animal economy.

Effuſions of ſerum, or the watery part of the blood, into the different cavities of the body, or the interſtices of the cellular membrane, conſtitute the various modifications of DROPSY; which ſee. Sometimes blood itſelf is effuſed into different parts of the body: when under the ſkin, if in the form of ſpots, it conſtitutes *petechiæ*; if in broader patches, *ecchymoſes*, or *ecchymomata*; if in ſtripes, like the ſtrokes of a whip, *vibices*. Theſe occur in malignant fevers, and in purpura and ſcurvy they are the leading and moſt obvious ſymptoms.

EFFUSION. This word, in *Surgery*, ſignifies the eſcape of any fluid out of the veſſels, or viſcera, naturally containing it, and its lodgment, either in another cavity in the cellular ſubſtance, or the ſubſtance of parts. Thus, when the cheſt is wounded, blood is ſometimes effuſed from the veſſels into the cavity of the pleura; in caſes of falſe aneuriſm, the blood gets out of the artery into the interſtices of the cellular ſubſtance; in caſes of fiſtulæ in perinæo, the urine gets from the bladder and urethra into the cellular membrane of the perinæum and ſcrotum; and when great violence is applied to the ſkull, blood is often effuſed even in the very ſubſtance of the brain.

Effuſion alſo ſometimes implies an oozing, or ſeparation of ſome fluid, from veſſels, which have not been ruptured. Thus, in caſes of inflammation, ſurgeons frequently ſpeak of coagulating being effuſed on different ſurfaces, and in the internal texture of the parts affected.

EFFUSION *of Blood*, *effuſio ſanguinis*, in our *Old Writers*, is uſed for the mulct, fine, or penalty, impoſed for the ſhedding of blood. This the king uſed frequently to grant to lords of manors. Among others it was granted to the abbot of Glaſtonbury.

EFLANI, in *Geography*, a town of Aſiatic Turkey, in the province of Natolia; 32 miles E.S.E. of Amaſieh.

EFNANLU, a lake of Aſiatic Turkey, in Natolia; 36 miles W. of Boli.

EFRIM, a town of Egypt; 27 miles E.S.E. of Alexandria.

EFT, or EFF, in *Zoology*, the name of a creature very common in all parts of England, and called alſo *newt*, and the *ſwift*, and by others the *common lizard*, *lacerta vulgaris*. See LACERTA.

The beak, or ſnout, of this creature is oval and obtuſe; its back of a ruſty-iron colour; its feet have each five toes, and are armed with very ſharp though ſmall claws. That toe which is in the place of the fore-finger with us is the longeſt of all; and that which anſwers to our thumb is placed lower. Ray's Syn. Quad. p. 264.

We have ſeveral ſpecies of this animal with us. 1. The common land eft, with the black ſpotted belly. 2. The ſnake-like eft, which is frequent in our heaths. 3. The ſmall brown land eft. This is very ſcarce. 4. The yellow ſcaly land eft, deſcribed by Plott in his Hiſtory of Staffordſhire. And, 5. The brown and black ſpotted water eft. Plott's Staff. p. 252.

The land eft, or, as the naturaliſts often call it, the land *ſalamander*, has ſomething very remarkable in its outer coat. Its ſkin often appears dry, like that of the lizard kind, but often alſo it appears wetted, and as if covered with a fine ſhining varniſh; the change from one to the other of theſe ſtates is uſually performed in an inſtant, and it frequently becomes immediately wet all over on touching it. It alſo contains, under the ſkin, a ſort of milky liquor, which ſpurts out to a diſtance on preſſing the body of the animal.

The paſſages for this milk are, a vaſt number of pores, or holes, many of which are plainly viſible to the naked eye; and very probably the firſt-mentioned liquor, which covers the ſkin in manner of a varniſh, may be the ſame with this, its white colour not being diſtinguiſhable when it is ſpread ſo thin over the ſurface of the animal. This milk reſembles very much the milky juice which the tithymals, and many other of the ſucculent plants, afford on being cut, or broken. It is of an inſupportably acrid and ſtyptic taſte; and though the tongue receives no injury from touching it, yet the ſenſation is ſo violent, that one is apt to imagine there muſt be a wound made in it. This animal, when bruiſed, yields alſo a very diſagreeable ſmell.

It has generally been ſuppoſed, that this animal is of a poiſonous nature; and the famous ſalamander of the old writers ſeems to be of the ſame genus, if not the ſame animal. Mr. Maupertuis, determined to inform the world of the truth in regard to theſe remarkable particulars, cauſed a larger number of theſe animals to be brought to him, which the country people, who had caught them about the bottom of old walls, brought to him with as much caution as if they had been vipers.

From his trials, it appeared very evident, that the ſtories of this creature's being poiſonous, are as idle and groundleſs as thoſe of its living in the fire.

One thing remarkable this gentleman obſerved in his diſſections of the animal, which was, that he found in ſeveral of the females, at once, cluſters of eggs, and living young ones. The eggs formed cluſters reſembling thoſe of the ovaries of birds, and the young ones were contained in two tubes, or long pipes, the coats of which were perfectly tranſparent, and the young ones were eaſily diſtinguiſhed through them; and there were counted in one female fifty-four of theſe, all living and vigorous. Med. Acad. Par. 1727.

The water eft affords an excellent opportunity of ſeeing the circulation of the blood by means of the microſcope, particularly of the ſolar one. By this apparatus, the veſſels are ſeen beautifully delineated on the ſkin; and the tide of blood, in the large ones, is equal to that of the ſtream of water which is ſhewn in hydroſtatical experiments thrown out of a veſſel by condenſed air. In either of theſe caſes, you can ſee no appearance of ſeparate drops, or globules, but the whole forms one continued body. In the leſſer veſſels the globules are ſeen paſſing along very ſwiftly, yet evidently ſeparate from one another.

It is remarkable, that in the tail of this animal there ſeem a greater number of veſſels than are immediately neceſſary to the circulation of the blood; for, when thus examined, there will be often ſeen two parallel veſſels, in one of which only the circulation is performed, and this ſucceſſively in one and the other of the veſſels, the tide often leaving the one wholly empty, which had juſt before been full, and circulating in the other. Phil. Tranſ. N° 460. p. 728.

EFT-*Stones*, in the *Materia Medica* of the American Indians, a name given to certain ſtones, ſaid to be found in the ſtomach of a certain ſpecies of water newt, or eft, in the manner of the bezoars in other animals. The waters of Braſil, Cuba, and Mexico, abound with this ſpecies of eft; but it does not ſeem well atteſted, that this ſort of ſtone was ever found in any of them by thoſe who have diſſected numbers of them, on purpoſe to ſearch for it. We have in Europe ſwallow-ſtones, and other ſuch things, whoſe names, and their fabulous hiſtories, would import their being produced in animals. As many ſwallows have been deſtroyed in England in looking for theſe ſtones, as newts in Mexico in looking for thoſe; and by the appearance of the American as well as the European ſtones, they both ſeem to be dug out of the earth, and to have been once the teeth, or other parts of fiſhes. Redi, Experim.

The virtues of the eft-ſtone of Mexico are celebrated by Ximenes, and all others who have been upon the ſpot. It is ſaid to be a certain remedy for the gravel, and all other nephritic complaints, and even to break and diſſolve the ſtone when already concreted in the bladder. But this account of its virtues ſeems as improbable as that of its origin. Redi tried theſe and many other ſtones of famous character among writers, and found no effect in any of them. Theſe eft-ſtones never produced any viſible effect in his trials, in nephritic complaints, nor the eagle-ſtone in women's labour, nor the ſtones ſwallowed by Caymans in quartans, though Menardes looks on theſe laſt as infallible in this caſe.

EGA, in *Geography*, a river of Spain, which runs into the Ebro, about a league below Calahorra.—Alſo, a town of Portugal, in the province of Beira; 7 miles S.S.W. of Coimbra.

EGABRA, in *Ancient Geography*, a town of Spain, in Boetica; now *Cabra* in Andaluſia.

EGAKTO, in *Geography*, one of the ſmaller Kurile iſlands, in the North Pacific ocean. N. lat. 49° 5′. E. long. 154° 44′.

EGBEL, a town of Hungary; 8 miles W. of Topaltzen.

EGBERT, in *Biography*, the firſt king of England, was deſcended from the Saxon princes who eſtabliſhed themſelves in this country, and a branch of the royal family of the kingdom of Weſſex. He had, towards the end of the eighth century, withdrawn into France, ſeeking an aſylum in the court of Charlemagne. Here he was received with hoſpitality, and ſerved in the armies of that monarch, where he acquired thoſe talents which rendered him ſuperior to all his Saxon countrymen. In the year 800 he accepted the invitation of the nobles of Weſſex, and became their king. His firſt employment was againſt the Britons in Cornwall, whom he defeated in many battles. He went on conquering till he finally united the whole heptarchy under his ſovereign authority. This event, which gave political conſequence to England, took place in 827. His government was quiet with regard to his own ſubjects, but the Danes made many incurſions againſt England, which were long a ſource of great calamity to the country. In 832 they plundered the iſle of Sheppey; they next landed on the coaſt of Dorſet, where they were met by the king, and driven to their ſhips with much loſs. In the midſt of his warlike cares Egbert cloſed his life in the year 838, and left the government to his ſon Ethelwolf, who was perfectly unequal to the duties devolved upon him. Hume's Hiſt. vol. i.

EGEDE, HANS or JOHN, ſuperintendant of the Daniſh miſſion in Greenland, was born in the year 1686, and at the age of 21 he became preacher at Bogen, in Nordland. Soon after he formed the project of converting the Greenlanders to the Chriſtian religion, for which purpoſe he went to Greenland, eſtabliſhed the Daniſh miſſion, and employed himſelf in the work with much zeal during fifteen years. He died in 1758, leaving behind him a good deſcription of the natural hiſtory of Greenland, which has paſſed through ſeveral editions, and has been tranſlated into the Dutch and French languages. The edition of 1763, printed at Geneva, was illuſtrated with a map and 10 plates. His ſon Paul, from the age of 12 years, was one of his moſt active aſſiſtants: Denmark was indebted to him for the ſucceſs of its colony at Greenland; and the inhabitants of that deſolate country are under great obligations to him for the anxiety which he felt, and the pains which he took to promote their welfare and comfort. He kept a journal from his twelfth year till his eightieth, which is ſaid to contain a multitude of curious facts reſpecting the Greenlanders, their manners and cuſtoms, and the ſuperſtitious notions which they entertain. He died in June, 1789. Gen. Biog.

EGEK, in *Geography*, a town of Hungary; 8 miles E.S.E. of Levens.

EGELESTA, in *Ancient Geography*, a town of Spain, S.W. of Lobetum.

EGELN, in *Geography*, a town of Germany, in Lower Saxony, and duchy of Magdeburg; 16 miles S.W. of Magdeburg.

EGENBURG, a town of Germany, in the archduchy of Auſtria; 12 miles S.W. of Znayen, and 36 N.W. of Vienna.

EGER. See DRAMMEN.

EGER, *Egra*, or *Cheb*, a handſome town of the empire of Auſtria, in the kingdom of Bohemia, in the territory of the ſame name, ſituated on the river Eger, on the boundaries of Franconia; 120 miles W. of Prague, and 250 N.W. of Vienna. E. long. 12° 30′. N. lat. 50° 2′. It is conſidered as next to Prague in point of importance, and remarkable for its mineral waters.

EGER-HORN, one of the *peaks* of the Wetterhorn group of mountains in Switzerland; which borders on the valley of Grindelwald, and ſlopes gradually from barren rock and ſnow to fertility and cultivation. There are two high pyramids, which tower near the Jungfrau, called from their poſition the exterior and interior Egers. The ſubſtance of theſe mountains is granite, covered with calcareous ſtone lying on reddiſh ſlate, which in many places forms a ſpecies of breccia, compoſed of an argillaceous baſe, covered with calcareous fragments. The height of the Eger is 13,086 Engliſh feet.

EGERI, a diſtrict of the canton of Zug, in Switzerland. See ZUG.—Alſo, a lake, 8 miles S.E. of Zug.

EGERMINATE, of *ex*, *out*, and *germen*, *bud*, in *Botany*, ſignifies to bud or ſpring out.

EGERO, in *Geography*, a ſmall iſland near the coaſt of Norway, in the North ſea; 24 miles S. of Stavanger.

EGERTON, Thomas, in *Biography*, viſcount Brackley, was born in Cheſhire about the year 1540, and admitted commoner of Brazen-noſe college in Oxford, in 1556. Here he laid the foundation of learning, and removed to Lincoln's-inn, where he applied with much diligence to the ſtudy of the law, and became a noted counſellor. In 1581 he was appointed ſolicitor general to queen Elizabeth, and in the following year he was elected Lent reader of Lincoln's-inn, and one of the governors of that ſociety. In June 1592 he was made attorney-general, and ſoon after received the honour of knighthood. The maſterſhip of the Rolls was conferred on him in 1593, and in 1596, by the queen's ſpecial favour, he received the ſeals, with the title of lord-keeper. He was, at the ſame time, ſworn of the privy-council. Few perſons have enjoyed their advancement with more general approbation than this eminent lawyer. He was conſulted and employed on all weighty affairs of ſtate. He acted as a true friend to the earl of Eſſex, endeavoured to mitigate the impetuoſity of his temper, and to render him ſubmiſſive to the higher powers. When the earl proceeded to open inſurrection, the lord-keeper Egerton was ſent, with others, to Eſſex houſe, to know the meaning of the tumultuous aſſembly held there. He commanded them to lay down their weapons and depart, which they not only refuſed, but held the delegates as priſoners, while Eſſex, with his aſſociates, made their laſt attempt to raiſe the city. (See Devereux.) Upon the death of Elizabeth, her ſucceſſor James I. ſignified his pleaſure that ſir Thomas Egerton ſhould continue to exerciſe the office of lord-keeper. Soon after he created him baron Elſemere, for his faithful ſervices to the late queen and himſelf; and immediately afterwards conſtituted him lord high chancellor of England, an office which he held above 12 years with dignity and reputation. In 1610 he was elected chancellor of the univerſity of Oxford, the duties of which he performed with much honour to himſelf and with advantage to the church of England. His health began to decline about the year 1615, when he was attacked by ſir Edward Coke in an affair relative to an interference of the court of chancery in a matter of common law. The caſe was argued before the king, aſſiſted by ſeveral eminent lawyers, who decided in favour of the chancellor. He was ſoon after appointed high ſteward at the trial of the earl and counteſs of Somerſet, for the death of ſir Thomas Overbury, and after the earl's conviction, he ſteadily refuſed to affix the great ſeal to the pardon extended to him by the king. His age and growing infirmities induced him to ſolicit his diſmiſſion from the office of chancellor, with which the king complied, though with much regret; at the ſame time raiſing him to the ſtyle and title of viſcount Brackley. He died at York-houſe in the Strand, March 15, 1617, in the 77th year of his age: and the earldom of Bridgewater was conferred on his ſon as a reward of his father's virtues. This worthy man, and excellent lawyer, was in his diſpoſition open and ſincere; in his adminiſtration honeſt and upright. He was a zealous and faithful ſervant of the crown, and did not ſcruple to give his ſovereign James the moſt wholeſome advice on many very important topics. His private character was virtuous and honourable. In his life-time was printed a ſpeech which he delivered in the Exchequer chamber, in Robert Calvine's cauſe; and after his death appeared his "Privileges and Prerogatives of the high court of Chancery"; and his "Obſervations concerning the Office of lord chancellor." He left his chaplain, Mr. (afterwards biſhop) Williams, four MS. collections, relating to the prerogative royal;—the privileges of parliament;—the proceedings in chancery;—and the power of the ſtar-chamber: which are ſuppoſed to have been the chief ſource of that prelate's legal and political knowledge. He was thrice married, and left behind him John, afterwards earl of Bridgewater, and Mary, married to ſir Francis Leigh. Biog. Brit.

EGESTION, from *egero*, *I caſt out*, in *Medicine*, the ſame with dejection.

EGG, in *Comparative Anatomy*. Under this term might be deſcribed, without impropriety, the parts immediately ſubſervient to the developement and growth of the embrio in all animals, even in thoſe which are called viviparous; but as the Engliſh word *egg* is only in common uſe for the ovum of *birds*, we ſhall at preſent confine ourſelves to a deſcription of it in that claſs of animals, and refer our readers for a more general account of the ſubject to the article Ovum, in *Comparative Anatomy*.

The parts entering into the compoſition of the egg of birds are, the *ſhell*, the *membranes*, and the *humours*, or rather *ſemi fluid ſubſtances*.

The *form* of the egg in moſt birds is not an exact oval, although that figure appears to have derived its name from its cloſe reſemblance to the ſhape of the ovum in birds. Eggs, having one of the ends ſmaller, or more pointed than the other, allow a larger number of them to be placed in the neſt, than if each were a perfect ellipſis, the variety in the ſhape of the ends being applicable to the different ſized angles left by the irregular appoſition of a number of round ſurfaces to each other. The uſual form of eggs would ſeem to be deſigned to render this arrangement in the neſt more compact during incubation, as, where the bird lays but few eggs, they commonly poſſeſs more ſtrictly the oval figure; and the eggs of the oſtrich, which, from the temperature of the climate, do not require the conſtant incubation of the parent, are of a ſhape between a ſphere and an ellipſis.

The moſt prevalent *colour* of birds' eggs is a milk white; but to this there are numerous exceptions, eſpecially amongſt the *paſſerine* tribes. Eggs are often beſpeckled with red, brown, &c. on grounds of different colours, and ſometimes are of one ſtrong plain tint, as green, &c. but a deſcription of the varieties in the colour and form of eggs belongs to the department of natural hiſtory.

The *ſhell*, or *calcareous inveſtment*, (*cortex* or *putamen* of the older anatomiſts,) is ſecreted from the internal ſurface of that part of the oviduct which is called the uterus, as already mentioned in the *Anatomy of* Birds. It adheres ſtrictly to the external membrane of the egg, with which it appears to be in a degree intermixed, by being incruſted in the interſtices of its external ſurface.

The ſhell varies very much in thickneſs according to the ſize of the bird. In the eggs of very ſmall birds the ſhell is thinner than the fineſt paper, while in the oſtrich it is one-eighth of an inch thick; but in every inſtance the ſhell is porous in its texture, and always light and fragile in proportion to its thickneſs.

Ariſtotle, Pliny, and ſome other older writers on the ſubject, ſuppoſed that the ſhell acquired its hardneſs after being laid, from evaporation, and the influence of external air. Fabricius ſpoke doubtfully on this point, and the opinion was not refuted until Harvey wrote. This error ſeems to have ariſen from the circumſtance of hens frequently laying their eggs before the ſhell is fully formed; in which caſes, the covering of the egg becomes much more firm after it is completely dry: but from the quantity of calcareous matter which the perfectly formed ſhell contains, it ſeems impoſſible that it ſhould poſſeſs any pliancy, or accommodate its ſhape to that of the paſſage through which it is ejected, as the older writers ſuppoſed: the common mode of aſcertaining whether a hen be about to lay or not, by introducing the finger into the cloaca and touching the hard ſhell of the egg, ſufficiently proves that no material change is produced on the ſhell by expoſure to the air. The impreſſions, which frequently appear upon ſhells, and which ſome people imagine are occaſioned by the conſtriction of the anus, are formed in the oviduct at the time the calcareous matter is depoſited. It ſometimes happens, that a very ſmall egg is found included in another of a common ſize. Harvey mentions his having met with an inſtance of this kind, in which he found both the external egg, and the one it contained, inveſted with a hard ſhell.

The earthy matter of the ſhell is compoſed of carbonat and phoſphat of lime, which are ſaid to be held in connection by a ſmall quantity of gelatine. The analyſis given by Vauquelin is as follows:

89.6	carbonat of lime.
5.7	phoſphat of lime.
4.7	animal matter.
100.0	parts of egg ſhell.

In one experiment we made, of diſſolving the ſhell of the egg in vinegar, the animal ſubſtance which remained appeared only as a fine membrane, or cuticular covering, on the external ſurface of the ſhell; we conceive therefore that the calcareous matter of the ſhell is not depoſited in the ſame manner as the earth of bones, but as a cruſt on the external membrane of the egg, and that the animal ſubſtance is confined to the ſuperficies of the ſhell, from which ariſe its greater denſity and poliſhed appearance.

The *external membrane*, or *membrane of the ſhell*, (*membrana albuminis* of Blumenbach) poſſeſſes exactly the form of the ſhell to which it ſerves as a lining; it is by far the ſtrongeſt membrane in the egg; it is ſmooth and gloſſy on the inner ſurface, and a little flocculent on that next the ſhell, to which, as has been before obſerved, it intimately adheres. This membrane is devoid of fibres, it has a degree of elaſticity which is equal in all directions. It has been long known to be compoſed of two layers; but we have been enabled to ſeparate it into a greater number of laminæ by boiling it, or by partially drying it.

The *folliculus aëris*, or *air cell*, is a circular ſpace left between two layers of the external membrane at the great end of the egg. This ſeparation of the membrane exiſts before the egg leaves the oviduct; it is, however, originally very inconſiderable; in a recently laid hen's egg it is about a quarter of an inch in diameter, but in ſtale eggs it is frequently found to meaſure an inch acroſs, and in the later ſtages of incubation the external membrane is ſeparated almoſt throughout into two layers by means of the air of the folliculus. The increaſe of the air before incubation depends upon the evaporation of the moſt fluid parts of the egg, which proceeds more rapidly than is commonly ſuppoſed; we have aſcertained by experiment that an egg by evaporation alone loſes ſeveral grains of its weight every day. The diminution of the fluids of the egg is more conſiderable during incubation, both from the expoſure to a high temperature, and the conſumption of theſe ſubſtances in the formation of the chick, and hence the neceſſity of the admiſſion of ſo large a portion of air into the egg during the period of incubation. This air is commonly ſuppoſed to be deſigned for the reſpiration of the fœtal chick: the arguments for ſuch an opinion, with thoſe againſt it, will appear more properly in the article Incubation *of the Egg*, which ſee. It is ſufficient at preſent to account for the exiſtence of air in the egg, without diſcuſſing its uſes.

The chemical properties of the air contained in unincubated eggs have not heretofore been exactly aſcertained. It has been ſuppoſed by ſome to be hydrogen. Coxe and others have thought it to be oxygen. Others again, as Hales, Blumenbach, &c. have conſidered it as atmoſpheric air; which laſt opinion we are led to adopt both from reaſoning and direct experiments made on the ſubject. It is univerſally allowed that the ſhell and external membrane of the egg are porous; if they were not ſo, evaporation of the humours could not take place to the extent we have ſtated; the ſame ſtructure which gives paſſage to the fluids may admit likewiſe air; it is to be ſuppoſed, therefore, that except the ſmall globule which exiſts before the ſhell is formed, the folliculus derives its air from the atmoſphere. It is further to be obſerved, that the organization of the external membrane does not permit its performing any office like ſecretion. It is itſelf an excretion from the oviduct, and even during incubation, when the other membranes are vaſcular, it does not acquire blood-veſſels, but remains unchanged in its ſtructure.

With the view of proving whether the air in the folliculus was received from without, or produced within the egg, we have covered the ſhell with varniſh, and, in ſeveral inſtances, in which this experiment was made, no ſenſible addition to the quantity of air originally contained in the air-cell took place: we have likewiſe eſſayed to analyſe the air of a number of unincubated eggs, by collecting it in a graduated glaſs tube, over mercury and over water, and expoſing it to the action of lime-water, phoſphorus, and nitrous gas; by which experiments ſimilar reſults were obtained, as, when atmoſpheric air was made the ſubject of inquiry. In ſome inſtances the air of eggs appeared to contain more carbonic acid gas, and leſs oxygen; but the deviation from common air, with reſpect to the quantity of theſe gaſſes, was ſo inconſiderable, that it could not always be detected. Some effect, with regard to the purity of the air of eggs, might be expected in conſequence of its remaining for a certain time in contact with the external membrane; if we may credit the aſſertions of Spallanzani, the air in the egg muſt be deprived of a conſiderable part of the oxygen. He ſtates that he found the ſhells of eggs and of teſtaceous mollusca abſorb oxygen freely. In order to ſatisfy himſelf if this gas was attracted by the calcareous matter, or the animal ſubſtance combined with it, he made correſponding experiments with ſnail ſhells which had been long deprived of their inhabitants, and had loſt by decay and expoſure almoſt all their animal ſubſtance, and with other ſhells which were in a more recent ſtate, and he found that the abſorption of oxygen was in proportion to the quantity of animal matter remaining in the ſhell. (Journal de Phyſique, Fructidor, an. 11.)

It is cuſtomary to judge of the freſhneſs of eggs by the degree of warmth which is felt upon the application of the tongue to the large end of them: the ſenſation of heat in this way is never abſolute, but comparative; that is to ſay, the temperature of the egg is not actually ſo high as that of the tongue; but the preſence of the air-cell behind the ſhell at the great end, prevents that part abſtracting the heat of the tongue ſo readily as the other portions of the egg.

The *whites* of the egg were deſcribed as a ſingle humour by the elder anatomiſts; they were called by Ariſtotle *ovi albitudo; ovi albus liquor* by Pliny; *ovi candidum* by Celſus; *ovi album et albamentum* by Apicius; and *albumen* by Fabricius ab Aquapendente: all of which appellations have ariſen from the appearance of this humour when boiled. Harvey was the firſt who made the diſtinction of two whites. Leveillé, a late French writer, divides the albumen into three portions; an external (*albumen certical*), a middle (*albumen moyen*), and a central white (*albumen central*); the laſt, however, is merely a different name for thoſe parts commonly deſcribed under the title of *Chalazes*.

The *external white* is the moſt ſuperficial; lying immediately under the membrane which lines the ſhell; all the other parts of the egg are therefore included by it. This white is always moſt abundant in recently laid eggs; in thoſe that have been long kept it is ſcarcely to be obſerved; it is at all times, however, much leſs in quantity than the middle white. It is a true albuminous fluid, but almoſt as liquid and tranſparent as water; two modes are employed for ſhewing the diſtinct exiſtence of the ſuperficial white; one is to open the ſhell and external membrane of a very freſh egg, when this humour will run off, leaving the principal white behind; the other mode is to boil a freſh egg, if gently, the external white will appear like milk, but if the boiling be long continued, the white will become hard, and the external one may be detached by a little pains from the other; it will then be obtained as a lamen diminiſhed in thickneſs towards the two ends of the egg.

Harvey ſaid that the external white was covered with a proper membrane, but we have failed to diſcover it.

The *middle, or principal* white, makes the chief part of that viſcid, tenacious, tranſparent, ſemi-fluid maſs which is commonly known under the name of the white of the egg: it is enveloped by the external white, and contains the yolk and the two chalazes; it is ſaid to be incloſed by a membrane; this circumſtance does not admit, however, of being clearly demonſtrated before incubation, in the later periods of which the tunic of the white becomes exceedingly evident. If the contents of an egg be thrown unbroken into water, they become opake and ſlightly coagulated upon the ſuperficies, which preſents a ſmooth membranous-looking ſurface, but if the white be broken, every part of it that may be in contact with the water aſſumes the ſame membranous appearance, ſo that no concluſion can be drawn with reſpect to the exiſtence of a membrane from this experiment, unleſs it be admitted that the white be compoſed throughout of an arrangement of albuminous fibres or membrane. This is the opinion of Maitre Jean, who was perhaps the moſt accurate writer on this ſubject: he ſays, that the white is a compoſition of glairy fibres, intermixed with aqueous parts; if, he obſerves, one beats for a long time the white of an egg, it becomes as fluid as water, which can only happen in conſequence of theſe fibres being broken or attenuated by the motion, ſo that not poſſeſſing any longer their arrangement, the conſiſtence of the whole maſs is changed. If other mucilaginous or glutinous liquors be beaten in the ſame manner, they do not become more fluid, becauſe they do not poſſeſs that peculiar arrangement of their parts which can be deſtroyed by motion: he further obſerves, that the white of the egg has a ſtructure, and compoſition altogether peculiar, although from its tranſparency we cannot perceive it. In order to be convinced of this, it is only neceſſary to make the following experiment; let an egg be opened, and ſuffer a ſmall quantity of the white to run out in order to introduce ſome diſtilled vinegar in its place, in a little time ſome parts of the white will be ſeen penetrated by the vinegar and coagulated, and others ſtill preſerve their tranſparency, by which there will be an opportunity of obſerving ſome large fibres differently ſituated, and many others forming a ſpecies of membrane. Obſervations ſur la Formation du Poulet, par Maitre Jean. p. 20, 21.

The white of the egg does not float about promiſcuouſly through the egg; it adheres to the membrane, lining the ſmall end of the egg, and always preſerves its proper relative poſition to the yolk; this may be conſidered as an additional argument for the exiſtence of ſolid albuminous fibres in the white.

The albumen, in its natural ſtate, has little taſte or ſmell. When ſpread thin and ſlowly over any body, it forms a varniſh ſimilar to what is made by gum arabic; which it alſo reſembles in taſte. It may alſo be again diſſolved in water, and brought back to its original ſtate. Uncoagulated albumen ſoon putrifies, unleſs it be dried; after which it may be preſerved for any length of time.

It is inſoluble in alcohol and ether: acids do not diſſolve it unleſs it be coagulated and heat employed.

When alkalies are mixed with the ſolution of albumen in water, no apparent change takes place; but if a concentrated ſolution of pure potaſh be triturated with albumen for ſome time, and then allowed to remain at reſt, the albumen gradually coagulates, or rather gelatinizes; for the coagulum has a ſtriking reſemblance to jelly. It gradually hardens; and at a particular period of its drying, it reſembles very exactly the cryſtalline lens of the eye. When quite dry, it is brittle and tranſparent. Thomſon's Chemiſtry, p. 490.

None of the earths form inſoluble compounds with albumen, in this reſpect reſembling the alkalies.

In a number of experiments mentioned by Dr. Thomſon, in which he tried the effects of a great variety of metallic ſalts upon a ſolution of albumen, obtained by mixing the white of one egg with a pint of water, every metal, except cobalt, occaſioned a precipitate: but no precipitate ever appeared, when the oxyd was held in ſolution, by an alkali or an earth. The effect of the metallic ſalts on albumen form a ſtriking contraſt with their effect on gelatine.

A ſolution of tan forms, with an aqueous ſolution of albumen, a very copious yellow precipitate, of the conſiſtence of pitch, and inſoluble in water, which is a combination of tan and albumen. When dry it is brittle, like over tanned leather, and is not ſuſceptible of putrefaction. Nicholſon's Journal, i. 272.

According to the chemical analyſis which has been made of the white of the egg, 100 parts of it contain 80 parts of water, 4 5 of uncoagulable matter, and 15.5 of pure albumen. By diſtillation it affords water, carbonat of ammonia and empyreumatic oil, a coal remaining in the retort which yields ſoda and phoſphate of lime.

The white of the egg is well known to be coagulable by heat, acids, alcohol, and even by water in a ſlight degree.

It has been ſuppoſed by Fourcroy and other chemiſts, that the coagulation of the albumen was produced by a combination with oxygen. To determine if this ſuppoſition were well founded, M. Carradori expoſed the freſh albumen of an egg to the heat of boiling water, having previouſly covered its ſurface with olive oil: he aſſerts that coagulation was effected as readily in this way as in open air; and that there was no eſcape of elaſtic fluid through the oil, which would have happened had the water undergone any decompoſition during the experiment. M. Carradori likewiſe obſerved, that when he coagulated albumen in contact with oxygen gas, no abſorption of this fluid took place; he therefore concludes that the coagulation of the albumen is not effected by the oxygen, but by the action of the caloric alone. Annali di Chimica di Brugnatelli.

Scheele attributed the coagulation of the albumen to its combination with the matter of heat, which opinion he ſupported by ſome ingenious experiments. Mr. Thomſon, on the other hand, obſerves that, as we know when a fluid is converted into a ſolid, caloric is uſually diſengaged, it is extremely probable that the ſame diſengagement takes place here. But the opinion has not been confirmed by experiment. Fourcroy, indeed, relates that he ſaw the thermometer riſe ſeveral degrees; but as others have not been able to perceive any variation of temperature during the coagulation of albumen, it cannot be doubted that this philoſopher has been miſled by ſome circumſtance or other to which he did not attend. Thomſon's Journal, iii. 271.

It is remarkable, that if albumen be diluted with a ſufficient quantity of water, it can no longer be coagulated. Scheele mixed the white of an egg with ten times its weight of water, and then, though he boiled the liquid, no coagulum appeared. Acids, indeed, and alcohol, even then coagulated it; but they loſe their power if the albumen be diluted with a much greater quantity of water, as has been aſcertained by many experiments.

When albumen is coagulated either by heat, alcohol, or acids, it is an opake ſubſtance of a pearl white colour, tough, and of a ſweetiſh mucilaginous taſte; it is no longer ſoluble in water, and is leſs ſuſceptible of decompoſition than uncoagulated albumen. Mr. Hatchet kept it for a month under water without its becoming putrid. By drying it in the temperature of 212°, he converted it into a brittle hard, yellow, ſubſtance, ſemi-tranſparent like horn.

When this ſubſtance was digeſted for ſome hours in water, it ſoftened and became white and opake, like newly coagulated albumen.

When coagulated albumen is ſteeped in diluted nitric acid for ſome weeks, it communicates a yellow tinge to the acid, and becomes itſelf opake, but does not diſſolve: when the albumen, thus treated, is immerſed in ammonia, the liquid aſſumes a deep orange colour, inclining to blood red, the albumen is ſlowly diſſolved, and the ſolution has a deep yellowiſh brown colour. If the albumen, after being ſteeped in nitric acid, be waſhed, and then boiled in water, it is diſſolved, and forms a pale yellow liquid which gelatinizes, when properly concentrated. If the gelatinous maſs be again diſſolved in boiling water, the ſolution is precipitated by tan and by nitro-muriat of tin. Hence we ſee that that nitric acid has the property of converting coagulated albumen into gelatine. For this important fact we are indebted to Mr. Hatchet.

Coagulated albumen is readily diſſolved by a boiling lixivium of potaſh, ammonia is diſengaged, and an animal ſoap is formed. Hatchet, Phil. Tranſ. 1800. Thomſon's Chemiſtry, p. 494, &c.

The *albuminous cords*, which connect the yolk with the white were called, from a fancied reſemblance to hail, by the older writers, *Chalazes*, *Grandines*, &c. From the uſe which Vic D'Azir aſcribed to them, he named them *Ligamens ſuſpenſeurs du jaune.* Leveillé has deſcribed them as a third white, *albumen central;* and in this country they are popularly known, in conſequence of a vulgar error, by the name of *the tread* or *treddle*.

Theſe parts are two ſubſtances of a much more firm texture than any other portion of the white: they appear to be compoſed of an opake albuminous membrane coiled upon itſelf, ſo as to form a cord; this cord is again convoluted or doubled upon itſelf, to which ſome thick greeniſh ſemi-tranſparent albumen adheres, ſo as to give the whole a knotted or granulated figure; from which it was formerly compared, though not very aptly, to hail. Theſe cords are each attached by one of their extremities to the membrane of the yolk, at which place the cord is denſe and compact; the other extremity is loſt in the white, and is looſely formed, and ends in membranous folds; the attachment of the cords to the yolk membrane is at the two poles of the yolk, correſponding to the two ends of the egg. The chalazes are not generally of the ſame magnitude; one is larger and more knotted than the other, and extends towards the great end of the egg: the ſmaller one lies next the ſmall end, and makes a turn to one ſide of the egg. Sometimes one of theſe cords is wanting, and this happens more frequently in the eggs of the *guinea fowl*, than in thoſe of the common *hen*.

The above deſcription of the chalazes correſponds with that generally given by authors, and with what we have obſerved in nature, but differs very materially from the account of theſe parts which Leveillé has publiſhed.

He conſiders the chalazes not as ſeparate bodies; he ſays, they are conjoined by means of a light train of albuminous ſubſtance, and thence looks upon them as a diſtinct white. He aſſerts, that their relation to the yolk is not the ſame that has been deſcribed even by the moſt modern authors; they are not, he ſays, ſituated at the two oppoſite poles of this globe; but divide its circumference in two ſegments, of which the difference in extent is very remarkable, and is in the proportion of 24 to 100.

In ſpeaking of the cords themſelves, he ſays, they never have been deſcribed but by him; although, in his own language, he had before him the deſcription of Maître Jean, who ſays, "Ils ſemblent naitre l'un & l'autre de la membrane, qui recouvre le jaune, par un pedicule qui ſemble compoſé de *deux petit cordons*, ou boyaux entortillés *comme une corde*." (Obſervations ſur la Formation du Poulet, p. 15.)

Leveillé proceeds to ſay of theſe two cords, one is purely membranous, twiſted upon itſelf, and joined to the membrane of the yolk, from which it is eaſily detached by diſſection or the ſtaleneſs of the egg; this cord is often wanting. The other is truly vaſcular, twiſted on itſelf, and formed like an umbilical cord; it is continuous and incorporated with the membrane of the yolk, one cannot ſeparate it without breaking this particular tunic, and opening the cavity which contains the yolk. It is always to be obſerved in freſh eggs; but in thoſe long kept, it is, as it were, macerated and detached. It is to this detachment and diſorganization produced by time, that we attribute the want of ſucceſs in incubation; it is this conduit which explains the point of communication between the yolk and the white. Its vaſcular ſtructure is not equivocal, if after having divided it in a tranſverſe direction it be obſerved with the naked eye, as we have done in the preſence of Cuvier, or examined with a magnifying lens of ſmall powers. Sometimes we have ſeen it injected with a yellow fluid, and upon this point we claim the teſtimony of Déyeux. The free extremity of this cord is pencillous and divided into an infinite number of very ſmall filaments, which may be conſidered as the ramifications of the principal trunk, intended to form ſo many ſuckers calculated to abſorb the moſt fluid part of the albuminous ſubſtance. (Diſſertation Phyſiologique ſur la Nutrition des Fœtus conſidérés dans les Mammiferes & dans les Oiſeaux, par J. B. F. Leveillé, &c. &c. Journal de Phyſique, tome v. Floreal, an. 7.) M. Leveillé aſſumes this explanation of the uſes of the albuminous cords, as an original diſcovery; although Maitre Jean had long ſince declared a ſimilar opinion in theſe words: "Quoique j'appelle ligamens ces deux appendices qui ſont aux deux côtes du jaune, je n'eſtime pas que leur ſeul uſage ſoit d'attacher le blanc au jaune, mais qu'ils ſervent encore à préparer le blanc ou à le filtrer & le conduire dans le jaune."

With reſpect to the points of attachment of the two albuminous cords to the membrane of the yolk, we have no heſitation in ſaying, that Leveillé has mis-ſtated the fact, and that they are placed at the poles of the yolk, and as near as may be, in the words of Maitre Jean, diametrically oppoſite (diametralement oppoſés.)

We have repeatedly examined the albuminous cords with the view of diſcovering the vaſcularity of one of them, as ſtated by Leveillé, but have never been able to perceive it; although the obſervations were conducted with much care and attention, and made under a variety of circumſtances, and with glaſſes of different magnifying powers; we have alſo made ſeveral attempts to inject the cords with coloured fluids, in both directions, but without ſucceſs. We are, therefore, led to conclude, that there is no veſſel in either of the chalazes; for we entertain but little inclination to credit the evidence of Leveillé reſpecting this circumſtance, from finding his repreſentations ſo erroneous in general, ſo much ſo indeed, that we ſhould not have thought it neceſſary to have noticed his opinions at all, had he not aſſociated with them the reſpectable names of Cuvier and Déyeux.

Leveillé has ſaid likewiſe, that the chalazes are covered with a membrane; this, however, is not viſible even during incubation, although at that time the membranes become ſo much ſtronger; and its exiſtence does not ſeem probable, as the denſe albumen of which the chalazes are compoſed is gradually loſt in the common ſubſtance of the principal white.

The yolk, or *vitellus*, is that well known ſpherical yellow maſs which occupies the centre of the egg; it is incloſed in an extremely thin but denſe membrane, which is apparently without fibres, and is inelaſtic; this membrane is at all times really double, but it is extremely difficult to demonſtrate the internal layer previous to incubation.

The globe of the yolk, as before ſtated, is enveloped by the white; it is not, however, ſituated exactly in the centre of the albumen, but ſomewhat nearer the great than the ſmall end of the egg; and it is always found near the ſuperior ſurface of the albumen in whatever way the egg may be placed.

The yolk varies a good deal in ſize, it is occaſionally found double. It is always a ſmaller maſs in the egg of birds than the white, which was obſerved by Ariſtotle, although ſome late writers have expreſſed doubts with reſpect to this circumſtance. Its abſolute weight is conſiderably leſs than that of the white. An entire egg weighs uſually about two ounces. In one inſtance, where we weighed the parts ſeparately, the white was found to be one ounce one drachm and five grains, and the yolk only five drachms and fifty-ſeven grains; the white, therefore, was three drachms and eight grains heavier than the yolk. When a given portion of the white and the yolk are compared, the latter is found to poſſeſs leſs weight than the former. It is in conſequence of the greater ſpecific gravity of the white that the yolk is always ſeen near its upper ſurface. If a yolk of an egg be thrown into a veſſel containing a quantity of albumen, it will be found to deſcend a little farther than it is obſerved to do in the white while in the egg; the circumſtance of its riſing ſo near the ſurface of the white in the egg, depends, therefore, probably in part, upon the manner in which theſe two ſubſtances are there connected with each other. If the covering of the yolk be ruptured, and the contents poured upon ſome albumen, it floats entirely on the ſurface, which ſeems to prove that it is the concentrated and globular form which preſerves the yolk under the ſurface of the white while in the egg.

The yolk is uſually of a bright yellow colour; but in ſome birds it is pale, in others it is a ſaffron colour, and a red-yellow in ſome others; it is always a much more fluid humour than the white.

The yolk has not the ſame ſtructure or compoſition throughout; the external part is of a deeper colour; it is leſs tenacious, and contains more oil. The centre is a clear yellow, is viſcid, and reſembles cream. When the yolk is boiled, the external part appears pale-coloured, porous, dry, and of a farinaceous texture, while the centre forms even a more firm coagulum than the albumen.

The ſubſtances into which the yolk is reſolvable, are water, oil, albumen, and gelatine; if after being boiled the yolk be heated in a pan, it ſoftens, and when ſqueezed between the fingers, drops of oil exude; if put into linen in this ſtate, and preſſed, an oil may be forced out. This oil is of a yellow colour, and inſipid, unleſs too much heat has been employed in preparing it. Its properties are thoſe of fixed oil, or rather of ſemi-fluid fat. Chandelier obtained this oil without the aſſiſtance of heat.

The reſidue, after the ſeparation of the oil, poſſeſſes the properties of albumen, though it is ſtill a little coloured by the remains of the oil; hence, when waſhed with water, a kind of emulſion is obtained. It is owing to the preſence of albumen that the yolk hardens when heated.

When this albumen is boiled in water, the liquid is ſaid to ſeparate a little gelatine. (Thomſon's Chemiſtry.)

Mr. Hatchet found, that when he boiled potas with yolk he obtained a pale olive-coloured concrete animal ſoap, which being diſſolved in water, and ſaturated with muriatic acid, was thrown down in the ſtate of fat; when burnt, the yolk left a ſmall reſiduum of phoſphat of lime and phoſphat of ſoda. (Phil. Tranſ. 1800)

Maitre Jean has obſerved, that if we harden in boiling water the eggs of young hens, in which the yolk is uſually a pale yellow; thoſe of a guinea hen, which have the yolk of a ſaffron colour; and ſome duck eggs, in which the yolk is a deep red-yellow: and if we afterwards take equal weights of each of theſe yolks, and extract the oil from them in the uſual manner, we ſhall obtain more oil from the yolks of the guinea hen than from thoſe of the pullet, and moſt of all from the yolks of the duck: from which experiment it may be concluded, that the yolk owes its colour, in a great meaſure, to the oil it contains.

Leveillé relates an experiment on the yolk, which he conſiders very curious and inexplicable. He ſtates, that he repeated it ſeveral times before Déyeux, Fourcroy, and Cuvier. He took the yolk of an egg, diveſted of its membrane, and agitated it in ſome water, which became, in conſequence, turbid and milky. Being ſuffered to ſtand for a few inſtants, the liquid became a very delicate red; this roſe-coloured tinge diſappeared as ſoon as all the yolk was diſſolved, and ſeemed to depend entirely upon the ſolution of the yolk in the water. (Journal de Phyſique, p. 395.)

It is well known, that the yolk of an egg acquires a reddiſh hue by being broken and expoſed to the air: may not, therefore, this change of colour, in both caſes, depend upon the abſorption of oxygen?

There is always to be ſeen upon the centre of the ſuperior ſurface of the yolk a *white ſpot*, which, when minutely examined, is obſerved to be formed of ſeveral concentric parts.

Maitre Jean deſcribes this appearance on the yolk under the name of *la tache blanchâtre*; but it is moſt commonly called the *cicatricula*. The latter appellation was given to it by Fabricius ab Aquapendénte, under the ſuppoſition, that the appearance was occaſioned by the ſeparation of the yolks from the peduncules which ſuſtain the capſules of the eggs in the ovary, in the ſame manner as we ſee a mark left upon a fruit at the place where the ſtalk was attached to it. The explanation of Fabricius was, however, perfectly erroneous, for the pedicles of the capſules have no ſuch connection with the ova; this was pointed out by Harvey, but the name of cicatricula has been ever ſince generally employed by writers on the ſubject notwithſtanding; Haller calls the central part of the white ſpot the *follicle of the yolk* (*follicule du jaune.*)

Maitre Jean gives the following deſcription of the cicatricula. Upon the ſuperficies, and uſually on the ſide of the large end of the egg, there is always to be obſerved a whitiſh ſpot, ſometimes round and ſometimes oblong and irregular; in the middle of which one may perceive another ſmall ſpot of an aſh-colour, which uſually correſponds in figure with the other; and in the centre of this laſt, and a little towards the ſide, there is a ſmall body of a little lighter colour than the other parts of the whitiſh ſpot, it is oblong, and a little folded, and ſeems to float in a liquor. Around the whitiſh ſpot there is a narrow grey circle, then another broader one of a yellowiſh colour, which is ſurrounded by another of a greyiſh hue, and laſtly, by a fourth circle, which is at firſt of a deep yellow, and becomes inſenſibly lighter, until it is loſt in the general colour of the yolk. The number of theſe circles is not always the ſame; it is ſometimes leſs, at others more, but whatever the number may be, the one diſtinguiſhed by the deep yellow colour always ſurrounds the others. (Obſervation du Poulet, p. 13.)

The obſcure aſh-coloured ſpot is the part which is particularly called cicatricula; becauſe, when the membrane is carefully removed, it is found to be a real depreſſion or cell in the ſubſtance of the yolk: this hollow, Maitre Jean deſcribes as being filled with a limpid fluid. Many authors have conſidered it as the amnios, and believed that it contained the rudiments of the chick. Haller was at great pains to prove that this follicle had no connection whatever with the amnios; and he aſſerts, that it does not even contain any fluid: we ſhall defer the diſcuſſion of theſe opinions until we treat of incubation; the changes which the cicatricula undergoes during that proceſs being highly illuſtrative of both the ſtructure and uſes of this part of the egg.

The *vital properties* of the egg muſt be neceſſarily obſcure before incubation has excited oſtenſible actions in the membranes and fluids; they muſt be confined to the maintenance of the proper organization of the ſeveral parts in oppoſition to the influence of temperature and ſome other external agents.

The power of generating heat was fully proved to exiſt in eggs, by ſome experiments of the late Mr. Hunter, which, as being highly intereſting, we ſhall quote at length.

"I had long ſuſpected," he ſays, "that the principle of life was not wholly confined to animals, or animal ſubſtance endowed with viſible organization and ſpontaneous motion; but I conceived, that the ſame principle exiſted in animal ſubſtances, devoid of apparent organization and motion, when the power of preſervation was ſimply required.

"I was led to this notion twenty years ago, when I was making drawings of the growth of the chick in the proceſs of incubation. I then obſerved, that whenever an egg was hatched, the yolk (which is not diminiſhed in the time of incubation) was always perfectly ſweet to the very laſt; and that part of the albumen which is not expended on the growth of the animal, ſome days before hatching, was alſo perfectly ſweet, although both were kept in a heat of 103°; in the hen's egg for three weeks, and in the duck's for four: but I obſerved, that if an egg was not hatched, that egg became putrid in nearly the ſame time with any other dead animal matter."

To determine how far eggs would ſtand other teſts of a living principle, I made the following experiments.

"Having put an egg into a cold about 0, which froze it, I then allowed it to thaw; from this proceſs I imagined, that the preſerving powers of the egg muſt be deſtroyed. I next put this egg into the cold mixture, and with it one newly laid; and the difference in freezing was ſeven minutes and a half; the freſh one taking ſo much longer time in freezing.

"A new laid egg was put into a cold atmoſphere fluctuating between 17° and 15°, it took above half an hour to freeze, but when thawed, and put into an atmoſphere at 25°, it froze in half the time. This experiment was repeated ſeveral times with nearly the ſame reſult."

To determine the comparative heat between a living and a dead egg, and alſo to determine whether a living egg be ſubject to the ſame laws with the more imperfect animals, I made the following experiments.

"A freſh egg, and one which had been frozen and thawed, were put into the cold mixture at 15°, the thawed one ſoon came to 32°, and began to ſwell and congeal. The freſh one ſunk to 29½°, and in 25 minutes after the dead one it roſe to 32°, and began to ſwell and freeze.

"From theſe experiments it appears, that a freſh egg has the power of reſiſting heat, cold, and putrefaction, in a degree equal to many of the more imperfect animals; and it is more than probable, this power ariſes from the ſame principle in both." (Hunter's Animal Œconomy, p. 106.)

The above experiments are very important in different points of view. They prove that vital temperature is not neceſſarily dependent upon the function of reſpiration, or any one analogous to it; for eggs, ſo far from requiring expoſure to air, are beſt kept entirely excluded from it: hence, when varniſhed or covered with tallow, their vitality may be maintained for an indefinite period. Theſe experiments likewiſe ſhew, that the humours of the egg are endowed with life as well as the membranes; for it is not to be ſuppoſed that any power of regulating temperature reſiding in the membranes alone could account for the phenomena related by Mr. Hunter. Had Blumenbach reflected upon theſe experiments, he would not have referred all the vital properties of the egg to the membranes. (Blumenbach's Lectures, M.S.)

Mr. Hunter's experiments further prove, that the evolution of animal heat does not require vaſcular action, for even ſuppoſing that inviſible veſſels exiſted in the membranes at all times, their influence could not be extended beyond theſe membranes.

It ſhould be added, that during the firſt hours of incubation, the fluid parts of the egg undergo certain changes in organic ſtructure, and that the membranes exhibit actions, and alter their form previous to the exiſtence of the veſſels. Every part, therefore, of the egg, except the external membrane and the ſhell, muſt be admitted to poſſeſs vital properties. See the articles OVUM, and INCUBATION *of the Egg*.

EGGS, *Analyſis of*, in *Chemiſtry* and *Pharmacy*. The *egg-ſhell* is carbonat of lime in a ſtate of very conſiderable purity, being mixed only with a little animal matter and a minute portion of phoſphat of lime. When egg-ſhells are digeſted with very dilute nitric acid, the whole diſſolves except a few flocculi of animal matter. If the clear ſolution be ſuperſaturated with pure ammonia, the ſmall trace of phoſphat of lime which was taken up by the acid is precipitated ſingly, after which, the carbonat of lime may be thrown down by any carbonated alkali.

The *white of the egg* has been generally conſidered as very pure *albumen*, the properties of which have been deſcribed under that article. It is, however, not perfectly pure albumen, as a more accurate chemical analyſis has detected ſeveral other ſubſtances. The lateſt and moſt exact is that of Dr. Boſtock.

The white of egg, even when quite freſh, turns ſyrup of violets to green, whence it is inferred to contain a ſmall portion of naked alkali, which (as in the bile, in ſerum, and ſome other animal fluids) is probably ſoda, and the quantity appears to be no more than about $\frac{1}{1000}$dth of the whole. The oxalic acid ſhews a ſmall proportion of lime in white of egg, which is probably contained in the form of phoſphat. When white of egg is heated it coagulates, and the properties of this coagulum, which may be conſidered as nearly pure *albumen*, have been deſcribed under this article.

It does not all coagulate however, for a portion, which is eſtimated by Dr. Boſtock at about a fourth of the whole, eſcapes this change. This part is entangled with the coagulum, but may be ſeparated by cutting the latter in ſlices, and digeſting it in boiling water, by which the uncoagulated portion is extracted. On adding to this watery ſolution ſome Goulard's extract, (or litharge diſſolved in vinegar,) a copious precipitate is formed, but no effect is produced either by infuſion of galls or corroſive mercurial muriat. If the watery ſolution be ſlowly evaporated, it does not gelatinoze on cooling when concentrated, as the watery ſolution of jelly does, but gradually inſpiſſates as the water eſcapes, and at laſt a hard brittle tranſparent matter is left behind, which more correſponds with the properties of animal mucilage than any other ſingle animal principle.

A faint ſmell of ſulphuretted hydrogen eſcapes from the watery ſolution of the white of egg when boiling, and the vapour blackens ſilver; whence ſulphur is inferred to be contained in the egg, though in an extremely minute quantity.

When the coagulated white of egg is kept for ſome days by a fire ſide, or in a temperature rather higher than that of a ſummer atmoſphere, it ſhrinks, hardens, becomes tranſparent, and of an amber yellow colour, and the conſiſtence of tough horn. In this ſtate it may be kept unchanged for an indefinite length of time. White of egg loſes by this drying proceſs no leſs than four-fifths of its weight on an average, which loſs is merely water.

Owing to this deſiccation of white of egg into a clear yellow hard ſubſtance, it is often uſed for varniſhing, and with very good effect.

The *yolk* of the egg is a ſtill more compounded fluid than the white. Its colour is yellow, and the taſte is bland and rich. It contains a large portion of albumen, whence it coagulates firmly, by the ſame heat which is ſufficient to harden the white, but it alſo contains a conſiderable portion of a clear inſipid oil, that may be extracted from the hardened yolk by preſſure. This oil (oleum ovorum) has been in ſome uſe in pharmacy, but is now obſolete. It is thus prepared. Take the yolks of any number of hard-boiled eggs, put them in a glazed earthen pan over a moderate fire, cruſh them to a paſte, and beat them with conſtant ſtirring, avoiding that degree of heat which would turn them red, till an oily matter ſweats out from their ſurface, and they ſwell prodigiouſly; then put them while ſtill hot into a hair bag under a preſs, the plates of which are heated by boiling water, and the clear oil will flow out, which is of a golden colour, a pleaſant ſmell, and a ſweet agreeable taſte. From fifty yolks of eggs, about five ounces of oil may be obtained.

The yolk of egg, when rubbed with any watery fluid, mixes with it uniformly into a ſmooth emulſion, and in this way alſo it ſerves as an intermede in pharmacy, to unite oily and reſinous ſubſtances with water for more convenient exhibition. See the preceding article.

Eggs, in *Diet*, ſerve for an agreeable and nouriſhing aliment; but it is neceſſary, that they ſhould be freſh and moderately coagulated by heat. If, upon holding them to a candle, they appear of a turbid colour, they are uſually reckoned ſtale; or if, upon preſenting them to the fire, they exhale a moiſture, they are freſh. As the ſubſtance of eggs affords a matter peculiarly ſuited to the formation of the young animal, it muſt be conſidered as containing a large proportion of nutritious matter; and, conſequently, any quantity of it taken into an animal body muſt be ſuppoſed to introduce a large proportion of ſuch matter. But as the white of egg is generally taken into the ſtomach in its coagulated ſtate, or even if it be taken in its liquid ſtate, the firſt change that happens to it there is its being coagulated, it muſt in all caſes be again diſſolved by the peculiar power of the gaſtric juice, probably for the purpoſe of its being mixed with other matters neceſſary to conſtitute the proper animal fluid. Dr. Cullen obſerves, (Mat. Med. vol. i.) that although it is ſurpriſing what a quantity of egg may be digeſted by ſome perſons, yet this power is in moſt caſes ſo limited, that a ſmaller bulk of this than of any other food, will ſatisfy and occupy the digeſtive powers of moſt men. He obſerves, at the ſame time, that egg ſeems to be a leſs alkaleſcent food than almoſt any other animal ſubſtance, and during its digeſtion to be leſs ſtimulant. With reſpect to the particular qualities of the eggs of different birds, he is diſpoſed to think, that they are not very different; and he is certain, that in many inſtances, the peculiar odour and taſte of the fleſh of the bird, are in no degree communicated to their eggs. He adds, however, that in certain different birds the colour of the yolks and the denſity of the coagulated whites are ſomewhat different from one another. The yolk is uſed in many medicinal preparations, as emulſions, &c.

Eggs, *Albumina*, or *whites of*, are of ſome uſe in medicine, though rather externally, in the preparation of collyriums for the eyes, and anacollemata, on account of their cooling, agglutinating, and aſtringent quality, than internally.

Albumina are uſed for burns, and in ſome mixtures with bole armenic, &c. for conſolidating freſh wounds, and under bandages, and compreſſes to prevent the luxation of bones after reduction. A late writer recommends them as a ſecret in the jaundice. Junc. Conſ. Therap. tab. xiii. p. 379. Quinc. Diſpenſ. part ii. § 12. p. 204. Ephem. Germ. dec. 3. an. 2. obſ. 35. p. 43.

Beſides medical, the whites of eggs have alſo their chemical uſes, *e. gr.* for the clarifying of liquors; to which purpoſe being mixed, and incorporated with the liquors to be clarified, and the whole afterwards boiled, the whites of eggs are by this means brought together, and hardened, and thus carry off the groſs parts of the liquor along with them. They likewiſe form a very white and ſhining varniſh, which is applied to ſeveral kinds of work, and particularly to pictures.

Egg-*ſhell white*, in *Painting*, is ſometimes uſed in water-colours, and preferred to flake or the Troy-white: it is prepared by peeling off the inner ſkins, and levigating the ſhell to a proper fineneſs, and waſhing over the powder.

Egg, what is termed *centeninum ovum*, among *Naturaliſts*, denotes a ſort of hen's egg, much ſmaller than ordinary, vulgarly called a "cock's egg," from which it has been fabulouſly held, that the cockatrice or baſiliſk was produced. Brown, Vulg. Err. lib. iii. cap. 7.

The name is taken from an opinion, that theſe are the laſt eggs which hens lay, having laid a hundred before; whence centeninum, *q. d.* the hundredth egg.

Theſe eggs have no yolks, but in other reſpects are like common eggs, having the albumen, chalazes, membranes, &c. in common with others.

In the place of the yolk is found a body reſembling a little ſerpent, coiled up, which doubtleſs gave riſe to the tradition of the baſiliſk's origin from hence.

Their formation is probably aſcribed by Harvey to this, that the yolks in the vitellary of the hen are exhauſted before the albumina. Harvey De Generat. Animal. Exerc. 12.

M. La Peyronie has carried the hiſtory of the ova centenina to a greater length, as well as certainty; a hen was brought to him, which, for a conſiderable time, laid no other eggs. The ſame hen was alſo obſerved to crow like a cock, and to render by the cloaca a thin yellow matter, much like the yolk of an egg diluted in water. Upon opening her, ſhe was found hydropical; a bladder as big as the fiſt, full of water, was found contiguous to the oviduct, which it preſſed and crowded in ſuch manner, as not to leave the cavity thereof above five lines in diameter; ſo that a common egg, ſuch as it is when it falls from the ovary into the tube, could not paſs without burſting, by which the yolk was let out, and diſcharged another way. Mem. Acad. Scienc. an. 1710. p. 730.

Eggs, *preſervation of.* M. de Reaumur, of the Paris academy, thinking nothing that could be a public benefit beneath the cognizance of a philoſopher, beſtowed conſiderable pains on finding a method of preſerving eggs for a long time, and ſucceeded at length ſo far in it, as to be able to produce eggs of months, nay years old, which taſted as freſh and well as if they had been laid but the day before. The egg always is quite full, when it is firſt laid by the hen, but from that time it gradually becomes leſs and leſs to its decay; and however compact and cloſe its ſhell may appear, it is nevertheleſs perforated with a multitude of ſmall holes, though too minute for the diſcernment of our eyes. The effect of theſe, however, is evident, by the daily decreaſe of matter within the egg, from the time of its being laid, a fluid matter is continually perſpiring through theſe perforations of the ſhell, which occaſions the decay; and this is carried on in a much quicker manner in hot weather than in cold. To preſerve the egg freſh, there needs no more to be done than to preſerve it full, and ſtop its tranſpiration; and the plain and rational method of doing this, is by ſtopping up theſe pores through which the matter tranſpires, with a matter which is not ſoluble in watery fluids, and therefore cannot be waſhed away by the matter perſpired by the egg; and on this principle, all kinds of varniſh, prepared with ſpirit of wine, will preſerve eggs freſh for a long time, if they are carefully rubbed all over the ſhell. This might ſeem to moſt people a very common and cheap ſubſtance for this purpoſe; but the misfortune is, that in country places, where it ſhould be put in practice, no ſuch thing is to be had: and the poorer ſort of country people are not eaſily brought into the uſe of any thing to which they are not accuſtomed.

To obviate the difficulty ariſing from this, Mr. Reaumur thought of ſubſtituting in the place of varniſh ſome other ſubſtance more common; and ſoon found, that another ſubſtance, which is very cheap, and every where to be had, would very well ſupply the office of varniſh; for experiments proved, that any hard fat would have the ſame effect. The beſt of all fat for this purpoſe, is found to be a mixture of that of mutton and of beef; theſe ſhould be melted together over the fire, and ſtrained through a linen cloth into an earthen pan; and when thoroughly melted, an egg is to be dipped into it, and immediately taken out again; and it is then in a ſtate to keep perfectly freſh more than a twelvemonth. Memoirs Acad. Scienc. Par. 1735.

The only difficulty attending this method is, that the eggs cannot be ſo eaſily plunged into the fat, as that all their ſurfaces ſhall be covered by it; for if they are held in a pair of pincers, the parts of the egg where the pincers touch will be bare; but the eggs may be ſuſpended by a loop at the end of a thread, and by that means plunged in; and the thread being then coated over with the fat, as well as the ſurface of the egg, will preſerve that part which it covers as well as the coat of fat will the reſt. The great care is to uſe this means while the eggs are perfectly freſh; it ought indeed to be done on the very day when they are laid; for if the evaporation is begun, and the empty ſpace once made, there is room for a fermentation, which never terminates but in the deſtruction of the egg.

There is one advantage in this uſe of fat rather than varniſh, which is, that the eggs rubbed over with it boil as quick as if nothing had been done to them, the fat melting off as ſoon as they touch the hot water; whereas the varniſh not being ſoluble even in hot water, only becomes moiſtened by it, and ſtill hanging about the egg, prevents the tranſpiration of juices, neceſſary to bring the egg to that ſtate in which it is to be eat. When the egg, which has been preſerved by fat, is taken out of the water, there remains very little fattineſs upon it, and what there does is eaſily wiped off with a napkin, the egg is as nicely freſh as if laid but the day before, and no palate can diſtinguiſh the leaſt difference.

The method of preſerving them by means of fat, is greatly preferable alſo to that by varniſh, when they are intended for putting under a hen to be hatched; as the fat eaſily melts away by the heat, while the varniſh remains and impedes the hatching. By this means the eggs of foreign fowl might be ſent over and hatched here, whereby many beautiful and valuable birds may be naturalized among us.

At Tonquin they are ſaid to keep eggs entire for three years, by covering them up in a paſte made of aſhes and brine.

Eggs, *Ant.* See Ant.

Eggs *of Flies.* After the congreſs with the male, the female fly is ſeldom ſo much as twenty-four hours before ſhe begins to depoſit her eggs on ſome ſubſtance proper to give nouriſhment to the worms that are to be produced from them.

The eggs are but a little time in hatching; and the growth, and all the changes of the animal, take up but a little time. The creature is found to make its way out of the upper part of the egg; and it is not more than three weeks from the laying of the egg that is taken up, before the creature is ſeen in the form of a perfect fly, if a female, and ready to depoſit hers.

Among the butterfly claſs the female has but one congreſs with the male by which the eggs are fecundated, and immediately after it begins to depoſit her eggs, and continues ſo doing, without interruption, till ſhe has finiſhed; but it is much otherwiſe with the two-winged flies; for they, after having laid one ſet of eggs, have repeated congreſſes with the male for ſeveral days; and after every one of theſe, lay a new ſet.

The female of the butterfly claſs does not depoſit her eggs on any plant at random, on which ſhe happened to be placed when the male coupled with her, but ſearches out ſuch a ſpecies of plant for leaving them on, as is what ſhe loved when in the caterpillar ſtate, and what the young caterpillars to be hatched from them will be able to feed on, that they may find food ready for them at the moment of their birth. She does not ſcatter them about irregularly, and without order, but ſhe diſpoſes them with perfect ſymmetry, and faſtens them one to another, not by their own glutinous nature, but by a viſcid liquor, which ſhe ſeparates for that purpoſe. In many ſpecies alſo, where the hinder part of the body of the female is covered with long hairs, ſhe by degrees throws off all thoſe hairs, and with them makes a neſt for the eggs ſhe is laying, where they are kept very ſoft and ſafely till the time of their hatching. This, indeed, is the whole buſineſs of her life; and when the eggs are all laid, ſhe dies. Memoirs Acad. Scienc. Par. 1736.

The eggs of butterflies are of very different ſizes, according to the ſpecies; they are alſo of many different figures, ſome are ſpheric, others ſegments of ſpheres, others conic, in different forms and degrees: nor is this all, their ſurfaces are very different alſo in the different kinds. Some are elegantly wrought, as it were; ſome dented, and others more deeply notched at the ſides; and others channelled or furrowed all over. In ſhort, the moſt ingenious artiſt could ſcarcely contrive ſo many various ornaments as there are on theſe eggs, all which alſo are inviſible to the naked eye, being diſcoverable no way but by the microſcope.

The eggs of the different ſpecies of the two-winged flies are alſo of very different figures.

There are ſome ſpecies which faſten their eggs to the ſides of veſſels of water: theſe all lay oblong eggs: ſome of them, however, are perfectly ſmooth in all parts; and thoſe of other ſpecies ſmooth only in their inner ſurface, and ridged longitudinally on the other. What is alſo the more remarkable in theſe, is, that they all have a fine thin flake running down all along the two ſides, diametrically oppoſite; and theſe two bands ſurrounding the whole egg in this manner, have much the appearance of a caſe, and give the egg the appearance of being encloſed in a paper frame. It is probable that the uſe of this frame is to hold the body of the egg the better faſtened againſt the veſſel; and probably thoſe eggs which have it not, are depoſited from the body of the female fly with a viſcous matter about them, in ſufficient quantity to faſten them on without this aſſiſtance.

There are ſome eggs of the fly kingdom which muſt neceſſarily be held faſt to ſome other body, in order for the worm to be able to make his efforts towards the opening of them, without carrying them away; and ſome of the ſpecies require much more ſtrong attachments of this kind than others.

On the ſtalks of the common meadow graſſes there are alſo frequently found the eggs of flies depoſited in great numbers. On other ſtalks of graſs, one may often ſee alſo yellow ſpots and blotches, which may naturally enough paſs with an incurious obſerver for maladies of the plants; but when examined with the microſcope, they appear to be, in reality, cluſters of eggs, and amaſſed in different numbers: ſometimes alſo they are formed perfect and whole, and at others, with their ends eaten. Theſe laſt are ſuch eggs from which the worms have made their way. Theſe worms are white, and have a variable head, armed with two hooks, but their changes are not known. Reaumur, Hiſt. Inſect. vol. iv. p. 376—383.

EGGS *of Gnats.* There are few creatures in the winged kingdom more prolific than the gnat. Its whole ſeries of changes, from the egg to the perfect animal, is uſually accompliſhed in three weeks or a month; and there are commonly ſeven generations of them in a year, in each of which every female is the parent of two or three hundred young ones, if all the eggs come to proper maturity. Theſe eggs are arranged by the animals in the form of a ſmall boat, and each ſeparate egg is of the ſhape of a ninepin. The thicker ends of theſe are placed downwards; they are all firmly joined to one another by their middles; and their narrower, or pointed parts, ſtand upwards, and make the upper ſurface of the boat of eggs, as it were, rough or prickly.

When theſe eggs are examined ſingly by the microſcope, they appear not exactly of the ninepin ſhape: the larger end is rounded, and terminated by a ſhort neck, the end of which is bordered with a ridge, which makes a kind of mouth. The neck of each of theſe is ſunk within the water on which the boat ſwims; for it is neceſſary that it ſhould keep on the ſurface, ſince, if wholly ſubmerged, the worms could never be hatched.

It is only in the morning hours that the gnats are to be found laying their eggs; and then they will frequently be found about the ſurfaces of ſuch waters as are in a proper condition to give ſupport to their young. The female gnat here places herſelf on a ſmall ſtick, the fragment of a leaf, or any other ſuch matter, uſually near the water's edge, and places her body in ſuch a manner, that the laſt ring but one touches the ſurface of the water; the laſt ring of all, where there is the paſſage for the eggs, is turned upward, and every egg is thruſt out vertically: and the creature, when it is almoſt diſengaged, applies it againſt the ſides of the already formed cluſters, to which it readily adheres, by means of mucilaginous ſticking matter with which it is naturally covered, like the eggs of many other inſects. The greateſt difficulty to the creature is, the placing of the firſt laid eggs in a proper poſition to receive the reſt, and ſuſtain themſelves and them in a proper direction; theſe ſhe with great precaution places exactly by means of her hinder leg; and when a ſufficient number of them are thus arranged together, the reſt is eaſy, becauſe they ſerve as a ſupport to all the following. Reaumur, vol. iv. p. 615, &c.

EGGS, *Hatching of.* See HATCHING.

EGG, *Wind.* See WIND *Egg.*

EGG, *Sea, Echinus Marinus.* See ECHINODERMA.

EGG, *Cows,* is a name which ſome authors give to a kind of bezoard, found in the ſtomach of the cow kind.

EGG, in *Architecture,* an ornament of an oval form, cut in the echinus, or quarter round of the Ionic and Compoſite capitals. The profile, or contour of the echinus, is enriched with eggs and anchors, alternately plated.

EGG, in *Geography,* a town of Norway; 48 miles E.N.E. of Drontheim.

EGG, one of the weſtern iſlands of Scotland, about 10 miles in circumference; 4 miles S. of Sky. This iſland and Canna are the only popiſh iſlands.

EGG *Harbour,* a town of America, in Glouceſter county, New Jerſey, on Great Egg harbour, famous for the exportation of pine and cedar.

EGG *Harbour river, Great,* a river of America, which riſes between Glouceſter and Cumberland counties, in New Jerſey; and which, after running E. S. E. a few miles, becomes the line of ſeparation between cape May and Glouceſter counties, and falls into a bay of its own name. The inlet from the Atlantic ocean lies in 39° 22′. This river is navigable 20 miles for veſſels of 40 tons, and abounds with various kinds of fiſh, adapted to the market at Philadelphia.

EGG *Harbour inlet, Little,* lies about 17 miles N. E. of Great Egg harbour inlet. It receives Mulicus river, which riſes in Glouceſter and Burlington counties, and forms part of the ſeparating line, a few miles from the bay. It is navigable 20 miles for veſſels of 60 tons. The townſhip of "Little Egg harbour," in Burlington county, conſiſts of about 23 000 acres of barren and unimproved land. The compact part of the townſhip is called "Clam Town." It has a ſmall trade to the Weſt Indies.

EGG *Iſland,* an iſland on the N. E. ſide of Delaware-bay, in Cumberland county.

EGG *Bird,* in *Ornithology,* the STERNA *fuliginoſa;* which ſee.

EGG-*Plant,* in *Botany.* See SOLANUM.

EGGE, in *Geography*, a river of Germany, which runs into the Danube, between Dettingen and Hockſtet.

EGGENBERG, a town of Germany, in the duchy of Stiria; three miles W. N. W. of Graz.

EGGERON, a town of Egypt; ſeven miles S. of Atfieh.

EGGYNA, in *Ancient Geography*, a town of Sicily, mentioned by Cicero.

EGHAM, in *Geography*, a pariſh in the hundred of Godley and Chertſey, Surry, England, is ſituated on the ſouth bank of the river Thames, at the diſtance of 18 miles from London. In 1801, the pariſh contained 363 houſes, and 2190 inhabitants. The place is a great thoroughfare between the metropolis and the ſouth-weſtern counties of England. In the vicinity of Egham is Runnymead, a place memorable in the Engliſh annals, for the ratification of Magna Charta by king John. The ſame field or meadow is now occaſionally uſed as a race-courſe. Near the weſtern extremity of this pariſh is Camomile-hill, a place ſo named from the quantity of camomile which has been cultivated here, and now grows wild.

EGILSHA, one of the Orkney iſlands, about ſix miles in circumference, E. of Ronſa.

EGINA, in *Ancient Geography*. See ÆGINA.

EGINHART, in *Biography*, the moſt ancient German hiſtorian, who flouriſhed in the ninth century, was educated with the ſons of Charlemagne. To this great ſovereign he afterwards became ſecretary and ſon-in-law. He appointed him ſuperintendant of his buildings, and ſent him to Rome in 806, as his agent with pope Leo III. Upon the death of Charlemagne he was taken into the confidence of Lewis le Debonnaire, who entruſted him with the education of his ſons, and ſettled upon him ample eſtates. Eginhart, being now well provided for, devoted himſelf to religious concerns, was placed at the head of the monaſteries, and became abbot of Selingeſtadt. Notwithſtanding the partiality which he had for retirement, he was frequently called to the court of his ſovereign, to give advice and direction in affairs of moment. At length, he was permitted to renounce all ſecular affairs, and ſhut himſelf up in his monaſtery, maintaining no other correſpondence but with a few men of letters in foreign countries. He died in the year 839, leaving behind him a life of Charlemagne, written in the Latin language, and with a purity of ſtyle which was uncommon in that age. Its impartiality and veracity have been called in queſtion, but the editor, it is ſaid, took unwarrantable liberties with it in altering the language. Suetonius was the model which our hiſtorian chiefly looked to in the compoſition of his work. Eginhart compiled the annals of France from the year 741 to 829: theſe, and his memoir of Charlemagne, were inſerted by Bouquet in his collection of French hiſtorians. He left behind him likewiſe 62 epiſtles, which relate to the hiſtory of the times in which he flouriſhed, and which were publiſhed at Frankfort in the year 1714. Moreri. Bayle.

EGLANTERIA, EGLENTERIA, *Englanteria*, or *Eſglanterium*, in *Botany*, the name of a ſpecies of Roſe, corrupted, as it appears, from the French Eglentier, or Eglantier, of whoſe derivation we are ignorant. In Engliſh Eglantine or Eglentine. Turner's herbal. 193. Theſe names unqueſtionably belong to the common Engliſh Sweet Briar, or *Roſa ſylveſtris foliis odoratis*, Bauh. Pin. 483; *R. foliis odoratis, Eglentina dicta*, Bauh. Hiſt. v. 2. 41. *R. rubiginoſa*, Linn. Mant. 2. 564. Sm. Fl. Brit. 540. Engl. Bot. t. 991. This therefore is what moſt authors have taken for *R. Eglanteria* of Linnæus, all whoſe ſynonyms in the firſt edition of Sp. Pl., and conſequently the ſpecific character taken from Haller, belong to it. We learn alſo from Dr. Afzelius's Diſſertation on Swediſh Roſes, in Sims and Konig's Annals of Botany, v. 2. 213, that this is the true Swediſh plant, *R. Eglanteria*, Linn. Fl. Suec. ed. 2. 171. except that the deſcription following the place of growth, is accidentally made from another ſpecies, not found in Sweden, the Yellow Briar, or *R. lutea ſimplex* of Bauhin's Pinax. Now it unfortunately happened that Linnæus originally confounded this Yellow Briar with our Sweet Briar, both having highly fragrant leaves, and he being really, at that time, very ſlightly acquainted with Roſes at all. Accordingly the original marked and numbered ſpecimens of *R. Eglanteria* in his herbarium, are this Yellow Briar, of which an excellent figure may be ſeen in Curtis's Magazine, t. 363. Long afterwards he received from Mygind ſpecimens of our Sweet Briar, which he deſcribed at the end of his ſecond Mantiſſa, by the very apt name of *R. rubiginoſa*, derived from its ſpecific character and Haller's ſynonym. He takes care to diſtinguiſh it from his *Eglanteria*, though by a ſtrange fatality he quotes Bauhin's *R. lutea* as a ſynonym, confounding, moreover, the ſingle and double yellow roſes of that author together, though none can be more diſtinct.

Of all this we have long ago been ſufficiently aware, though entirely obliged to our learned friend for aſcertaining the Swediſh plant, nor was it without due conſideration that we determined to abide by the deciſion of the able authors and editors of the Hortus Kewenſis. to which we ſtill beg leave to adhere. We therefore retain the name of *Roſa rubiginoſa* for our Sweet Briar, as being indiſputably certain, peculiarly expreſſive, and now ſanctioned by Jacquin, Roth, Willdenow, indeed by general uſe. Lightfoot named it *R. ſuavifolia*, which is at leaſt equally applicable to the Yellow Briar, and has been followed in the Flora Danica only. But on the other hand, we do not follow even Linnæus in his errors, nor apply the word *Eglanteria* to a wrong plant. The Yellow Briar is beſt named *Roſa lutea* after all the old authors, an appellation firſt adopted by Miller, nor is there any occaſion to call it *foetida* with Allioni, though we agree with thoſe who think the ſmell of its flower unpleaſant; eſpecially as the foliage is ſo very ſweet. Neither can any ambiguity ariſe between it and the Double Yellow Roſe, ſo well named *ſulphurea* in the Hortus Kewenſis, where it was firſt properly diſcriminated. Ehrhart indeed called this laſt *glaucophylla* and our Yellow Briar *chlorophylla*, expreſſive names, but altogether ſuperfluous. Even the confuſion of Engliſh names, which Mr. Curtis dreaded, ſee his Magazine, t. 363, is avoided by terming one a Briar the other a Roſe, which is perfectly correct. On turning to Lamarck's Flore Francoiſe in hopes of learning ſomething of the derivation or meaning of the word églantier, but in vain, we perceive he has taken the orange-coloured variety of *R. lutea*, or Auſtrian Roſe, Curt. Mag. t. 1077, for Linnæus's *rubiginoſa*, an error as remarkable as his making the Apple Roſe, or *R. villoſa*, a variety of the Sweet Briar. For the uſe of thoſe who may hereafter write in this work the difficult article ROSA, we muſt proteſt againſt a miſtake of our excellent friend Afzelius, in making our *R. tomentoſa* the real *villoſa* of Linnæus. The latter ſpecies depends altogether on his ſynonyms, and is the large Apple Roſe ſo common in gardens, and wild in the north of England, from which we firſt, in Fl. Brit., diſtinguiſhed this *tomentoſa*. We know our friend's candour will excuſe us, and we look with anxiety for the ſequel of his remarks, to confirm the ſuggeſtions, or diſpel the doubts, in his admirable eſſay.

Ambiguity reſpecting the Eglantine is not confined to ſyſtematic botaniſts. Our great poet in his Allegro has confounded it with the Woodbine or Honeyſuckle, as Mr. Curtis has well remarked in his Flora Londinenſis, faſc. 1. t. 15.

> "Through the ſweet-briar, or the vine,
> Or the twiſted eglantine."

We have not been able to find any thing in the old herbals to account for this miſtake in a writer uſually ſo ſupremely accurate, nor do the Italians, with whom he was ſo converſant, throw any light upon this matter. They ſeem not even to have adopted the word eglantine in any ſhape, but have appropriate names for the Sweet Briar and Woodbine. Shakeſpear, in his Midſummer Night's Dream, and Cymbeline, evidently uſes the word in queſtion according to its common acceptation. S.

EGLANTINE. See Eglanteria.

EGLETONS, in *Geography*, a ſmall town of France, in the department of the Correze, chief place of a canton in the diſtrict of Tulles; 18 miles N. E. of Tulles, 12 miles W. of Neuvic, with a population of 886 individuals. The canton contains ſeven communes, and 5331 inhabitants, on a territorial extent of 145 kiliometres.

EGLISAU, a ſmall town of Switzerland, in the canton of Zurich, on the north ſide of the Rhine, in the diſtrict of the ſame name, remarkable for being more ſubject to earthquakes than any other part of Switzerland. It is a great thoroughfare from Switzerland to Germany.

EGLISE neuve sur Billon, a ſmall town of France, in the department of the Puy-de-Dôme; 18 miles S. E. of Clermont.

EGLON, in *Ancient Geography*, a royal town of Paleſtine, in the tribe of Judah, which, in the time of Euſebius, was merely a village, E. of Eleutheropolis.

EGMONT, Justus Van, in *Biography*, a painter of hiſtory, born at Leyden, but moſtly employed in France by Lewis XIII. and XIV. in the eſtabliſhment of the royal academy of painting and ſculpture at Paris. He aſſiſted Vouit in many of his hiſtorical works, and painted many of his own compoſition in large and ſmall, for which he was highly eſteemed and liberally rewarded by the French monarch. He died in 1674, aged 72.

Egmont, Lamoral *Count of*, a nobleman of great diſtinction in Flanders, was born in 1522, and at an early age devoted himſelf to the profeſſion of arms. He accompanied Charles V. into Africa in 1541, and was made captain-general of the lances. In 1546 he went to the emperor's aſſiſtance againſt the proteſtant princes of Germany, and attended him to the diet of Augſburg. He next came to England, as ambaſſador, to conclude the marriage between queen Mary and Philip II. By this ſovereign he was appointed governor of Flanders and Artois, and general of the cavalry. From his conduct in war, and in negociation, he was very highly eſteemed at the commencement of the troubles in the Low Countries; and from his ſervices to the crown, and his attachment to the Roman catholic religion, might have been ſuppoſed to poſſeſs the favour of the court. But his devotedneſs to the ſovereign did not make him leſs the advocate of the rights of the people, which excited againſt him cruel enmities. Egmont united with the prince of Orange in oppoſition to the Spaniſh councils, by which the Low Countries were now to be governed: they, with count Horn, wrote letters to the king, charging cardinal Granvelle with a mal adminiſtration of affairs, who by their repreſentations was removed, but ſtill the ſame plans were adopted by the council. Egmont then went to the court of Spain, to lay before the king full information of the ſtate of affairs, and was received with every mark of confidence and outward eſteem: but his deſtruction was at the ſame time ſecretly determined on. He had vindicated the people's rights, a crime not to be forgotten, and when the duke of Alva was ſent over for the expreſs purpoſe of quaſhing by force all oppoſition, the prince of Orange in vain endeavoured to perſuade count Egmont to withdraw from the ſtorm. One of the firſt meaſures of the duke was to ſeize the counts Egmont and Horn, and to ſend them out of the province, contrary to the privileges of the meaneſt ſubjects, where they were kept in cuſtody, till a ſpecial commiſſion was made out to bring them to trial at Bruſſels. Trial and condemnation, in their caſe, were terms of the ſame import, and they were both publicly beheaded in June 1508, to the grief of the whole Flemiſh people. Egmont was only in his forty-ſixth year. The French ambaſſador wrote on the occaſion to his court, "I have ſeen that head fall which twice made France to tremble." Nouv. Dict. Hiſt.

Egmont, in *Geography*, a town of Holland, on the ſea-coaſt; three miles S.W. of Alcmaer.

Egmont *Bay*, a bay on the S.W. of the iſland of St. John, in the gulf of St. Lawrence. N. lat. 46° 30'. W. long. 64°.

Egmont *Iſland*, an iſland in the South Pacific ocean, diſcovered by Capt. Byron in 1767, and ſo called by him. S. lat. 19° 20'. W. long. 138° 30'.

Egmont, *Mount*, a lofty peak on the coaſt of New Zealand, ſituated in S. lat. 39° 16'. W. long. 185° 15'; and ſo called by Cook in 1770. It appeared to tower above the iſlands, and was coverd with ſnow. Its baſe ſeemed large, and it roſe with a gradual aſcent. Being near the ſea, ſurrounded by a flat country, and clothed with verdure and wood, it was the more conſpicuous. To the ſhore under it, which forms a large cape, he gave the name of "Cape Egmont."

Egmont, *Port*, is ſituated in Falkland iſland, and was ſo called by commodore Byron in 1765, who repreſents it as one of the fineſt harbours in the world. The mouth of it is S.E. diſtant ſeven leagues from a low rocky iſland, which is a good mark to know it by. Within inland, and about two miles from the ſhore, there is between 17 and 18 fathom water; and about three leagues to the weſtward of the harbour there is a remarkable white ſandy beach, off which a ſhip may anchor till there is an opportunity for running in. The whole navy of England, ſays the Commodore, might ride here in perfect ſecurity from all winds. In every part of port Egmont there is freſh water in the greateſt plenty. Geeſe, ducks, ſnipes, and other birds, are very numerous; wild celery and wood-ſorrel may be obtained in great abundance; nor is there any want of muſcles, clams, cockles, and limpits. Seals and penguins are innumerable, and the coaſt ſwarms with ſea-lions, many of which are of an enormous ſize.

EGNATIA, in *Ancient Geography*, a town of Italy, in the part called Peucetia, ſituated on the ſea-coaſt E. of Bœium, now called Agnazzo.—Alſo, an epiſcopal town of Africa, in the Byzacene territory.

EGNAZIO, Batista, in *Biography*, a learned Italian, was born at Venice of poor parents about the year 1478. Having received a good education, he opened a private ſchool, at which the belles lettres were to be taught, when he was only eighteen years of age. The ſucceſs and reputation which attended the labours of Egnazio excited the jealouſy of Sabellico, a public profeſſor of the ſame city; they became violent enemies, but on the death-bed of Sabellico a full reconciliation took place. Finding himſelf near his end, he ſent for Egnazio, beſought his forgiveneſs, and entruſted to his care his ten MS. books of "Examples." Theſe he publiſhed,

liſhed, and pronounced the funeral oration over the aſhes of Sabellico. Egnazio had now conferred upon him the right of citizenſhip, and was afterwards preſented with eccleſiaſtical preferment. In 1515 he was ſent with others to Milan, to compliment king Francis I. to whoſe honour Egnazio compoſed a panegyric, for which he was rewarded with a gold medal. In 1520 he was elected public profeſſor of eloquence at Venice, in oppoſition to many rival competitors. So high was his reputation in this department of literature, that he had frequently five hundred auditors to hear him daily. He was conſulted upon important affairs by the ſenators, who had a great opinion of his wiſdom. Towards the decline of life he was deſirous of reſigning his employment, but was perſuaded by the ſenators to continue, and his ſalary was augmented. He at length obtained his diſmiſſion, but enjoyed the emoluments of his office without any deduction. He died in 1553, at the age of 75. He was the author of many works, *viz.* "Orations," "Epiſtles," a treatiſe "De Romanis principibus vel Cæſaribus," containing the lives of the Roman emperors from Julius Cæſar to Palæologus, and from Charlemagne to Maximilian I.; a treatiſe "On the Origin of the Turks," and a work in nine books, "De exemplis Virorum illuſtrium." He was, as he grew old, very irritable; againſt Robertello, the perſon who had cenſured his writings, he drew his ſword, giving him a wound which had nearly proved fatal. Moreri.

EGOISTS, in the hiſtory of *Philoſophy*, a ſect of philoſophers in France, who ſprung up after Des Cartes, and who maintained that we have no evidence of the exiſtence of any thing but ourſelves. Theſe philoſophers are mentioned by many authors, and particularly by Buffier, in his "Treatiſe of Firſt Principles;" and they have followed the method of Des Cartes, in reſting upon the truth of their own thoughts as a firſt principle, agreeably to his maxim, "Cogito, ergo ſum," but requiring arguments for the proof of every other truth of a contingent nature; but none of them, excepting Mr. Locke, has expreſsly treated of firſt principles, or given any opinion of their utility or inutility. Their general opinion may be collected from their following Des Cartes in requiring proof, or pretending to offer proof of the exiſtence of a material world, which ſurely, ſays Dr. Reid, (Eſſays on the Intellectual Powers of Man, p. 642,) ought to be received as a firſt principle, if any thing be, beyond what we are conſcious of.

EGOITOS, a term uſed by Van Helmont to expreſs the light of underſtanding, by which we reflect and reaſon within ourſelves.

EGONA, in *Ancient Geography*, a river of Gaul.

EGORBEUSK, in *Geography*, a town of Ruſſia, in the government of Riazan; 28 miles N. of Riazan.

EGOREVSKOI, a town of Ruſſia; 40 miles N.E. of Kologrin.

EGOSA, in *Ancient Geography*, a town of Spain, in the Tarragoneſe territory.

EGRA, a town of Arabia, near the gulf of Aila.

EGRA *Water and Salt*, the celebrated mineral ſpring near Egra, in Bohemia, appears to be a clear ſparkling water, chalybeate when freſh taken from the ſpring, and which beſides contains a conſiderable quantity of a vitriolic ſalt, which is doubtleſs Glauber, and not Epſom ſalt, as it does not become turbid by an alkali. Beſides the great conſumption of the water at the ſpring head, much of it is evaporated on the ſpot, and the reſiduary ſalt, which is probably almoſt entirely ſulphat of ſoda, is ſold in Germany and Bohemia under the title of Egra ſalt. Both the water and ſalt are much extolled by Hoffmann, and they probably effect all that can be expected from a powerful ſaline chalybeate.

EGRA, in *Geography*. See EGER.

EGREMONT, a townſhip of America, in Berkſhire county, Maſſachuſetts, and incorporated in 1760, and containing 835 inhabitants; 145 miles W. of Boſton.

EGREMONT, a market town, and formerly a borough, in the ward of Allerdale, and county of Cumberland, England, is ſeated on a ſmall river which falls into the Iriſh ſea, near the promontory of St. Bee's. It is five miles from Whitehaven, and 289 from London, has a ſmall weekly market on Saturday, and one annual fair. In 1801 the town conſiſted of 319 houſes, which were occupied by 1515 inhabitants. Many of the houſes appear ancient, and ſome of them have piazzas in front. On a conſiderable eminence are the remains of an old caſtle; a part of which has been fitted up as a court, for the ſteward of the earl of Egremont, who is lord of the manor, and receives his title from the place. Hutchinſon's Hiſtory, &c. of Cumberland, 2 vols. 4to.

EGRET, in *Ornithology*, a ſpecies of ARDEA. See HERON.

EGREVILLE, in *Geography*, a town of France, in the department of the Seine and Marne, and diſtrict of Nemours; three leagues S.E. of Nemours.

EGRISELLES, a town of France, in the department of the Yonne, and diſtrict of Sens; ſeven miles S. of Sens.

EGUILETTE, in the *Manege*. See YERKING.

EGUILLES, in *Geography*, a town of France, in the department of the mouth of the Rhone, and diſtrict of Aix; two leagues N.W. of Aix.

EGUIMUHA, or ELGIMUHA, a town of Africa, in the empire of Morocco, at the foot of mount Atlas, near which is an iron mine.

EGUISCE'. See AIGUISCE.

EGUISHEM, in *Geography*, a ſmall town of France, in the department of the Upper Rhine; three miles ſouth of Colmar, and ſix miles N. of Rouffach.

EGUIZENSIS, in *Ancient Geography*, an epiſcopal ſee of Africa, in the pro-conſular province.

EGURENDE, in *Geography*, a town of France, in the department of the Correze, and diſtrict of Uſſel; four leagues N.E. of Uſſel.

EGUZON, a ſmall town of France, in the department of the Indre, chief place of a canton in the diſtrict of La Châtre, with a population of 1056 individuals. The canton has a territorial extent of 152½ kiliometres, 10 communes, and 6199 inhabitants.

EGYPT, a country of Africa, called by its ancient inhabitants Chemia, and by the Copts Chemi, from Ham, the ſon of Noah, as ſome have ſuppoſed, and in ſcripture denominated the land of Mizraim, whence the Arabians, and other oriental nations, ſtill call it Meſr. The Greek name Egypt has been derived by ſome from one of its kings, denominated Egyptus; by others from *aia*, ſignifying in Greek *a country*, and *Æcoptos*, ſoftened into Egyptus, and thus denoting "the land of the Copts;" and by others again from the blackneſs of its ſoil and the dark colour both of its river and inhabitants, ſuch a blackiſh colour being called by the Greeks *ægyptios*, from *gyps* and *ægyps*, a vulture, which is a bird of that hue. Egypt is bounded on the north by the Mediterranean ſea, on the ſouth by a chain of mountains, which ſeparates it from Nubia, on the eaſt by the Red ſea and the iſthmus of Suez, and on the weſt by the deſerts of Libya, in the midſt of which ſtood the temple of Jupiter Ammon. Its greateſt length, according to Savary's ſtatement, is from Sienna or Syene, ſituated almoſt under the tropic of Cancer, to cape Burlos, which, forming the moſt advanced point of the Delta, almoſt terminates the 32d degree of latitude. This diſtance is about 225 leagues. Its greateſt breadth is 68 leagues, drawing a right line from the ruins of Pelufa to the tower of the Arabs, formerly called Tapoſiris. This meaſure agrees with that of the ancients, which made the breadth of the Delta 54 leagues from Peluſium to Canopus, and 14 from Canopus to Tapoſiris. Accordingly Diodorus Siculus and Strabo allow the baſe of the Delta, extending from Peluſium to Canopus, now called Aboukir, 1300 furlongs, which may be eſtimated at 54 leagues, to which if we add 14 leagues from Canopus to the tower of the Arabs, we ſhall have 68 leagues. Herodotus reckons 60 ſchœni or 80 leagues from mount Caſius to the gulf of Plintine, where Tapoſiris was ſituated; but mount Caſius being 12 leagues to the eaſtward of Peluſium, by ſubtracting this number from the former, we obtain 68 leagues from Peluſium to Tapoſiris. Ancient and modern geographers have not been agreed as to the preciſe limits of this country. Accordingly ſome have aſſigned to its length from north to ſouth 500 miles, and to its breadth, including the greater and leſſer Oaſis, about half that meaſure. Egypt, however, is in reality a narrow vale on both ſides of the river Nile, bounded by parallel ridges of mountains or hills. Some of the ancient geographers have even heſitated to what portion of the globe they ſhould aſcribe Egypt. Ptolemy and Strabo, with the modern geographers, fix the iſthmus of Suez as the boundary of Aſia and Africa. Dionyſius, Mela, Pliny, Salluſt, Hirtius, and Solinus, have preferred for that purpoſe the weſtern branch of the Nile, or even the great Catabathmus, or deſcent, which laſt would aſſign to Aſia, not only Egypt, but part of Libya.

Ancient Egypt is divided by ſome into two parts, the Upper and the Lower Egypt, and by others into three parts, *viz.* the Upper Egypt, properly ſo called, or Thebais, now called Said; the Middle Egypt, or Heptanomis, now Voſtani; and the Lower Egypt, the beſt part of which was the Delta, now called Bahira or Rif. (See Thebais, Heptanomis, and Delta.) Beſides this larger diviſion, Egypt was alſo diſtributed into ſeveral governments or prefectures, called by the Egyptians "Tabir," and by the Greeks "Nomes;" the number of which is uncertain, as they depended upon the pleaſure of the reigning prince. In general they were about 36, and were named from the chief city of each nome. This diviſion is attributed to Seſoſtris.

Upper Egypt, according to the modern and commonly received diviſion of the country into Upper and Lower Egypt, is a long valley, commencing at Sienna or Syene, (Aſouan) and terminating at Grand Cairo. Two chains of mountains, taking their riſe from the eaſt cataract, form the limits of that country. Their direction is from ſouth to north, until they reach the latitude of Cairo, where they ſeparate to the right and to the left; one of them taking the direction of mount Colzoum, and the other ending in banks of ſand near Alexandria. The former is compoſed of high and ſteep rocks; the latter of ſandy hillocks, over a bed of calcareous ſtone. Beyond theſe mountains are deſerts, bounded by the Red ſea on the eaſt, and on the weſt by Africa, in the midſt of which is that long plain, which is no more than ſeven or nine leagues broad, where it is the wideſt. Here the Nile flows, between two inſurmountable barriers, with varied current, ſometimes ſmooth and tranquil, and at other times impetuous and overflowing the country, which it covers with its waters and fertilizes for the ſpace of 150 or 200 leagues. (See Nile.) This valley, in which the ſciences were firſt cultivated, and whence they were diffuſed through Greece and other parts of the world, is ſtill as fertile as it was in ancient times; but it is leſs cultivated, and many of its former cities, overwhelmed by deſpotiſm and ignorance, are laid level with the duſt, and their former celebrity is now chiefly known by their magnificent ruins. (See Thebais.) The capital of Upper Egypt is *Girge*, which ſee.

Lower Egypt comprehends the whole country between Cairo, the Mediterranean, the iſthmus of Suez, and Libya. This immenſe plain preſents, on the borders of its parching ſands, a ſtrip of land cultivated along the canals of the river, and in the middle the triangular iſland, to which the Greeks gave the name of Delta. (See Delta.) To deſcribe Egypt in two words, ſays Volney, let the reader imagine, on one ſide, a narrow ſea and rocks; on the other, immenſe plains of ſand; and in the middle, a river flowing through a valley of 150 leagues in length, and from three to ſeven wide, which, at the diſtance of 30 leagues from the ſea, ſeparates into two arms, the branches of which wander over a country, where they meet no obſtacles, and which is almoſt without declivity. We do not really enter Egypt, ſays this writer, until we arrive at Roſetta (Reſchid). There the ſands peculiar to Africa end, and a black, fat, and loamy ſoil, the diſtinguiſhing characteriſtic of Egypt, begins; and there alſo, for the firſt time, we behold the waters of the celebrated Nile, which, rolling between two ſteep banks, conſiderably reſembles the Seine, between Anteuil and Paſſy. The baſis of Egypt, from Syene (Aſouan) to the Mediterranean is a continued bed of calcareous ſtone, of a whitiſh hue, and ſomewhat ſoft, containing ſhells, analogous to thoſe found in the two neighbouring ſeas, and principally conſiſting of echini, volutes, bivalves, and a ſpecies in the form of lentils. The ſame kind of ſtone is diſcoverable in the pyramids, and in the Libyan rock on which they ſtand. It is likewiſe found in the ciſterns, in the catacombs of Alexandria, and in the projecting ſhelves upon the coaſt. It is alſo ſeen in the eaſtern mountain, in the latitude of Cairo, and in the materials with which that city is built. This calcareous ſtone forms the immenſe quarries that extend from Sawadi to Manfalout, for the ſpace of more than 25 leagues, as we learn from father Sicard; who alſo informs us, that marble is found in the valley of Carts, at the foot of the mountains bordering on the Red ſea, and in the mountains to the north-eaſt of Aſouan. Between that place and the Cataract are the principal quarries of red granite, which are continued lower down; becauſe, on the oppoſite ſhore of the Red ſea, the mountains of Oreb, of Sinai, and their dependencies, at two days' journey towards the north, are formed of this ſubſtance. Not far from Aſouan, to the north-weſt, is a quarry of Serpentine ſtone, employed in its native ſtate by the inhabitants for the manufacture of veſſels, which will ſtand the fire. In the ſame parallel, on the Red ſea, was formerly a mine of emeralds, the traces of which are now loſt. Copper is the only metal of this country mentioned by the ancients. In the road to Suez is found the greateſt quantity of what are called Egyptian flints, or pebbles, lying on calcareous ſtone, that is hard and ſonorous; and here are likewiſe diſcovered thoſe ſtones, which, from their form, have been taken for petrified wood. The two lakes of Natron are ſituated in the deſart of Shayat, or St. Macarius, to the weſt of the Delta. (See Natron.) In the midſt of theſe minerals, of various qualities, and in the midſt of that fine and reddiſh-coloured ſand peculiar to Africa, the earth of the valley through which the Nile flows, manifeſts properties, which prove it to be of a diſtinct claſs. Its blackiſh colour, and its clayey cementing quality, evince its foreign origin, and indicate its deſcent with the river from the heart of Abyſſinia. Without this fat and light mud, Egypt muſt have been altogether unproductive. This alone ſeems to contain the ſeeds of vegetation and fecundity, and theſe are owing to the river, by which they are depoſited.

The fertility of Egypt, and the excellence of its productions and fruits, are highly celebrated by ancient writers, and even by Moſes, who was well acquainted with this country. It abounds in grain of all ſorts, but particularly rice; inſomuch that it was formerly the granary of Rome and of Conſtantinople. The exports of rice are ſtill very conſiderable, and alſo great quantities of wheat from Upper Egypt, in favourable years. No oats are ſeen in Egypt; and the barley is conſumed by the horſes. The moſt plentiful parts of Egypt are the *Delta*, (which ſee,) and the province of Faïoum, (ſee Faioum,) ſuppoſed to be the ancient Heracleotic nome; the capital of which, of the ſame name, is thought to have been Heracleopolis, Nilopolis, or Arſinoe, and is ſaid by the natives to have been built by Joſeph, to whom they own themſelves obliged for the improvements of this territory. Being the loweſt part of Egypt, they ſay that it was nothing but a ſtanding pool, till that patriarch, by making drains, and particularly the great canal, which extends from the Nile to the lake Moeris, diſcharged the water, and clearing it of the ruſhes and marſhy weeds, rendered it fit for tillage. It is now the moſt fertile and beſt cultivated land in the whole kingdom, containing, as it is ſaid, above 360 villages, and yields linen, grapes, and other fruits in abundance; and it fails not bearing even in thoſe years, when the Nile's not riſing to its uſual height occaſions a ſcarcity in the other parts of Egypt. The flouriſhing ſtate of agriculture amongſt the ancient Egyptians ſufficiently appears from the immenſe works which they conſtructed for the diſtribution of their canals, and for watering the lands. At preſent there are reckoned 80 canals, like rivers, all dug by manual labour, ſeveral of which are 20, 30, and 40 leagues in length. Theſe receive the inundation, and circulate the waters through the country. The others, nearly choaked up, are dry, upon the fall of the Nile. The large lakes of Mœris, Behire, and Mareotis formed vaſt reſervoirs for containing the ſuperfluous waters, and for ſpreading them over the adjacent plains. They were raiſed upon the elevated grounds by means of vertical wheels, the invention of which is owing to the ſkill of the Egyptians. One ox was ſufficient to turn them, and to water an extenſive field. Beſides theſe reſervoirs, all the towns, at ſome diſtance from the Nile, were ſurrounded by ſpacious ponds, to ſupply the wants of the inhabitants, and for the advantage of cultivation. Some great dykes, the ruins of which are ſtill to be ſeen, ſerved to keep in the river: others were oppoſed to the torrents of ſand, which have a continual tendency to cover the face of Egypt. The waters are conveyed by aqueducts to the very ſummits of the hills. There they were received in immenſe baſons hewn out of the rocks, from which they flowed into the midſt of deſerts, and converted them into fruitful fields. However, in the period of 1200 years, during which this country has been ſubject to nations that have not directed their attention to cultivation, nor beſtowed much labour upon it; the greateſt part of the noble works of antiquity has decayed and gone to ruin; and the barbariſm of the preſent government tends to accelerate and complete their deſtruction. The limits of cultivated Egypt are encroached upon annually, and barren ſand is accumulating from all parts. In 1517, the era of the Turkiſh conqueſt, lake Mareotis was at no diſtance from the walls of Alexandria, and the canal which conveyed the waters into the city was ſtill navigable. At this day, the lake has diſappeared, and the lands watered by it, which, according to hiſtorians, produced abundance of corn, wine, and various fruits, are changed into deſerts, in which are found neither ſhrub, nor plant, nor verdure. The canal itſelf, the work of Alexander, neceſſary to the ſubſiſtence of the inhabitants of the city, which he built, is nearly choaked up, and preſerves the waters only when the inundation is at its greateſt height, and for a ſhort time. About half a century ago, part of the mud depoſited by the river was cleared out of it, and it retained the water three months longer. Schemes have lately been adopted for opening and perfecting this canal. The Peluſiac branch, which diſcharges itſelf into the eaſtern part of the lake of Tanais, or Menzalé, is utterly deſtroyed. With it periſhed the beautiful province which it fertilized, and the famous canal begun by Necos, and finiſhed by Ptolemy Philadelphus. The famous works, executed by kings, who ſought their glory and happineſs in the proſperity of the people, have not been able to reſiſt the ravages of conquerors, and that deſpotiſm, which deſtroys every thing, till it buries itſelf under the wreck of the kingdoms, whoſe foundation it has ſapped. The canal of Amrou, the laſt of the great works of Egypt, and which formed a communication between Foſtat and Colzeum, reaches at preſent no farther than about four leagues beyond Cairo, and loſes itſelf in the lake of Pilgrims. Upon the whole, it may be confidently affirmed, that upwards of one-third of the lands formerly in cultivation is metamorphoſed into dreary deſerts. For the cauſe and the fertilizing effects of the annual inundation of the Nile, we refer to the article Nile. This river, in Upper Egypt, is confined by high banks, which prevent any inundation into the adjacent country; and the caſe is the ſame in Lower Egypt, except at the extremities of the Delta, where the Nile is never more than a few feet below the ſurface of the ground, and where, of courſe, inundation takes place. Egypt is indebted for its fertility to the aſſiſtance of human art. The lands near the river are watered by machines; and if they extend to any breadth, canals have been cut; and, by means of canals, the Nile becomes the ſource of fertilization. The ſoil in general is ſo rich as to require no manure. One of the principal articles of cultivation in Lower Egypt is rice; which is ſown from the month of March to that of May. During the inundation of the Nile, the fields are covered by its waters, and for the purpoſe of retaining them, ſmall dikes or raiſed embankments are thrown up, round each field, to prevent their running off. Trenches are alſo dug in order to convey thither a freſh ſupply, in order to give the plant a conſtant watering. Rice is nearly ſix months before it arrives at maturity, and it is generally cut down before the middle of November. As the uſe of the flail is unknown in Egypt, the rice plants are ſpread in thick layers on floors, formed of earth and pigeons' dung, which are well beaten and very clean; and then, in order to ſeparate the grain from the ſtraw, they make uſe of a ſort of carts, conſtructed like our ſledges, with two pieces of wood joined together by two croſs bars. Between the longer ſides of this ſledge are fixed tranſverſely three rows of ſmall wheels, made of ſolid iron, and narrowed off towards their circumference. On the fore part is fixed a high ſeat, on which a man ſits, for the purpoſe of driving two oxen that are harneſſed to the machine, and thus moving it in a circular direction over every part of the heap of rice, till the grain is completely ſeparated from the ſtraw; the grain is then ſpread in the air to be dried. The dried rice is carried to the mill, where it is ſtripped of its chaff or huſk. This mill conſiſts of a wheel turned by oxen, which ſets ſeveral levers in motion; and at their extremity is an iron cylinder, about a foot long, and hollow underneath. Theſe cylinders beat in troughs which contain the grain; and at the ſide of each trough there ſtands a man, whoſe buſineſs it is to place the rice under the cylinders. The next operation is to ſift the rice in the open air, by filling a ſmall ſieve, which a man lifts over his head, and thus lets fall, with his face turned to the wind, which blows away the ſmall chaff or duſt. This cleaned rice is put a ſecond time into the mill, in order to bleach it; it is afterwards mixed up in troughs with ſome ſalt, which contributes very much to its whiteneſs, and alſo to its preſervation; and in this ſtate it is ſold. Rice is furniſhed in great quantities in the Delta; and that which is grown in the environs of Roſetta is more eſteemed, on account of its preparation, than that which is produced in the vicinity of Damietta. The produce of the one and the other is equally wonderful. In a good ſeaſon, that is, when the riſe of the Nile occaſions a great expanſion of its waters, the profit of the proprietors of rice fields is eſtimated at 50 per cent. clear of all expences. Savary ſays, that it produces eighty buſhels for one. As ſoon as the ground is cleared of the rice, the Egyptians ſow a fine variety of trefoil, (Trif. Alexandrinum of Forſkal,) which they call "barſim". Its ſeed is ſcattered without ploughing, or even turning up the ground, and it ſinks to a ſufficient depth in the moiſt ſoil. This trefoil produces three crops before the time for again ſowing the rice; and in its dry or green ſtate it is the moſt common and the moſt ſucculent food for cattle; both at paſture and in ſtalls. Of the various plants which have rendered Egypt celebrated for its ſuperior abundance, wheat claims the pre-eminence. We have already ſaid, that it was formerly the granary of Rome and Conſtantinople, and by their means, of neighbouring nations. At this day, Arabia derives from it the means of ſubſiſtence. The numerous caravans which ſet ſail from Upper Egypt for Coſſeir, a port on the Red ſea, carry nothing but corn. It is thence conveyed to Dsjedda, and diſtributed over part of Arabia. Wheat is ſown as ſoon as the waters of the Nile have retired from the lands appropriated to it; the ſeed-time varies with the latitude, and alſo the harveſt, which are earlier in Upper than in Lower Egypt. Near to Syene they ſow the barley and the corn in October, and reap it in January. Towards Girgé they cut it in February, and in the month of March in the vicinity of Cairo. This is the uſual progreſs of the harveſt in the Said. There is alſo a number of partial harveſts, as the lands are nearer or at a greater diſtance from the river, lower or more elevated. In the Lower Egypt they are ſowing and reaping all the year. Wherever the waters of the river can be procured, the earth is never idle, and furniſhes three crops annually. In deſcending from the cataracts in January, the corn is ſeen almoſt ripe; lower down it is in ear, and advancing further, the plains are covered with verdure. The cultivator, in general, merely caſts the ſeed upon the moiſtened earth; the corn ſoon ſprings up from the mud, its vegetation is rapid, and four months after it is ſown it is fit to be reaped. In performing this operation, the ſickle not being uſed, the ſtalks are pulled up by the roots, and carried to large floors, like thoſe which are uſed for treading out rice; and by a ſimilar operation the corn is ſeparated from the ear. Unripe ears of corn are dried and ſlackly baked in an oven, and being afterwards bruiſed and boiled with meat, form a common diſh in Lower Egypt, called "férik." As they have neither water-mills nor wind-mills in Egypt, the uſeful arts of the miller, and alſo of the baker, are here in the rudeſt ſtate of infancy. Their bread is made in ſmall thin cakes, and is unleavened; and is very ſlightly baked, ſo that it is heavy and difficult of digeſtion. In the towns they have a kind of loaves or cakes, ſome of which are covered with fennel-flower ſeeds, procured from Upper Egypt, which give them an aromatic flavour, and others are ſoft, pierced with holes, and ſprinkled with ſeſamum, or oily grain, which gives them an agreeable taſte. The culture of barley occupies a conſiderable portion of land throughout all Egypt: it is ripe a month earlier than the wheat, and its harveſt is equally abundant. This is the common food of horſes in Egypt, as it is in all parts of the Eaſt, where oats and rye are unknown. From the moſt remote periods flax has been in general uſe in Egypt; and it is a conſiderable article of cultivation and commerce. Its thread has been employed in the fabrication of the garments of a numerous people. A conſiderable quantity of cloth is manufactured from it at this day; and the plant, from which indigo is extracted for dyeing it, grows alſo in this country, where it is called 'Nile." Of the hemp, which is abundantly cultivated in this country, the inhabitants prepare intoxicating liquors, and alſo by pounding the fruits into thin membranous capſules, they form a paſte, which anſwers a ſimilar purpoſe; and they alſo mix the capſules with tobacco for ſmoking. The ſugar-cane is alſo one of the valuable productions of Egypt. The common people do not wait for the extraction of the ſugar, but eat the canes green, which are ſold in bundles in all the towns. They begin to ripen in October, but are not, in general, fit to be cut till November or December. The ſugar refineries are in a very imperfect ſtate. Fruit trees of various ſpecies abound in this country. Among theſe we may reckon the olive-tree, fig-trees which yield figs of an exquiſite flavour, and the date-tree, which is to be found every where in the Thebais and in the Delta, in the ſands as well as in the cultivated diſtricts, requiring little or no culture, and yielding a very conſiderable profit, on account of the immenſe conſumption of its fruit. The ſpecies of palm tree that furniſhes dates produces alſo a bark; which, together with its leaves and the rind of its fruit, afford filaments, from which are manufactured ropes and ſails for boats. The leaves are alſo uſed for making baſkets and other articles. The very long rib of the branches is employed, on account of its lightneſs and ſolidity, by the Mamaluks, in their military exerciſes, as javelins, which they throw at each other from their horſes when at full ſpeed. A ſpecies of Cyperus, which produces a fruit reſembling the earth-nut, but of a much more agreeable flavour, is cultivated in the environs of Roſetta; and the ſmall tubercles are ſent to Conſtantinople and other towns of the Levant, where they are much valued. The Egyptians preſs from them a milky juice, which they deem pectoral and emollient; and give them to nurſes, in order to increaſe the quantity of their milk. The banana-trees, though not natives of the ſoil of Egypt, are nevertheleſs cultivated in the northern parts of that country. The papaw, or cuſtard apple-tree, is alſo tranſplanted into the gardens of Egypt, and yields a fruit equally gratifying to the taſte and ſmell. In the ſhade of the orchards are cultivated various plants, the roots of which are refreſhed by the water that is conveyed to them by little trenches; each incloſure having its well or reſervoir, from which the water is diſtributed by a wheel turned by oxen. The mallow (malva rotundifolia) grows here in abundance; it is dreſſed with meat, and is one of thoſe herbs that are moſt generally conſumed in the kitchens of Lower Egypt. Two other plants, uſed as food, are the garden Jew's mallow, and the eſculent hibiſcus. Another tree, which appears to be indigenous in this country, is the "Atlé," a ſpecies of large tamariſk (tamarix orientalis, Forſkal.) The wood of this tree ſerves for various purpoſes; and among others, for charcoal. It is the only wood that is common in Egypt, either for fuel or for manufactures. Fenu-greek is a plant cultivated for fodder, though for this uſe a plant already mentioned, and called barſim, is preferred. This plant, called "helbé," is cried about for ſale in November, in the ſtreets of the towns; and it is purchaſed and eaten with incredible avidity, without any kind of ſeaſoning. It is pretended, that it is an excellent ſtomachic, a ſpecific againſt worms and the dyſentery, and, in ſhort, a preſervation againſt a great number of diſorders. Lentils form a conſiderable article of food to the inhabitants of Upper Egypt, who rarely enjoy the luxury of rice. The Egyptian onions are remarkably mild, more ſo than the Spaniſh, but not ſo large. They are of the pureſt white, and the lamina are of a ſofter texture and looſer contexture than that of any other ſpecies. They detoriate by tranſplantation; ſo that much muſt depend on the ſoil and climate. They remain a favourite article of food with all claſſes; and it is uſual to put a layer or two of them, and of meat, on a ſpit or ſkewer, and thus roaſt them over a charcoal fire. We need not wonder at the deſire of the Iſraelites for the onions of Egypt. Leeks are alſo cultivated and eaten in this country, and almoſt all the ſpecies of European vegetables abound in the gardens of Roſetta. Millet and Turkey corn, the vine, the henné or Egyptian privet, the water-melon, &c. &c. are cultivated in Egypt; and the country furniſhes a variety of medicinal plants, as carthamus, ſenna, coloquintida, &c.

Of the animals of Egypt the moſt uſeful is the ox; and though the number of oxen now ſubſiſting in Egypt is inconſiderable, theſe animals were anciently held in high eſtimation. The worſhip of them was univerſal, and ſacred oxen were kept in ſeveral cities. The celebrity of Apis is well known. (See APIS.) Common oxen, when they chanced to die, were interred with funeral rites, and it was forbidden to put to death thoſe that had already worked. At preſent, though the race is tolerably handſome, it is much degenerated through long neglect: their horns are generally ſmall, and they are of a fawn colour, more or leſs deep. The oxen of Egypt are employed in tillage and in giving motion to a variety of hydraulic machines; and as they are harneſſed ſo as to draw from the pitch of the ſhoulders, their withers are higher than thoſe of our countries; and, indeed, they have naturally ſome reſemblance to the biſon (*bos ferus*) or bunched ox. It has been ſaid that the cows of Egypt bring forth two calves at a time; this is an inſtance of fecundity which ſometimes happens, but is not reckoned very common. Their calves are reared to maturity, as veal, which is forbidden by the law of the Mahometans, and the Copts alſo abſtain from the uſe of it, is not eaten in Egypt. The buffalo is an acquiſition of the modern Egyptians, with which their anceſtors were unacquainted, and it was brought from Perſia into their country. The ſpecies is more numerous than that of the ox, and is equally domeſtic. It is eaſily diſtinguiſhable by the conſtantly uniform colour of the hair, and ſtill more by a remnant of ferocity and intractability of diſpoſition, and a wild lowering aſpect, the characteriſtics of all half-tamed animals. The females are reared for the ſake of the milk, and the males to be ſlaughtered and eaten. The fleſh is ſomewhat red, hard, and dry; and has alſo a muſky ſmell, which is rather unpleaſant. This country has alſo horſes, aſſes, mules, and camels. The horſes of Egypt, next in rank to thoſe of the Arabians, are remarkable for their beauty and valuable qualities; and this commendation has been juſtified by the teſtimonies of both ancients and moderns. According to the Jewiſh hiſtory, it was chiefly in Egypt that Solomon purchaſed, at a very high price, the prodigious multitude of horſes which he kept in his numerous ſtables. (2 Chron. ix. 25. 1 Kings, iv. 26; x. 28, 29.) See alſo Shaw's Travels, p. 239. In Egypt, and alſo in Arabia, and almoſt every other part of the Eaſt, it is a general cuſtom to abſtain from caſtrating horſes; and the cavalry of Egypt is formed of ſtone-horſes. The aſſes of this country have no leſs a claim to diſtinction than the horſes; and theſe, as well as thoſe of Arabia, are eſteemed for their vigour and beauty the fineſt in the world. They are ſometimes ſold for a higher price than even the horſes. They are more hardy than horſes, leſs difficult as to the quality and quantity of their food, and are, therefore, preferred in traverſing the deſerts. The handſomeſt aſſes ſeen at Cairo are brought from Upper Egypt, and Nubia. On aſcending the Nile, the influence of climate is perceptible in theſe animals, which are moſt beautiful in the Said, but are in every reſpect inferior towards the Delta. With the moſt diſtinguiſhed race of horſes and aſſes, Egypt poſſeſſes alſo the fineſt mules; ſome of which at Cairo exceed in value the price of the moſt beautiful horſes. In deſert places they have tygers, antelopes, foxes, jackals, hares, ſheep, goats, and deer. Egypt has alſo a ſpecies of ape, ſtronger and more ſavage than others, called by the Greeks cunocephalus, from the reſemblance which its head bears to that of a dog. There are few towns in the world that contain ſo many dogs as thoſe of Egypt; and the worſhip of the dog was formerly ſpread over the whole of this country. The dogs of Egypt are a race of large grey-hounds; and it is a ſingular circumſtance reſpecting them, that they never quit the quarter where they are born, but form diſtinct tribes, which have limits that they never exceed; and if one dog ſhould go into another quarter, he would ſoon be attacked by the whole of the ſtrange tribe. The Bedouins are ſo much attached to their dogs, that a perſon who killed them would expoſe his own life to danger. In Ancient Egypt cats were held in great veneration, ſo that the killing of a cat, even involuntarily, incurred capital puniſhment; and cats that happened to die were carried to the ſacred temples, and after having been embalmed were buried at Bubaſtis, a city in Lower Egypt. There are ſtill cats in all the houſes in Egypt, and they are treated with much tenderneſs and attention. The ichneumon was one of the ſacred animals of Ancient Egypt. Particular care was taken of it whilſt it lived, and honours were paid to it after its death. Lands were appropriated to the ſupport of this animal; and it was fed like cats with bread ſoaked in milk, or with the fiſh of the Nile cut in pieces; and it was every where forbidden to be killed. At preſent the ichneumon is not domeſticated in Egypt, nor do the inhabitants rear them in their houſes; for though they hunt rats and mice, they deſtroy poultry. By deſtroying the eggs of crocodiles, it prevents their increaſe. However, in more than half of the northern part of Egypt, that is, in that part comprehended between the Mediterranean ſea and the town of Siout, they are very common, although this part has no crocodiles; but they are more ſcarce in Upper Egypt, where crocodiles are more numerous: and, therefore, many fables have been recorded concerning the antipathy of the ichneumon to the crocodile, that are deſtitute of foundation. Upper Egypt, below the cataracts, is much infeſted with crocodiles; and though the ichneumon had received the honour of carrying on a perpetual war againſt theſe animals, a ſpecies of tortoiſe of the Nile, called *Thirſé*, is more ſucceſsfully employed in their deſtruction. As ſoon as the young crocodiles are hatched and reach the river, this tortoiſe attacks and devours them. Rats and mice are very numerous in Egypt, and would render the country uninhabitable, if they were not deſtroyed by other animals, and alſo by the inundation of the Nile. Many cameleons are found in the neighbourhood of Cairo; and lizards and vipers of various ſorts abound in different parts of the country. Swarms of winged inſects ſupply food for ſwallows and wagtails; but the moſt numerous, as well as moſt troubleſome inſects, are flies. Gnats alſo fly in ſwarms after the rice-harveſt, from the inundated fields in which the preceding generation had depoſited its eggs; and their ſting is no leſs ſharp and painful than that of the muſquitoes of South America. The habitations of Egypt are alſo filled with an enormous quantity of bugs, the bite of which occaſions very conſiderable and painful ſwellings. Bees form a principal article of culture and commerce in Egypt. As Upper Egypt only retains its verdure for four or five months, and the flowers and harveſts are earlier there, the inhabitants of Lower Egypt profit by this difference. They collect the bees of different villages in large boats. Each proprietor truſts to them his hives, which have a particular mark. When the bark is loaded, the men, who have the management of them, gradually aſcend the river, and ſtop at every place where they find flowers and verdure. The bees, at the break of day, quit their cells by thouſands, and wander in ſearch of the treaſures with which they compoſe their nectar. They go and come ſeveral times laden with their booty. In the evening they return to their habitations. After travelling three months in this manner on the Nile, the bees, having culled the perfumes of the orange-flowers of the Said, the eſſence of roſes of the Faicum, the treaſures of the Arabian jeſſamine, and a variety of flowers, are brought back to the places from which they had been carried. This induſtry procures for the Egyptians delicious honey, and abundance of bees'-wax. The proprietors, in return, pay the boatmen a recompence proportioned to the number of hives which have been thus carried about from one extremity of Egypt to the other. Waſps are alſo very common in Upper Egypt; and the hideous inſects called ſcorpions grow to a very large ſize, and are ſaid to occaſion by their bite intenſe pain, ſwoonings, convulſions, and ſometimes death. It would far exceed our limits to enumerate the various ſpecies of birds that are ſtatedly or occaſionally found in Egypt; or to recite the different ſorts of fiſh with which the Nile and its other waters abound.

The climate of Egypt is, as we might naturally infer from its latitude, commencing at the Torrid and extending 9° into the Temperate zone, extremely hot. In July and Auguſt Fahrenheit's thermometer ſtands, in the moſt temperate apartments, at 86° and 88° above the freezing point. In the Said it riſes much higher. Of this extreme heat, the height of the ſun, which, in ſummer nearly approaches the zenith, is a primary cauſe; but when we conſider that in other countries, under the ſame latitude, the heat is leſs, we may be allowed to ſeek another ſecondary cauſe, no leſs powerful than the former; and this is, probably, the inconſiderable elevation of the country above. On this account ſome have diſtinguiſhed only two ſeaſons in Egypt; the ſpring and ſummer, that is, the cool ſeaſon and the hot. The latter continues from March to November; and from the end of February, the heat, even at nine o'clock in the morning, is hardly ſupportable by an European. During the whole of this ſeaſon the air is inflamed, the ſky ſparkling, and the heat oppreſſive to all that are unaccuſtomed to it. The body ſweats profuſely, and the ſlighteſt ſuppreſſion of it is a ſerious malady. The departure of the ſun tempers, in ſome degree, theſe heats. The vapours from the earth ſoaked by the Nile, and thoſe brought by the weſt and north-weſt winds, abſorbing the fire diſperſed through the atmoſphere, produce an agreeable freſhneſs, and even piercing cold, if we may credit the natives and ſome European merchants; but the Egyptians, almoſt naked and accuſtomed to perſpire, ſhiver with the leaſt degree of cold. The thermometer, which, at the loweſt, in the month of February, ſtands at 50° or 52° of Fahrenheit above the freezing point, indicates, that ſnow and hail are phenomena, which no Egyptian has ſeen in fifty years. Some writers reckon two ſummers in Egypt; the firſt occurring in March, April, and May, during which the exceſſive heats and parching winds cauſe various diſorders; but in the ſecond ſummer, in June, July, and Auguſt, and in the autumn and winter, the air is much cooler, the weather more conſtant, and Egypt becomes one of the moſt delightful countries in the world. The ſeaſon, however, being uncertain, thoſe who can afford it, and particularly the European merchants, wear furs; and it muſt be allowed, that the northerly and weſterly currents of air, which almoſt continually prevail, cauſe a very conſiderable degree of coolneſs out of the ſun. Theſe northerly winds ſerve the purpoſe of wafting a prodigious quantity of clouds into Abyſſinia. From the month of April to July theſe are ſeen inceſſantly aſcending towards the ſouth; and it might be expected, that rain would enſue; but this parched country is deſtined to receive its ſupply of moiſture in another form. In the Delta it never rains in ſummer, and but rarely, and in ſmall quantities, during the whole courſe of the year. It rains ſtill leſs as you aſcend towards the Said. Accordingly, rain is more frequent at Alexandria and at Roſetta than at Cairo, and at Cairo than at Minieh, and it is almoſt a prodigy at Djirdja. To us it ſeems to be aſtoniſhing that a country ſhould ſubſiſt at all without rain; but in Egypt, beſides the quantity of water which the earth imbibes at the time of the inundation, the dews which fall in the ſummer might ſuffice for vegetation. Theſe dews, as well as the rains, are more copious towards the ſea, and decreaſe in proportion to their diſtance from it, but they differ from the latter by being more abundant in ſummer than in winter. At Alexandria, after ſun-ſet, in the month of April, the clothes, expoſed to the air, and the terraces, are ſoaked by them, as if it had rained. Like the rains, theſe dews are more or leſs plentiful, according to the prevailing wind. The ſoutherly and the ſouth-eaſterly produce none; the north wind a great quantity, and the weſterly ſtill more. Theſe varieties are accounted for by obſerving, that the two former proceed from the deſerts of Africa and Arabia, which afford not a drop of water: while the northerly and weſterly winds, on the contrary, convey over Egypt the vapours from the Mediterranean, which the firſt croſſes, and the other traverſes lengthways. Another phenomenon, no leſs remarkable, is the periodical return of each wind, and its appropriation to certain ſeaſons of the year. In Egypt, when the ſun approaches the tropic of Cancer, the winds, which before blew from the eaſt, change to the north, and become conſtant in that point. In June they always blow from the north and north-weſt; the winds continue northerly in July, but vary ſometimes towards the weſt, and ſometimes towards the eaſt. About the end of July, and during the whole month of Auguſt and half of September, they remain conſtantly in the north, and are moderate; briſker in the day, however, and weaker at night. At this period an univerſal calm reigns on the Mediterranean. Towards the end of September, when the ſun re-paſſes the line, the winds return to the eaſt, and then more regularly from that point than from any other, except the north. As the ſun approaches the other tropic, the winds become more variable and tempeſtuous; they moſt uſually blow from the north, the north-weſt, and weſt, in which points they continue during the months of December, January, and February, which is the winter ſeaſon in Egypt. The vapours of the Mediterranean, condenſed by the coldneſs of the atmoſphere, deſcend in miſt and rains. About the end of February and in March, when the ſun returns towards the equator, the winds are more frequently ſoutherly than at any other ſeaſon. During this laſt month, and that of April, the ſouth-eaſterly, ſouth, and ſouth-weſterly winds prevail and at times the weſt, north, and eaſt; the latter of which becomes the moſt prevalent about the end of April; and during May, it divides with the north the empire of the ſea. The ſoutherly winds, which we have mentioned, are known in Egypt by the general name of *Kamſin*, or "winds of 50 days," ſo called becauſe they prevail more frequently in the 50 days preceding and following the equinox. For an account of them, ſee Kamsin. Theſe ſoutherly winds, which are diſtinguiſhed by their heat and aridity, are in December and January as cold in Egypt as thoſe from the north, becauſe the ſun, having reached the ſouthern tropic, no longer burns up the northern parts of Africa, and becauſe Abyſſinia, which is extremely mountainous, is covered with ſnow. It might naturally be imagined that Egypt, on account of the heat to which it is ſubject, and from its wet and marſhy condition for three months, muſt be an unhealthy country; but the caſe is otherwiſe. This circumſtance, ſo different from the effect which might be expected, is aſcribed by Volney to the natural dryneſs of the air, to the proximity of Africa and Arabia, which inceſſantly draw off the humidity, and to the perpetual currents of wind, which meet with no obſtacle. This aridity is ſuch, that fleſh meat expoſed, even in ſummer, to the north wind, does not putrefy, but dries up, and becomes hard as wood. Beſides poſſeſſing this drying quality, the air appears to be ſtrongly impregnated with ſalts, the proofs of which are every where apparent. This property of the air and the earth, added to the heat, gives vegetation an activity almoſt incredible in our cold climates. Notwithſtanding the heat in Egypt, the climate is not, upon the whole, inſalubrious. The inhabitants are a robuſt and healthy race of people. Many of them live to old age. Attentive to their regimen during the hot ſeaſon, their health is thus preſerved. At this time they ſubſiſt chiefly on vegetables, pulſe, and milk. They make frequent uſe of the bath, eat little, rarely drink fermented liquors, and mix a great deal of lemon juice in their aliment. By this courſe of ſobriety their vigour is maintained to a very advanced age. The water of the Nile is alſo ſaid to have a great influence on the health of the inhabitants, and to the uſe of this water, either as a bath or as a beverage, ſome have aſcribed the fecundity of the Egyptian women. The Nile, however, has been the ſubject both of panegyric and of cenſure. Sonnini and other travellers concur with the ancients in commendation of its ſalubrity; and ſo far from conſidering it as a ſource of diſorder, thoſe who for a number of years have drank only this water, aſcribe to the uſe of it the good health which they have enjoyed. Such is the generally received opinion in Egypt, where this water is reckoned not only very wholeſome, but is alſo ſuppoſed to poſſeſs qualities truly miraculous. The method employed in this country for purifying the water of the Nile, when it is loaded with ſlime, has been deſcribed by Proſper Alpinus, and by more modern travellers. Savary ſays, that it conſiſts in beating about in the water, contained in great jars, ſome ſweet almonds ſlightly bruiſed, and in rubbing with this the edges of the vaſe. At the expiration of a few hours, the impure particles ſettle at the bottom of the jar, and the water remains clear and limpid. The water thus purified is poured out for uſe into ſmall veſſels, made of dried but unbaked clay, which the Turks call "bardacks," and the Arabs "kollat." Theſe are not varniſhed, ſo that on being expoſed to the open air the water gradually oozes through their pores; and it is perfectly cooled by the continual evaporation. Notwithſtanding the commendations given of the ſalubrity of Egypt by Herodotus, Strabo, and Diodorus Siculus, and alſo by many modern travellers, others, and particularly M. Pauw, have aſſerted that it is the cradle of the plague. Savary, however, and Volney, whoſe teſtimony is confirmed by Sonnini and others, have undeceived the public with regard to this circumſtance. It is now aſcertained, that this dreadful diſorder, which is endemial in other countries of the Eaſt. is not ſo in Egypt, and never originates in that country. Whenever it makes its appearance, it has been brought thither, either from Conſtantinople, from ſome other part of Turkey, or from the interior of Africa. This latter kind, which is called the "Said plague," becauſe it comes from Upper Egypt, is much dreaded, and is in fact more deſtructive than any other. It is further affirmed, that no epidemical diſeaſes prevail in this country; and that experience amply atteſts the purity and ſalubriouſneſs of its atmoſphere. In Egypt, however, though its diſeaſes are neither frequent nor epidemical, putrid and inflammatory diſorders attack thoſe, whoſe conſtitution is bilious. Herniæ are not common; and they originate from the relaxation occaſioned by the uſe of warm baths, from incautious riding, and from the extraordinary width of a part of the Egyptian dreſs. Cutaneous diſeaſes are common, and would be more prevalent if they were not counteracted by the uſe of the bath. The leproſy and the elephantiaſis ſometimes make their appearance, but they ſeldom occur, and do not ſeem to be very contagious. The elephantiaſis is peculiar to the northern part of Egypt, and ſeldom appears at any diſtance above Cairo. There is, perhaps, no country in the world, where diſeaſes, that corrupt the ſources of generation, are more widely ſpread than Egypt. The ravages of the Syphilis, although checked by the heat of the climate, abundant perſpiration, and warm baths, are not the leſs dreadful; and no remedy being applied to ſtop its progreſs, it ſometimes produces the moſt frightful effects. But a malady, truly endemial, is the ophthalmia, or inflammation of the eyes. Eyes, perfectly ſound, and which are wholly free from defluctions, are rarely to be ſeen. This diſorder has been aſcribed to a variety of cauſes. Some have attributed it to the reverberation of a burning ſun, to the effect of the ſoutherly winds, to the ſubtile duſt, with which the air is filled, or to the vapours which exhale from the ſtagnant waters. Savary ſeeks its origin from the cuſtom which the Egyptians have of ſleeping in the open air in ſummer, either on the terraces of their houſes, or near their huts. The nitre, he ſays, generally diffuſed through the air, and the heavy dews of the night, attack the delicate organ of ſight, and deprives them either of one or both eyes. Eight thouſand of theſe unhappy people are kept in the great moſque of Cairo, and there provided with a decent ſubſiſtence. The principal cauſes of this diſorder, ſays Sonnini, are the exceſſive heat, the air impregnated with nitrous particles, and the acrid and burning duſt which the wind ſcatters in the atmoſphere. Theſe, he ſays, are the principal cauſes; beſides which, there are other ſecondary cauſes that render theſe diſorders more frequent than they were in the time of the ancient Egyptians, ſuch as the bad quality of the food on which the preſent inhabitants ſubſiſt, and which communicates to the humours an acrimony that affects the ſight; to which may be added the exceſſive propenſity of the Egyptians to pleaſures, which are ſeldom thoſe of love. To this purpoſe, Avicenna obſerves, (iii. c. 5.) "Multiplicatio coitus eſt acribilior res oculo." The air, ſays Volney, to which the inhabitants of Cairo, the Delta, and alſo the coaſt of Syria, are expoſed during ſleep, acquires ſome noxious quality from the vicinity of the ſea; and this quality, in his opinion, is moiſture combined with heat, which becomes a firſt principle of theſe diſorders. The ſaline quality of the air, ſo remarkable in the Delta, contributes ſtill farther to the effect, by the irritation and itching it occaſions in the eyes. The uſual diet of the Egyptians appears likewiſe to be a powerful cauſe. The cheeſe, ſour milk, honey, confection of grapes, green fruits, and raw vegetables, which are the ordinary food of the people, produce in the ſtomach a diſorder, which phyſicians have obſerved to affect the ſight; and alſo the raw onions, which they devour in great quantities, have a peculiar heating quality. A diſpoſition to this diſorder, tranſmitted by generation, becomes a freſh cauſe of malady; and hence the natives are more expoſed to it than ſtrangers. He adds, it will appear more probable, that the exceſſive perſpiration of the head is a principal cauſe, when we conſider that the ancient Egyptians, who went bare-headed, are not mentioned by phyſicians as being ſo much afflicted with ophthalmies; and that the Arabs of the deſert, who cover it very little, eſpecially when young, are equally exempt from them. Hiſtory informs us, however, that ſeveral of the Pharaohs died blind. Blindneſs in Egypt is, in many inſtances, occaſioned by the ſmall-pox, which, for want of proper treatment, is very fatal in this country. Inoculation is either unknown, or little practiſed. The ſpring, which, in Egypt, is the ſummer of our climates, brings with it malignant fevers, which ſoon arrive at a criſis. The Egyptians, in general, are of a bilious habit, as appears from their eyes and black eye-brows, their brown complexion, and meagre make. Their habitual malady is the colic; and moſt of them frequently complain of a ſourneſs in the throat, and an acid nauſea; emetics and cream of tartar are, therefore, generally efficacious. The malignant fevers ſometimes become epidemic, and are then miſtaken for the plague.

The population of Egypt is not eaſily eſtimated; becauſe the uſual mode of determining the number of inhabitants from the number of houſes cannot be applied to this country: a large proportion of the people having no viſible dwelling. Ancient Egypt furniſhed ſubſiſtence for about eight millions of inhabitants; but at this day we do not reckon, ſays Savary, half the number. Mr. Browne, another intelligent traveller, who eſtimates the population of Cairo at 300,000 perſons, ſuggeſts, that Egypt may contain, in all, two millions and a half. Volney, ſtating the number of towns and villages as not exceeding 2300, which was the number in 1783, and the number of inhabitants in each of them, one with another, including Cairo, which contains about 250,000, as not more than a thouſand, eſtimates the whole number of inhabitants in Egypt at two millions three hundred thouſand. The cultivable lands, according to d'Anville, contain 2100 ſquare leagues; whence reſults, for each ſquare league, 1142 inhabitants. This great decreaſe is principally owing to the nature of its government, which is deſpotic and oppreſſive. Egypt, deprived 23 centuries ago of her natural proprietors, has ſeen her fertile fields ſucceſſively a prey to the Perſians, the Macedonians, the Romans, the Greeks, the Arabs, the Georgians, and, at length, the race of Tartars, diſtinguiſhed by the name of Ottoman Turks. Several of theſe various nations have left veſtiges of their tranſient poſſeſſion; but they have been ſo blended, that it is not eaſy to diſcriminate their reſpective characters. Volney, however, diſtinguiſhes them into four principal races of different origin.

The *firſt*, and moſt generally diſperſed, is that of the Arabs; who may be diſtributed into three claſſes; *viz.* 1. The poſterity of thoſe, who, on the conqueſt of Egypt by Amrou in the year 640, haſtened from Hedjaz, and every part of Arabia, to ſettle in a country juſtly celebrated for its fertility. Accordingly, the Delta was ſoon filled with foreigners, to the prejudice of the vanquiſhed Greeks. This firſt race is preſerved in the preſent claſs of fellahs, or huſbandmen, and artizans, who ſtill retain the characteriſtic features of their anceſtors, but are rather taller, and more ſtrongly formed, from the natural effect of a more plentiful nouriſhment than that of the deſerts. Their ſkin, tanned by the ſun, is almoſt black, but their countenances are not diſagreeable. 2. Another claſs of Arabs is that of the Africans, or Occidentals, in Arabic "Magarbe," the plural of "Magrebi," weſtern, who have arrived at different periods, and under different chiefs, and united themſelves to the former. Like them, they are deſcended from the Muſſulmen conquerors, who expelled the Greeks from Mauritania; like them, they exerciſe agriculture and trades; but they are more eſpecially numerous in the Said, where they have villages, and even diſtinct ſovereigns of their own. (See MOGRABIANS.) 3. The third claſs is that of the Bedouins, or inhabitants of the deſerts, known to the ancients by the name of "Scenites," that is, dwellers in tents. (See BEDOWEENS.) It is calculated, ſays Volney, that the different tribes of thoſe in Egypt might form a body of 30,000 horſemen; but theſe are ſo diſperſed and diſunited, that they are only conſidered as robbers and vagabonds. A *ſecond* race of inhabitants conſiſts of the Copts. (See COPHTI.) A *third* race is compoſed of Turks, who are the maſters of the country, or, at leaſt, poſſeſs that title. The name "Turk" was not originally peculiar to the nation to which it is now applied; it denoted, in general, all the hordes diſperſed to the eaſt, and even to the north of the Caſpian ſea, as far as beyond lake Aral, over thoſe extenſive countries which have taken from them the name of "Tourk-eſtan." (See TURKS.) Theſe people were known to the ancient Greeks by the names of Parthians, Maſſagetæ, and even of Scythians, for which we have ſubſtituted that of Tartars. They were a nation of ſhepherds, continually wandering, like the Bedouin Arabs, and, in every age, diſtinguiſhing themſelves as brave and formidable warriors, whom neither Cyrus nor Alexander could ſubdue; though the Arabs, about eighty years after Mahomet, invaded their country, and compelled them to embrace their religion, and to pay tribute. Like the Bedouins they were divided into tribes, or camps, called, in Chineſe language, "ordou," of which we have made "horde;" and theſe tribes, allied or at variance, according to their ſeveral intereſts, were perpetually engaged in wars. In 1517, ſultan Selim took poſſeſſion of Syria and Egypt, and from that time the Turks eſtabliſhed themſelves in that country, but they were not ſettled much among the villages. Individuals of that nation are chiefly found at Cairo, where they exerciſe the arts, and occupy the religious and military eſtabliſhments. Formerly they were advanced to poſts under government; but, at a later period, they poſſeſs merely the title, without the reality of power; and they are not very numerous. This revolution has been effected by the *fourth*, and laſt race, that occupy Egypt. The individuals of this race, all born at the foot of mount Caucaſus, are diſtinguiſhed from the other inhabitants by the flaxen colour of their hair, which is entirely different from that of the natives of Egypt. Theſe were found there by the Cruſaders in the 13th century, and called by them "Mamelas," or, more correctly, "Mamlouks." After remaining almoſt annihilated for 230 years, under the government of the Ottomans, they have found means to regain their conſequence. For their hiſtory, character, &c. ſee MAMLOUKS. The Jews in Egypt are not very numerous. Theſe, as well as the Chriſtians of Syria and the Greeks, devote themſelves to commerce, to the exchange, and the arts. The acuteneſs and ſubtlety which diſtinguiſh them have rendered them alternately directors of the cuſtom-houſes and intendants of the revenues of Egypt. Many of them are goldſmiths, and work in gold, ſilver, and precious ſtones; and their works in fillagree have been admired. Some of them have eſtabliſhed manufactures of light ſtuffs, which they fabricate with Bengal cotton and Syrian ſilk. In order to underſtand the nature of the preſent government of Egypt, we ſhould advert to the firſt introduction of the Mamlouks into the country in the year 1227. Before this period, from the middle of the 6th century, till about the year 1250, the Arabs were in poſſeſſion of Egypt, and it formed a part of the vaſt empire of the Caliphs, who ſent thither viſiers, inveſted with unlimited powers, to govern in their name. Theſe formed a body of ſoldiers of tried courage and extraordinary beauty, who were trained up to military exerciſes. By degrees, the ſoldiers, like the Pretorian bands of Rome, gave laws to their maſter; and ultimately appointed one of their own chiefs inſtead of the ſultan whom they depoſed and maſſacred, inveſting him with the title of ſultan, and retaining for themſelves that of Mamlouks, which ſignifies military ſlaves. About the year 1250, immediately after the defeat of St. Louis, the government of the Arabian princes terminated in Touran Shah, the laſt prince of the family of the Aioubites. Thus, were theſe nominal ſlaves converted into deſpots, who, for many centuries, have continued to give law to Egypt. Claiming the right of authority merely by conqueſt, the Mamlouks had no other rule of conduct and government beſides the violence of a licentious and inſolent ſoldiery. At length, in 1517, Selim, ſultan of the Ottomans, having taken and hanged Toumam-Bey, their laſt chief, put a period to that dynaſty. Selim, inſtead of exterminating the whole body of Mamlouks, according to the principles of Turkiſh policy, projected ſuch a form of government, that the power, being diſtributed among the different members of the ſtate, ſhould preſerve ſuch an equilibrium, as ſhould keep them all dependent upon himſelf. The remnant of the Mamlouks, who had eſcaped his firſt maſſacre, appeared fit for ſerving his purpoſe; and he therefore eſtabliſhed a divan, or council of regency, compoſed of the pacha, or baſhaw, and the chiefs of the ſeven military corps. (See Bashaw and Bey.) The ſultan, likewiſe, eſtabliſhed tributes, one part of which was deſtined to pay 20,000 infantry, and a corps of 12,000 cavalry, reſident in the country; the other, to procure for Mecca and Medina the neceſſary ſupplies of corn, and the third to ſwell the treaſury of Conſtantinople, and to ſupport the luxury of the ſeraglio. In all affairs that concerned religion, they were to maintain ſtrict obedience to the mufti of Conſtantinople, and to inſert the name of the Ottoman emperors in the prayers, and on the coin. This was a kind of mixed government, compoſed of monarchy, repreſented by the pacha, and ariſtocracy, compoſed of the Beys; but the people, who were to defray all charges, were conſidered as mere paſſive agents, and remain in ſubjection to all the rigours of a military deſpotiſm. This form of government has ſubſiſted for more than two centuries; but within the greateſt part of the laſt century, the Porte having relaxed in its vigilance, innovations have taken place; the Mamlouks have increaſed; become maſters of all the riches and ſtrength of the country, and gained ſuch an aſcendancy over the Turks, that the power of the latter is almoſt annihilated. (See Ali-Bey, Bashaw, Bey, and Mamlouks.) The Beys, dreading the diſpleaſure of the Porte, dare not declare their independence; but their ſubmiſſion is more formal and verbal than real. The Mamlouks have taken care to degrade the military corps of the Azabs, or Janizaries, which, on the part of the Turks, were formerly the terror of the pacha; and the whole military force of Egypt really conſiſts in the Mamlouks, who are diſperſed through the country to maintain the authority of their corps, collect the tributes, and improve every opportunity of extortion. Theſe are the men, who at preſent govern and decide the fate of Egypt; men, who have ſtill the meanneſs of ſlaves, though advanced to the rank of monarchs. Sovereignty with them centres in the means of poſſeſſing more women, more toys, horſes, and ſlaves, and ſatisfying all their caprices. It conſiſts in managing the court of Conſtantinople, ſo as to elude the tribute, or the menaces of the ſultan; and in purchaſing a number of ſlaves, multiplying partiſans, counter-mining plots, and deſtroying their ſecret enemies by the dagger, or by poiſon. See Bey.

What is the condition of the people in a country thus governed it is not difficult to determine. Wherever, ſays Volney, the cultivator enjoys not the fruit of his labour, he works only by conſtraint, and agriculture languiſhes; wherever there is no ſecurity in property, there can be no induſtry to procure it, and the arts muſt remain in their infancy; wherever knowledge has no object, men will do nothing to acquire it, and their minds will continue in a ſtate of barbariſm. Such is the condition of Egypt. The greater part of the lands in Egypt is to be conſidered as divided between the government, and the religious bodies who perform the ſervice of the moſques, who have obtained poſſeſſion of what they hold by the munificence of princes and rich men, or by the meaſures taken by individuals for the benefit of their poſterity. Hence, a large proportion of the tenants and cultivators hold either of the government, or the procurators of the moſques. But there is one circumſtance common to both, *viz.* that their lands, becoming unoccupied, are never let but upon terms ruinous to the tenants. Beſides the property and influence of the Beys, the Mamlouks, and the profeſſors of the law, are ſo extenſive, and ſo abſolute, as to engroſs into their own hands a very conſiderable part; the number of the other proprietors is extremely ſmall, and their property liable to a thouſand impoſitions. Every moment ſome contribution is to be paid, or ſome damage repaired; there is no right of ſucceſſion, or inheritance for real property, except for that called "Wakf," which is the property of the moſques; every thing returns to government, from which every thing muſt be re-purchaſed. The peaſants are hired labourers, ſays Volney, to whom no more is left than what is barely ſufficient to ſuſtain life. (But Browne ſays, that theſe terms can be properly applied to very few of them. The occupier of the land, aſſiſted by his family, is the cultivator; and in the operations of huſbandry *ſcarcely* requires any other aid. And the tenant of land commonly holds no more than he and his family can cultivate, and gather the produce of. When, indeed, the Nile riſes, thoſe who are employed to water the fields are commonly hired labourers.) The rice and corn they gather are carried to their maſters, and nothing is reſerved for them but dourra, or Indian millet, of which they make a coarſe and taſteleſs bread, without leaven. This, with water and raw onions, is their only food throughout the year; and they think themſelves happy, if they can ſometimes procure a little honey, cheeſe, ſour milk, and dates. Their whole clothing conſiſts in a ſhirt of coarſe blue linen, and in a black cloak. Their head-dreſs is a ſort of cloth bonnet, over which they roll a long handkerchief of red woollen. Their arms, legs, and breaſts are naked, and ſome of them do not even wear drawers. Their habitations are mud-walled huts, in which they are ſuffocated with heat and ſmoke, and in which, beſides the experience of other inconveniencies, they are perpetually diſtreſſed with the dread of the robberies of the Arabs, and the extortions of the

the Mamlouks, family feuds, and all the calamities of a perpetual civil war.

The more conſiderable ſources of revenue in Egypt, as well as of the Porte at this day, and alſo of the Caliphate while the ſovereignty remained with the Arabs, are nearly coeval in their inſtitution with Mahometaniſm itſelf. The moſt ancient tribute due from the ſubject to the government was the "Zecchât," a tenth of all the permanent productions of the earth. This was impoſed by Mahomet himſelf, and deſigned for the relief of the neceſſitous. This impoſt or tax is ſtill continued, but it is diverted from its original purpoſe, and applied to neceſſary expences or needleſs prodigality. It is not, however, now applicable to land or houſes, but to the merchandize imported into the country. The duties on theſe, when demanded of Mahometans, are taken under the name of "Zecchât." The ſecond impoſt is the "charage," which ſignifies the product of lands; and it denotes, not only any tax on land, but alſo on the perſons of "dhummies," that is, Chriſtians and Jews; though in the latter caſe it receives the appellation of "Jizié," the capitation tax, or ſalvage for their perſons, which otherwiſe, according to the letter of the Koran, the true believer is not bound to ſpare. In modern times the revenue of the Porte, which is derived from various ſources, is known under the name of "Miri;" the private one of the emperor is ſupplied in a different way, and termed "Chaſné." The impoſts in Egypt, one of the earlieſt territorial acquiſitions of the ſucceſſors of Mahomet, are not diſtinguiſhed by any remarkable ſeverity; and if that country has been ſince impoveriſhed and depopulated, it appears not to reſult from the original inſtitutions, ſo much as from the abuſes, which happened at an early period of the Egyptian Caliphate. Theſe abuſes, which have been long gradually increaſing, are now ſo far multiplied as to be incapable of further extenſion conſiſtently with the being of the peaſantry. The principal local tribute is a tax on land of two pataches each "foddan" all over the country, which was continued by ſultan Selim. Taking the cultivable lands in Egypt at two million one hundred thouſand acres, this ſhould produce the ſum of twelve thouſand nine hundred purſes, or at the preſent exchange of 630.000*l.* ſterling; but at this time only two thirds of theſe lands are actually cultivated, which reduces the ſum to 420.000 *l.* On the other hand, however, the Beys inſiſt on receiving, in many inſtances, five or ſix pataches per "foddan," which again raiſes this ſingle branch of revenue to a million and a quarter, or even more. There are, indeed, ſome diſtricts in the Upper Egypt, always ſeveral years in arrear. The patache may be rated at from *3s.* to *3s. 4d.* The "foddan" is a given meaſure, deriving its name from the quantity that a yoke of oxen can plough in a day, roughly taken, equivalent to an acre. The other articles are the cuſtoms of Alexandria, Damietta, Suez, and Coſſeir, and what is drawn from the commerce of Africa in its paſſage by Charjé, Aſſiout, and Cairo. The amount of theſe is not eaſily aſcertained; but it is very conſiderable. The "Jizié," already mentioned, is ſuppoſed, by Mr. Browne, not to amount to more than 1500 purſes. The remaining revenue is made up of caſualties: as forfeitures, ſmall impoſts, and tolls, paſſing on the Nile, and other parts of the interior; and above all, the incalculable profit ariſing from continued plunder of all ranks and denominations. Five, ten, twenty to thirty thouſand pataches, are demanded, in one day, of the Chriſtians engaged in commerce, at another of the Mahometans, and at another of the Franks. The wandering Arabs or Bedouins are exempt from any regular tribute, though they are often plundered. All the proſtitutes, public baths, places where brandy is ſold, &c. &c. are under a particular juriſdiction, and pay ſomething to government. The articles above enumerated form collectively the "Miri," or public revenue; 1200 purſes of which ſhould be annually forwarded to Conſtantinople, but it is retained by the Beys, under pretence of repairing moſques or other public works. The Pacha receives for his whole expences 1000 "mahbûbs." or 3000 piaſtres per day. (See Bashaw and Bey.) The collectors of the "Miri" are the Copt writers, who exerciſe their office under the direction of the ſecretary of the ruling Bey. Theſe writers have regiſters of each village, and are employed in receiving the payments and accounting for them to the treaſury. Rigorous and unjuſt in their exactions, they often ſell the oxen, the buffaloes, and even the mat on which the oppreſſed wretches lie. It is calculated, that the whole produce of the "Miri," collected as well in money as in corn, barley, beans, rice, &c. may amount to about two millions ſterling, when bread ſells at ſomewhat more than a half-penny per pound of 14 ounces. The adminiſtration of the cuſtoms ſeems to be, in Egypt, one of the principal offices of government. The perſon who exerciſes it is at the ſame time the comptroller and farmer-general. On him depend all the duties on entry, exports, and the circulation of commodities. He names all the ſubalterns who collect them; and to this he adds the "paltes," or excluſive privileges of the natron of Terane, the kali of Alexandria, the caſſia of the Thebais, the ſenna of Nubia; and, in a word, he is the deſpot of commerce, which he regulates at his pleaſure. His office is never held for a longer period than a year. The price of his contract, in 1783, was one thouſand purſes, which, at the rate of 500 piaſtres per purſe, and 50 ſols the piaſtre, makes 12 hundred and 50 000 livres, or above 52 000*l.* The cuſtom-houſes were formerly managed, according to ancient cuſtom, by the Jews; but when they were ruined in 1769 by Ali Bey, in conſequence of an enormous extortion, they paſſed into the hands of the Chriſtians of Syria, with whom they ſtill remain. Thoſe Chriſtians who came from Damaſcus to Cairo almoſt a century ago, conſiſted at firſt of about two or three families, their profit attracted others, and their number has ſince multiplied to about 500 From the time of their taking poſſeſſion of the cuſtom-houſe, after the ruin of the Jews, they have acquired great opulence.

Egypt is excellently ſituated for commerce and navigation; the trade of the weſtern parts of Aſia, Europe, and the North, lying open to it, by the Mediterranean ſea; and that of Arabia, Perſia, and India, and the ſouthern and weſtern coaſts of Africa, by the Red ſea: the eaſtern merchandize being commodiouſly brought into Egypt on camels, by the iſthmus of Suez. It is therefore to be preſumed, that the inhabitants would ſupply themſelves with thoſe articles which their country wanted, ſuch as metals, wood, pitch, reſin, &c. by bartering their own rich productions and manufactures, ſuch as corn, linen, paper, glaſs, and other valuable commodities. Sir John Marſham ſuppoſes, that the Egyptians did not apply themſelves to merchandize till the time of the Ptolemies, but in this opinion he ſeems to be miſtaken; though theſe princes did very much encourage trade, recovering that of the Eaſt to their ſubjects, by building Berenice, Myos Hormos, and other ports on the Arabian gulf, ſo that Alexandria became the greateſt mart in the world; yet the Egyptians certainly traded very conſiderably with foreigners long before. The Egyptian Pharaohs were undoubtedly acquainted with the advantages of trade. The numerous canals which they formed ſerved, not only to diffuſe fertility by means of the water of the Nile, but to tranſport with facility the produce of the country from one end of the empire to another. The fairs they eſtabliſhed in the Delta and the Thebais united the inhabitants of the moſt diſtant provinces. The Egyptians muſt alſo be regarded as one of the moſt ancient nations of navigators. They made voyages on the Red ſea, as it is ſaid, long before the famous expedition of the Argonauts. Danaus, according to Herodotus, carried into Greece, then in a ſtate of barbariſm, the art of navigation and of commerce. His brother Seſoſtris, if we credit ſome hiſtorians (ſee SESOSTRIS,) ſoon after reduced the interior kingdoms of Aſia, and with a fleet of 400 ſail took poſſeſſion of the ports of the Arabic gulf, ſailed through the ſtraits of Babel-Mandel, and penetrated into the Indian ocean. From this era we muſt date the commerce of Egypt with Aſia, which has never been diſcontinued ſince that remote period. Seſoſtris founded ſeveral colonies, one of which fortified itſelf on the coaſt of Phœnicia. If we admit the truth of what ſome writers have reported concerning Seſoſtris, his efforts produced no permanent effect, and they appear to have been ſo contrary to the genius and habits of the Egyptians, that on the death of Seſoſtris they reſumed their ancient maxims, and many ages are ſaid to have elapſed before the commercial connections of Egypt with India became of any great importance. Tyre ſoon prepared to diſpute the glory of navigation with the mother-country, ſending her ſhips as far as the pillars of Hercules, and ſpreading the arts every where with her commerce. The Egyptians on their ſide mounting the Boſphorus, entered the Black ſea, exchanging with their brethren, ſettled in Colchis, the productions of their country with thoſe of the northern nations; whilſt the fleets of the Red ſea went in ſearch of the pearls, the diamonds, the perfumes, and the precious ſtuffs of the eaſtern world. Egypt, as a commercial ſtate, ſoon attained a high degree of power; the colleges of her prieſts, applying to the ſtudy of the heavens, taught navigators that aſtronomy which ſerved to guide them through unknown ſeas; and rich in her own productions, ſhe with her trade propagated the light of the ſciences. Greece, enlightened by the great men who acquired knowledge of various kinds in the ſchools of Memphis and Heliopolis, was divided into ſeveral republics, each of which wiſhed to poſſeſs commerce and a navy. Pſammetichus, to ſay nothing of Oſiris, the Mercury of the Egyptians, to whom the invention of commerce is aſcribed, gained great riches by trade, as we learn from Diodorus, before he became king of all Egypt; and we learn from ſcripture, the moſt ancient and authentic hiſtory extant, that the Midianites and Iſhmaelites traded to Egypt ſo early as the time of Jacob; and, moreover, it is preſumed, that they had anciently the ſovereignty of the Red ſea, by which they engroſſed all the trade of India, and other ports; which were then carried on that way. (See EDOM.) Pſammetichus, ſays Herodotus, being a friend to the Greeks, opened to them the ports of Egypt; and he began his reign in the year 660 B. C. His ſon Nechos, the Pharaoh-Necho of ſcripture, who ſucceeded him 616 B. C., attempted to open a communication between the Nile and the Red ſea; but failing in this attempt he directed his views to another enterprize. Having fitted out a fleet and engaged Phœnician mariners, he ordered them to make a tour of Africa. Accordingly they ſailed out of the Red ſea through the ſtraits of Babel-Mandel, ſteered down the eaſtern ſhores of Africa, and doubling the Cape of Good Hope, coaſted up northward till they came to the pillars of Hercules, or ſtraits of Gibraltar, by which they entered the Mediterranean, and thus returned to Egypt, having performed their voyage in three years. Apries, the Pharaoh-Hophra of ſcripture, aſcended the throne in the year 600 B. C. and defeated in a naval combat the combined fleets of the Tyrians and Cypriots, two of the moſt renowned people in the art of navigation. Amaſis having, as ſome have ſaid, dethroned Apries and uſurped the kingdom, 569 B. C., made a conqueſt of Cyprus and became maſter of the Mediterranean: and in order to give activity to commerce, permitted the Greeks to build Naucrates at the entrance of the Canopic branch, and at the ſame time reſtricted their veſſels from landing merchandize in any harbour but that of this town. The fairs eſtabliſhed there, and the ſucceſſive arrival of ſhips, rendered it very commercial. At this time the proſperity of the kingdom was at its height. The arts had arrived at a great degree of perfection. Aſtronomy predicted eclipſes with accuracy. The ſculptor engraved fine ſtones, and faſhioned at his pleaſure the hardeſt marbles. Mechaniſm elevated in the air maſſes of aſtoniſhing ſize. Chemiſtry ſtained glaſs, gave brilliancy to precious ſtones, and dyed ſtuffs with indelible colours. Agriculture had enriched the country with the productions of India. From Egypt they paſſed to the Greeks; from thence to the Romans; and by the Romans they were tranſmitted to the Gauls. Commerce enriched the country, and called forth into exerciſe a variety of talents; ſo that whilſt treaſures were collected in great abundance from adjacent and diſtant nations, the arts and ſciences were cultivated with ſingular ardour. The gold duſt rolled down by the torrents of Ethiopia, the pearls of Ormuz, the perfumes of Arabia, the ſtuffs of Bengal arrived at Memphis, and it became the moſt commercial city upon earth. In this flouriſhing condition Egypt was attacked by Cambyſes with innumerable armies. Amaſis had given cauſe of diſcontent to the militia of the kingdom, by giving preference to the Grecian troops, and 150,000 men abandoned their country. This deſertion threw the kingdom into the hands of the Perſian monarch, who ravaged it with fire and ſword, 525 B. C. After ſacrificing thouſands of ſoldiers in the mad expedition which he undertook againſt the temple of Jupiter Ammon, and the Ethiopians, he left a detachment of his army in Egypt, and returned into Perſia. Although commerce ſuffered at this time, it ſoon recovered its vigour, and followed its eſtabliſhed courſe. Darius, the ſon of Hyſtaſpes, was ſenſible of its utility, and favoured it through the whole extent of his empire. About the year 332 B. C. Alexander of Macedon turned his arms againſt Egypt. This nation having ſupported with impatience the Perſian yoke, ſubmitted willingly to the great conqueror, and the country was ſubdued without a battle. In order to ſecure Egypt he founded in it a large city, encompaſſed by three harbours, fit to receive the fleets of Greece and the merchandize of all nations. On his premature death his generals divided his ſpoils, and Ptolemy, ſon of Lagus, called *Soter*, having received Egypt for his ſhare, 323 B. C. endeavoured to carry into execution the great projects of his maſter, and to promote the commercial proſperity of his new government. The improvement of Alexandria engaged his particular attention; and as her ports were ſituated to the weſt, the north, and ſouth, ſhe received the merchandize of the whole univerſe, and became, as Strabo calls her, the greateſt market in the world. (See ALEXANDRIA.) Ptolemy Philadelphus, who ſucceeded his father 284 B. C. purſued the courſe which he had marked out, and rendered Egypt fruitful and happy. This prince, either better acquainted with the level of the ſea, or more fortunate than Nechos and Darius, who had unſucceſsfully proſecuted the ſame object, continued the canal which was to join the Nile to the Red ſea, and had the glory of compleating it. He began at the Peluſian branch and extended it as far as Arſinoé, now called

Aggerout. He founded the city Berenice, &c. (See Berenice and Ptolemy.) For the protection of the Egyptian merchants, the Ptolemies kept up a formidable navy in the Red ſea and the Mediterranean. Ptolemy Euergetes (246 B. C.) imitated the example of his predeceſſors, and founded his power on trade, which he encouraged to the utmoſt of his power; and during his reign the wealth of the Egyptians was at its height. The abundance of gold, and of every kind of goods, produced at Alexandria great luxury, and corrupted the court of the kings. But notwithſtanding the immenſe treaſures that were conſumed by various indulgences and expences, the country long continued rich and flouriſhing. Ptolemy Phyſcon (169 B. C.) diſpatched Eudoxus on an embaſſy to ſeveral of the potentates of India; and he brought back reports, which gave a new ſpur to the avidity of the merchants. They made freſh expeditions to the Eaſt, and penetrated by the Ganges even to Bengal. After the king's death, his widow, Cleopatra, ordered Eudoxus to viſit the nations at the extremity of Africa, and having embarked on the Red ſea, he touched on the coaſt of Soffala. Under Ptolemy Lathvrus (116 B. C.) Eudoxus ſailed out of the ſtraits of Babel-Mandel, doubled the point of Africa, and returned to the pillars of Hercules. This was the ſecond time of performing this adventurous voyage. Under Ptolemy IX. the merchants of Alexandria continued to navigate the Black ſea, the Perſian gulf, and even to the extremities of India. When Egypt paſſed under the dominion of the Romans, the conqueſt was, with regard to Rome, what Peru has been for Spain, and Bengal for England. It diffuſed gold and ſilver there in ſuch abundance, that lands, merchandize, and every article, doubled their prices. However, it haſtened the downfal of that empire. Deprived of their monarchs, and ſubjected to the Romans, the Egyptians became their factors. In proportion as the Romans extended the limits of their empire, they adopted the vices as well as the ordinary uſages of the conquered people. Egypt contributed much to influence their manners, becauſe it was the moſt ample ſource of wealth. The beautiful linen and cotton manufactured at Alexandria, her magnificent tapeſtry, her cryſtals of various colours, were conveyed to Rome. The grain of the Thebais, and her abundant productions, fed the capital of Italy; ſo that, from this period, ſhe no longer ſtood in need of manufactures, and ſhe ceaſed to encourage the labours of the huſbandman. After Conſtantine had tranſported the ſeat of the empire from Rome, Egypt long ſupported the tottering throne of the emperors of Byzantium. When Egypt became a province of the empire of the Caliphs, ſhe gradually loſt her commerce and the arts. The commerce of the Mediterranean was neglected, through dread of intercourſe with Chriſtian princes, and the Egyptians confined themſelves to that of the Red ſea, and the interior of the country. Agriculture, however, ſtill flouriſhed, and ſome of the Arab princes encouraged the ſciences. At length the Venetians found means to open for themſelves the ports of this country, and to keep conſuls there; and they carried on the trade with India under the protection of the Egyptians. From this intercourſe they derived great advantages, and became the firſt navigators of Europe, which they furniſhed with all the productions of Aſia and Africa. The Genoeſe partook with them for ſome time of theſe advantages; but the marine of the Venetians, having rapidly increaſed, reigned triumphant in the Mediterranean. When the Ottomans took Egypt from the Arabs, they were excited and aided by the Venetians to equip a fleet on the Red ſea, and to put a ſtop to the conqueſts of the Portugueſe, who had formed ſettlements in India. Albuquerque, who then governed them, fought the Ottoman fleet, penetrated into the Arabian gulf, and determnied to deſtroy Egypt, by turning the waters of the Nile into the Red ſea. But this deſtructive project of ambition, for the execution of which he had formed a treaty with the emperor of Abyſſinia, was defeated by Albuquerque's death. Whilſt the maritime powers of the world are endeavouring to found the proſperity of their ſtates on the baſis of commerce, in aid of internal cultivation and manufactures, Egypt, without arts, without a marine, and groaning under the tyranny of 24 Beys, is unable to derive any advantage from her ſituation, or to enter into competition with the Europeans. Her ignorant mariners no longer navigate to India; ſcarcely do they dare to make the circuit of the Red ſea. Their moſt diſtant expeditions are annual voyages to Mocha. Their ſaiks, ill equipped, and incapable of defence, load there the coffee ot Yemen, the perfumes of Arabia, the pearls of the Baharein iſles, the muſlins and the linens of Bengal, which are brought there by the Banians. Even this limited commerce is advantageous to them. The coffee alone is an annual object of eleven millions of livres. They export the principal part to Conſtantinople, to Greece, to Marſeilles, and to the coaſt of Syria, and conſume the remainder in the country. Egypt might again recover her ſplendour, as ſhe contains within herſelf the ſource of genuine riches. Her abundance of grain, with which ſhe feeds Arabia, Syria, and a part of the Archipelago; her rice which ſhe ſends throughout the Mediterranean; the flower of the charthamus, with which the inhabitants of Provence yearly load ſeveral veſſels; her ſal-ammoniac, which is conveyed throughout Europe; the kali produced there in abundance; her beautiful flax, ſo much valued in Italy, and her blue linen are important and profitable articles of trade. The Abyſſinians bring her gold duſt, elephants' teeth, and other precious ſubſtances, which they barter for her produce. The articles exported thither by France are by no means ſufficient to pay the various commodities ſhe receives in exchange. The copper veſſels and the furs landed by the Turks in the port of Alexandria do not balance the corn, the rice, the lentils, the coffee, the perfumes they load there, which are chiefly paid for in ſpecie. In a word, excepting at Mocha, and at Mecca, where the Egyptians leave every year a great quantity of ſequins, all thoſe who carry on a trade with them bring them gold and ſilver. Theſe precious metals are ſtill in ſuch abundance in the country, that Ali Bey, on flying into Spain, carried with him about a million ſterling, and Iſmael Bey, who a few years after eſcaped in the ſame way, loaded 50 camels with ſequins, pataches, pearls, and precious ſtones. Egypt is ſtill capable of great improvement, and of deriving great advantages from commerce, if the character of her government and conſequent condition of her inhabitants were meliorated. What cloth might be manufactured with the beautiful wool of her ſheep! What linen with her delicate flax! What muſlins with the two ſorts of cotton, one annual, one perennial, which grow there! What ſtuffs, with the ſilks, which might be eaſily introduced in a country, where the ſilk-worms muſt thrive! What an affluence of benefits might be procured by clearing the canals, repairing the dykes, and reſtoring to agriculture the third part of her lands now buried under the ſands! With what ſucceſs might not her mines of emeralds be explored, almoſt equalling in hardneſs that of the diamond! The granite, the porphyry, and the alabaſter, which are found in ſeveral of her mountains, would form a valuable branch of commerce. The manufacturer might employ to great advantage her indigo, her carthamus, and other materials for dyeing, that are ſpread over her deſerts. Egypt has poſſeſſed theſe advantages for many ages. She has loſt them by a deſpotic government. A wiſe adminiſtration would reſtore to her all the treaſures which nature has laviſhed upon her, and which have rendered her in former ages eminently diſtinguiſhed among the nations of the earth. The commerce with Egypt is, even now, when uninterrupted by contending nations, far from being inconſiderable. According to Niebuhr's account, about 800 bales of cloth from Languedoc and Provence, and the ſame quantity from England, Flanders, Germany, and Venice, arrive in Egypt every year. They alſo require in Egypt, every year, at leaſt 80 barrels of cochineal, and in times of war between France and England, about 200 barrels paſs through Egypt into India. From Europe are annually exported into Egypt 400 bales of pepper, each bale containing near 300 pounds. Europe furniſhes Egypt with ſeveral kinds of drugs, both for medicinal and culinary uſe. The Europeans ſend thither annually 60 barrels of pewter, and as many of wine, and a certain quantity of cheſts containing needles, ſciſſars, knives, ſmall looking-glaſſes, &c. &c. From Europe, and particularly from Venice, according to the ſtatement of Vanſleb, are exported, among other things, a great quantity of ſmall glaſs ware, as beads, &c., writing-paper, different ſpecies of cutlery and looking glaſſes; from Zante, wine; from Leghorn, cloth; from Genoa, China-ware, and pieces of eight in ſilver; from Meſſina, Syracuſe wine, velvet, and other ſilk-ſtuffs. Egypt has no direct commerce with Holland and England; but it is carried on by Venice and Leghorn. From Marſeilles are conveyed money, nuts, almonds, cheſnuts, &c., and alſo cloth and paper. Since the time of Vanſleb, the commerce of Egypt has much increaſed; and it draws every ſpecies of merchandize from the different ſtates of Europe. The Engliſh, beſides cloths, ſend thither works of poliſhed ſteel, and all ſorts of iron-wares, fire-arms, and gunpowder. The articles of trade which arrive in Europe by the way of Alexandria and Damietta are, flax, ſpun cotton, printed cottons, muſlins, India camblets, dimities, all linens and cottons of different qualities. The exportation of all kinds of grain, roots, and ſeeds, with which the country abounds, is prohibited; notwithſtanding which prohibition, great cargoes of rice and linſeed are ſhipped for Europe. Theſe two ports alſo afford coffee, aſſafœtida, ſenna, caſſia fiſtularis, ſugar, ſal ammoniac, the black vomica nut, tamarinds, gums, incenſe, myrrh, aloes, ſpikenard, cinnamon, carthamus tinctorius, dates, oſtrich-feathers, balm of Mecca, coloquintida, buffaloes', bulls', and cows' hides, and precious ſtones.

How different has been the government of Egypt in modern times from that which laid the foundation of its celebrity at an earlier period of its exiſtence! The Egyptians are ſaid to have been the firſt who found out the rules of government, and the art of making life eaſy, and a people happy. Their laws and inſtitutions were not only highly reverenced by thoſe who lived under their immediate influence, but by other nations, and particularly the Greeks, whoſe firſt ſages and legiſlators travelled into this country to acquire a knowledge of them, and who borrowed from them the beſt part of thoſe which they afterwards eſtabliſhed at home. Nevertheleſs, as much as the Egyptians ſeemed to excel other nations in the wiſdom of their laws and conſtitution, they yet ſurpaſſed them more in ſuperſtition. Idolatry was ſo ancient among them, that the Grecians confeſſed they borrowed not only their religious ceremonies, but the names of almoſt all their gods, from Egypt. For the Egyptians are ſaid to have been the firſt people who erected altars, images, and temples, and the firſt inventors of feſtivals, ceremonies, and tranſactions with the gods by the mediation of others; and alſo to have firſt given names to the twelve gods. They had a great many deities of different ranks and orders. Thoſe who were chiefly honoured in Egypt were Oſiris and Iſis, by which they moſt probably meant the ſun and the moon, whoſe influences governed, and preſerved the world. Theſe two luminaries being reckoned by them the great cauſes of nutrition and generation, and, as it were, the ſources from which the other parts of nature, which they alſo looked upon as gods, and to which they gave diſtinct names, were derived. Theſe were Jupiter or ſpirit, Vulcan or fire, Ceres or the earth, Oceanus (meaning the Nile) or moiſture, and Minerva, called Neith, or air. Beſides theſe celeſtial or immortal gods, there were alſo terreſtrial or mortal deities, who had merited the honours paid them by the benefits which they conferred on mankind. Several of them had been kings of Egypt; ſome of theſe bore the ſame names with the celeſtial gods, and others had proper names of their own. Such were the Sun, Cronus or Saturn, Rhea, Jupiter, called by the Egyptians Ammon, Juno, Vulcan, Veſta, Hermes or Mercury, Orus, Venus, Pan, Anubis, Nephthys, Harpocrates, and others. Serapis is ſaid to have been introduced by one of the Ptolemies at Alexandria; but others ſuppoſe him to have been the ſame with Oſiris, who was alſo called Bacchus. Oſiris was ſuppoſed to be a god of a good and beneficent nature; but his brother Typhon was the reverſe, and held in deteſtation for the evils brought by him on his family and nation. Although the bodies of theſe mortal deities remained in their ſepulchres on earth, yet the Egyptians believed their ſouls ſhone in the ſtars of heaven, as that of Iſis in the Dog-ſtar, that of Orus in Orion, and that of Typhon in the Bear. Notwithſtanding the polytheiſm of the Egyptians, they are ſaid in reality to have acknowledged one ſupreme God, the maker and ruler of the world, whom they ſometimes denoted by the name of Oſiris or Serapis, ſometimes by that of Iſis, and at other times by Neith, who had a temple at Sais. The inhabitants of Thebais are reported to have worſhipped only the immortal and unbegotten god *Cneph*, (which ſee,) for which reaſon they were exempt from all contributions towards the maintenance of the ſacred animals which were worſhipped in Lower Egypt. From this god Cneph, they ſuppoſed a ſecondary god proceeded, repreſenting the world, called Phtha, a word which is uſed by the Copts to ſignify the divine being. Idolatry of the groſſeſt kind ſeems, in proceſs of time, to have prevailed throughout Egypt; and they beſtowed divine honours on ſeveral animals, and even on vegetables, as leeks and onions: and theſe honours were appropriate to particular places; inſomuch that the chief cities of Egypt were named by the Grecians after the gods or animals that were worſhipped in them. This diverſity of worſhip was attended with very ill conſequences in ſome caſes, eſpecially if their deities happened to be enemies to one another, and thus the inhabitants of one place rendered worſhip to animals, which were held in abhorrence in other places. Hence proceeded diſcord, and even war; ſuch as happened in particular between the inhabitants of Heracleopolis, who worſhipped the ichneumon, and thoſe of Arſinoe, who worſhipped the crocodile; and alſo between the cities of Oxyrynchus and Cynopolis, the former of which ſacrificed and eat dogs, which were the deities of the latter. For a more particular account of the Egyptian deities, ſee Osiris, Isis, Serapis, Jupiter, and Ammon, Anubis, Harpocrates, Orus, Canopus, Apis. &c. &c. &c. The objects of the Egyptian worſhip were ſuch animals as the cat, dog, ibis, the wolf, the crocodile, and ſeveral others of a ſimilar kind; and they were treated with a reſpect of a ſingular nature whilſt they lived, and if they were wilfully killed, the guilty perſon was puniſhed with death; and when they died, they were lamented with the deepeſt concern and ſorrow, and buried with funeral honours. Some have traced the origin of this ſtrange and prepoſterous kind of worſhip to the uſe they made of the images of theſe animals on their ſtandards for the arrangement of their troops; others ſuppoſe that theſe images were uſed in the moſt early times to diſtinguiſh the firſt civil ſocieties, which united for mutual defence againſt the violence of their fellow-creatures: others again aſcribe the worſhip of theſe animals to the benefits that were derived from them; as the ox in tilling the land, the ſheep in ſupplying milk and wool, the dog in protecting the houſe, the ibis and hawk in deſtroying ſerpents and noxious inſects, the crocodile in defending the country againſt the incurſions of the Arabian robbers, the ichneumon in preventing the multiplication of crocodiles, and the cat for its ſervice againſt the aſp and other venomous reptiles, &c. &c. Others pretend, that the worſhip paid by the Egyptians to animals did not terminate in the animals themſelves, but in the gods, whoſe ſymbols they were, and to whom they had ſome peculiar relation. Such was the ſtrict attachment of the populace to the groſſeſt kinds of polytheiſm and ſuperſtition, that Herodotus repreſents them as the moſt religious of men. As the objects of their worſhip were not only gods, heroes, and eminent men, but various kinds of animals and plants; Juvenal has juſtly ridiculed their ſuperſtition in the following paſſage, (Sat. xv. v. 1, &c.);

> "Quis neſcit, Voluſi Bithynice, qualia demens
> Ægyptus portenta colat? Crocodilon adorat
> Pars hæc; illa pavet ſaturam ſerpentibus Ibin," &c.

Thus rendered,

> "Who knows not, that there's nothing vile or odd,
> Which brain-ſick Egypt turns not to a god?
> Some of her fools the crocodile adore,
> The ibis cramm'd with ſnakes, as many more.
> A long-tailed ape, the ſuppliants moſt admire
> Where a half Memnon tunes his magic lyre:
> Where Thebes, once for her hundred gates renown'd,
> An awful heap of ruins ſtrews the ground;
> Whole towns in one place, river-fiſh revere,
> To ſea-fiſh ſome as piouſly adhere:
> In ſome a dog's high deity is ſeen;
> But none mind Dian, tho' of dogs the queen:
> Nay vegetables here take rank divine;
> On leeks and onions 'tis profane to dine.
> Oh holy nations! where the gardens bear
> A crop of gods through all the live-long year!

The Egyptians were the firſt who aſſigned each month and day to a particular deity, and obſerved the time of each perſon's nativity, by which they judged of their future fortune. If they were not the firſt people who eſtabliſhed oracles, and introduced the cuſtom of conſulting them, the moſt ancient and celebrated oracles among the heathens, particularly thoſe of Jupiter in Libya, and at Dodona, owed their original to Egypt. Amidſt the numerous oracles which exiſted in Egypt, thoſe which they chiefly reverenced were the oracle of Latona in the city of Butus, and in later times that of Serapis in Alexandria. The ſacred animals, as well as the deities, Hercules, Apollo, Minerva, Diana, Mars or Jupiter, had their reſpective oracles, as the apis, the goat, the lion, and the crocodile. The ancient Egyptians alſo offered human ſacrifices at the tomb of Oſiris, at Heliopolis, and to Juno or Lucina, at a city in Upper Thebais. This barbarous cuſtom, however, was aboliſhed by Amaſis, who ordered that ſo many images of wax ſhould be offered inſtead of them. Of their temples we ſhall give an account in the deſcription of the cities in which they were conſtructed; and for their monuments of art, we refer to CATACOMBS, LABYRINTH, OBELISK, PYRAMIDS, &c.

The theology and alſo the philoſophy, of the Egyptians, were of two kinds; the one exoteric, addreſſed to the vulgar, the other eſoteric, confined to a ſelect number of prieſts, and to thoſe who poſſeſſed, or were to poſſeſs, the regal power. The myſterious nature of their concealed doctrine was ſymbolically expreſſed by images of ſphinxes placed at the entrance of their temples. The former ſort of religion is univerſally known to have conſiſted in the groſſeſt and moſt irrational ſuperſtition. Concerning the eſoteric, or philoſophical doctrine of the Egyptians, it ſeems evident, that they conceived matter to be the firſt principle of things, and that before the regular forms of nature aroſe, an eternal chaos had exiſted, which contained, in a ſtate of darkneſs and confuſion, all the materials of future beings. This chaos, which was alſo called night, was worſhipped, in the moſt ancient times, as one of the ſuperior divinities. This material principle, called Chaos or Night, was probably worſhipped by the Egyptians under the name of "Athor," which, in the Coptic language, ſignifies Night. This divinity the Grecian mythologiſts confounded with Venus. The ſymbol of this divinity, which in their uſual manner the Egyptians placed in her temple, was a cow. Beſides the material principle, it ſeems capable of ſatisfactory proof, that the Egyptians admitted an active principle, or intelligent power, eternally united with the chaotic maſs, by whoſe energy the elements were ſeparated, and bodies were formed, and who continually preſides over the univerſe, and is the efficient cauſe of all effects. By the united teſtimony of many writers, who give accounts of the Egyptian gods, "Phtha," or Vulcan, and "Cneph," or Agathodæmon, it is rendered probable, that theſe were only different names expreſſing different attributes of the ſupreme divinity. The name "Phtha," in the Coptic language, denotes one by whom events are ordained; and the appellation "Cneph" denotes a good genius; and he was repreſented under the ſymbol of a ſerpent. Upon a temple dedicated to Neitha, at Sais, the chief town in Lower Egypt, was this inſcription, "I am whatever is, or has been, or will be, and no mortal has hitherto drawn aſide my veil; my offſpring is in the ſun." If it be granted, that Neitha and Phtha were only different names of the ſame divinity, this inſcription will confirm the opinion, that the Egyptians acknowledged the exiſtence of an active intelligence, the cauſe of all things, whoſe nature is incomprehenſible. The doctrine of an ethereal intelligence pervading and animating the material world, appears, among the Egyptians, to have been from the earlieſt time accompanied with a belief in inferior divinities. Conceiving emanations from the divinity to be reſident in various parts of nature, when they ſaw life, motion, and enjoyment communicated to the inhabitants of the earth from the ſun, not, as they ſuppoſed, from other heavenly bodies, they aſcribed theſe effects to the influence of certain divinities derived from the firſt deity, which they ſuppoſed to inhabit theſe bodies. From the ſame ſource it may be eaſily conceived, that among the Egyptians, as well as in other nations, would ariſe the worſhip of deified men. When they ſaw their illuſtrious heroes or legiſlators protecting their country by their prowefs, or improving human life by uſeful inventions and inſtitutions, they concluded that a large portion of that divinity, which animates all things reſided in them, and that, after their death, good dæmons that animated them paſſed into the ſociety of the divinities.

It is univerſally agreed that the Egyptians believed the human ſoul to be immortal. Herodotus aſſerts, though perhaps without ſufficient ground, that they were the firſt people who taught this doctrine, and Diodorus Siculus relates, that the Egyptians, inſtead of lamenting the death of good men, rejoiced in their felicity, conceiving that, in the inviſible world, they would live for ever among the pious. But it has been a ſubject of diſpute, into what place, according to the Egyptian doctrine, the ſouls of men paſſed after death. Plutarch ſpeaks of the Amenthes of the Egyptians, correſponding to the Hades of the Greeks, a ſubterraneous region, to which the ſouls of dead men were conveyed. With this agrees the account given by Diodorus Siculus of the funeral cuſtoms of the ancients. Herodotus, on the contrary, gives it as the opinion of the Egyptians, that when the body decays, the ſoul paſſes into ſome other animal, which is then born; and that after it has made the circuit of beaſts, birds, and fiſhes, through a period of 3000 years, it again becomes an inhabitant of an human body. Diogenes Laertius alſo relates, after Hecatæus, that, according to the tenets of the Eygptians, the ſoul, after death, continues to live, and paſſes into other bodies. Theſe different notions might be held by different colleges of prieſts, ſome of whom might maintain the doctrine of tranſmigration, while others held, that the ſouls of good men, after wandering for a time among the ſtars, were permitted to return to the ſociety of the gods; or the ſeeming inconſiſtency of theſe opinions may be reconciled by adopting the doctrine, that God is the ſoul of the world, from which all things come, and to which they will return. But as different minds have contracted different degrees of impurity by their union with the body, it is neceſſary that they ſhould paſs through different degrees of purgation, to be accompliſhed by means of ſucceſſive tranſmigrations. According to this ſyſtem, bad men would undergo the metempſychoſis for a longer, good men for a ſhorter period: and the Amenthes or Hades may be conceived to have been the region, in which departed ſouls, immediately after death, received their reſpective deſignations. The Egyptians, whilſt they held that the world was produced from chaos by the energy of an intelligent principle, conceived that there is in nature a continual tendency towards diſſolution.

Of preceptive doctrine the Egyptians had two kinds, one ſacred, the other vulgar; the former, which reſpected the ceremonies of religion, and the duties of the prieſts, was written in the ſacred books of Hermes, but too carefully concealed to paſs down to poſterity. The latter conſiſted of maxims and rules of prudence, virtue, or policy. But it appears by ample evidence, that ſuperſtition blended itſelf with their notions of morals and corrupted them. Indeed, it is in vain to look for accurate principles of ethics among an ignorant and ſuperſtitious people.

The Egyptians paid particular attention to the education of their children, accuſtoming them betimes to a frugal diet, and inſtructing them in two ſorts of letters, thoſe called ſacred, and thoſe in which their common learning was written. The Egyptian youth were taught betimes to behave with great reſpect to their elders. In different parts of Egypt they inculcated abſtinence from ſeveral ſorts of animals, according to the different deities they worſhipped; and they all agreed in their averſion to ſwine's fleſh, which was accounted impure. Their animal food conſiſted of birds and fiſhes, thoſe excepted which were deemed ſacred, and of bread made of vegetables, and particularly the lotus and the lower ſtems of the papyrus. Their common drink was the water of the Nile; and their better ſort of drink or wine, as Herodotus calls it, was made of barley, ſo that we are probably indebted to this nation for the invention of beer. The Egyptians ſtill make a fermented liquor of maize, millet, barley, or rice, pleaſant to the taſte, but in the hot ſeaſon it will not keep above a day. This is drank in conſiderable quantities in Cairo and in the Said. The native Chriſtians diſtil for themſelves, from dates, a liquor called by the general name "Araki;" it is alſo made from currants, or the ſmall grapes, imported from Cerigo. The ancient Egyptians uſed frequent ablutions and purifications; they ſcrupulouſly avoided eating with ſtrangers as unclean; and the cuſtom of circumciſion, which remains to this day, and which was extended to women as well as men, was obſerved by them from time immemorial, and eſteemed by them ſo neceſſary, that Pythagoras, in order to obtain the liberty of converſing with the Egyptian prieſts and entering into their temples, was obliged to ſubmit to this operation. In many of their manners and cuſtoms they ſeemed to act in contradiction to the reſt of mankind; for with them it was the cuſtom for the women to be employed in trade and buſineſs abroad, while the men ſtaid at home to ſpin and minded domeſtic affairs; and this practice, perhaps, gave occaſion to the extraordinary law, by which the ſons were not obliged to provide for their parents, but the daughters were. They kneaded dough with their feet, and tempered mortar with their hands: and though in other countries, the places deſtined for cattle were ſeparated from thoſe of the men, in Egypt men and beaſts dwelt together. Gratitude was a virtue which the Egyptians held in high eſtimation; hence they were led to honour their princes, whom they conſidered to be poſſeſſed of power and will to do good to mankind, as gods, and hence alſo proceeded the great reſpect manifeſted by them to the remains of deceaſed anceſtors. The mourning for the dead, and funeral rites in Egypt, were anciently performed with peculiar ſolemnity. When any eminent perſon died, all the women of the family, having their heads and faces beſmeared with dirt, their breaſt bare, and their waiſts girt, left the body at home, and marching in this garb, attended by all their relations of the ſame ſex, through the ſtreets of the city, lamented the deceaſed, and beat themſelves in the moſt cruel manner. The men formed another company and mourned in the ſame manner. This ceremony they continued till the corpſe was interred, abſtaining from the bath, from wine, and delicate meats, and from the uſe of their beſt attire. The body was afterwards embalmed (See Embalming), delivered to the relations, and put into a wooden coffin, which was placed upright againſt the wall of the edifice appropriated to this purpoſe. At the time prefixed for the interment, the judges and friends were invited, and ſat in a certain place beyond the lake (ſuppoſed to be that of Mœris) which the body was to paſs. The veſſel, whoſe pilot was called Charon, being hauled up to the ſhore, before the body was ſuffered to embark, every one was at liberty to accuſe the deceaſed. If any accuſer made good his charge that the deceaſed had led a bad life, the body was denied the cuſtomary burial, but if the accuſer charged the deceaſed unjuſtly, he incurred a ſevere puniſhment. If no accuſer appeared, or the accuſation could not be ſupported, the relations recited the praiſe of the deceaſed, and the attendants joined their acclamations to this funeral oration. The body was then depoſited in the family ſepulchre. Thoſe, who for their crimes or for debt were forbidden to be interred, were depoſited privately in their own houſes. This inſtitution of the Egyptians relating to their treatment of dead bodies, was well adapted to the encouragement of virtue and the diſcouragement of vice; and from this practice the Greeks evidently deduced all their fables concerning the infernal judges, and the recompence or puniſhment of men after death. The ſepulchres of the dead were adapted to the rank and character of the deceaſed. See CATACOMBS and PYRAMIDS.

It appears, by very ancient teſtimonies, that the Egyptians were diſtinguiſhed by their wiſdom and learning, and that they were the inventors of many arts and ſciences. Geometry is generally allowed to have been firſt found out in Egypt. Arithmetic and algebra, and alſo aſtronomy, were alſo diligently cultivated in this country. The ſcience of medicine ſeems to have owed its origin to the Egyptians; and their phyſicians had a public proviſion made for them by the law. Herodotus relates, that, in his time, there were diſtinct phyſicians for different diſeaſes; which they claſſed according to their ſeat in the human body. From Diodorus Siculus we learn, that, inſtead of preſcribing medicines, according to the judgment and experience of the practitioner, every phyſician was obliged to follow a written code; and if, in adhering to this, he was unſucceſsful, he was free from blame; but if he ventured to depart from the preſcribed forms, though the patient recovered, the phyſician was to loſe his life. In adminiſtering medicines, they called in the aid of magical incantations, and pretended that ſupernatural virtues were thus communicated to certain plants. Upon the whole, medical practice was entirely empirical, and artfully connected with ſuperſtition, to ſecure the purpoſes of prieſtcraft. Anatomy was likewiſe cultivated at an early period in Egypt. The invention of muſic, as far as it comprehends the firſt elements of melody, is aſcribed to the Egyptians. For aſtrology and magic the Egyptians were particularly famous; the art was very ancient among them; and we find many references to it in the ſacred writings. We need not here take notice of their ſkill in architecture, mechanics, painting, and ſculpture. The art of alchemy is ſaid to have been known to the ancient Egyptians; and from the imagined founder of the Egyptian philoſophy, it has been called the Hermetic art. (See the ſeveral articles above-mentioned). As to the manner in which the Egyptians preſerved their knowledge, and tranſmitted it to poſterity, we may here obſerve, that their prieſts were the depoſitaries of all their learning. They had the charge of their philoſophy, and other ſciences, as well as of their religion and ſacred rites; and they were the perſons to whom thoſe who deſired to be inſtructed were to apply. For this purpoſe they had colleges, or academies, in ſeveral parts of the kingdom. One of theſe, at Heliopolis, is mentioned by Strabo, who viſited the apartments, where Eudoxus and Plato had ſtudied for ſeveral years. The Egyptian learning was partly inſcribed on columns, and partly committed to writing in their ſacred books. Of their columns, the moſt famous were thoſe of Hermes, mentioned by ſeveral credible authors, from which the Greek philoſophers and Egyptian hiſtorians deduced much information, and to which Pythagoras and Plato are ſaid to have been partly indebted for their philoſophy. Sanchoniatho and Manetho made uſe of theſe monuments, which ſtood in certain ſubterraneous apartments near Thebes. But it ſhould be conſidered, that the Egyptians, like others among the ancients, had two ſorts of learning, the vulgar, open to all, and the ſecret, which was veiled and diſguiſed, written in a character not commonly underſtood, and guarded by the prieſts. Hence it happened, that Pythagoras is ſaid to have found great difficulty in gaining acceſs to the ſources of Egyptian knowledge and learning. The chief method which the Egyptians adopted for concealing their doctrine, was that of wrapping it up in hieroglyphics, ſymbols, enigmas, and fables. In their inſcriptions and writings, they made uſe of three different ſorts of characters. The firſt and moſt ancient ſort was that of *hieroglyphics*; which ſee. They alſo uſed literal characters, of which they had two kinds, *viz.* the ſacred letters, in which their public regiſters, and all matters of an higher nature, were written; and the other the vulgar, uſed by every one in their common buſineſs. How far the Egyptians were concerned in the invention of letters is a queſtion to which our attention will be directed under the articles LETTERS and WRITING.

The Egyptian language is, without doubt, one of the moſt ancient in the world, and, as ſome have imagined, an original, or mother-tongue. See LANGUAGE, and the article COPHTS.

We ſhall cloſe this article with a conciſe ſketch of the hiſtory of Egypt. This country conſiſted originally of a narrow tract on the borders of the river Nile. The region, afterwards called Lower Egypt, and the Delta, was, in thoſe early ages, a gulf of the ſea. The date of the population of Egypt is uncertain. Some learned men have conjectured that, not long after the diviſion of the earth among the ſons of Noah, Ham with his family retired to this fertile tract; and that his ſon Mizraim peopled the country with his own iſſue, which inhabited ſeveral parts of it, under the names of Mizraim, Pathruſim, Caſluhim, and Caphtorim. Some have added, that after the death of Mizraim, Egypt was divided into ſeveral ſmall principalities, which were governed by their reſpective ſovereigns. It is not probable, however, that Mizraim ſhould eſtabliſh a monarchy in Egypt; but it is more likely, that the world was at firſt planted by tribes, or colonies, compoſed of different families blended together without diſtinction; and that every tribe ſhould remain ſeparate and independent, in its ſettlement, till it was conſtrained to yield to ſome powerful invader, and that thus the monarchical form of government was eſtabliſhed. The ſources of information concerning the ancient ſtate of Egypt are thoſe with which we are furniſhed by Syncellus, Manetho, and Eratoſthenes. But theſe are ſo fabulous, defective, and inconſiſtent, that it is needleſs for us to recite them. The reader may find them ſtated and examined, or rather expoſed in the 1ſt volume of the Ancient Univerſal Hiſtory. The reſult, however, from an examination of theſe ſources is, that in Egypt there were 30 dynaſties, conſiſting of 36,525 years, and that, after a period of ſomewhat more than 34,200 years, during which their gods and demi-gods reigned, the cynic circle ſucceeded. The duration of this dynaſty is fixed to 443 years, after which their kings began to reign; the firſt of whom is Menes. In Blair's tables, the kingdom of Egypt is ſaid to commence under Mizraim, the ſon of Ham, in the year 2188 B. C., and to have laſted for 1663 years, to the conqueſt of Cambyſes, in the year 525 B. C. Sir Iſaac Newton places Menes after Seſoſtris, ſuppoſed by him to be Oſiris, and in oppoſition to other chronologers who wrote before him, he thus tranſpoſes the ſeries of the kings of Egypt mentioned by Herodotus. According to his account, Menes was the ſame with Amenophis and Memnon, and was about 300 years older than Pſammetichus, with whom the Egyptian chronology begins to be unravelled, and to acquire a certain degree of clearneſs and conſiſtency. Sir Iſaac holds it irrational to ſuppoſe, that there was any king of Egypt till after the expulſion of the ſhepherds.

Menes, ſuppoſed to be the firſt mortal who reigned over Egypt, is ſaid to have found the whole country, except Thebais, a moraſs, ſo that no land appeared between the lake Mœris and the Mediterranean. He diverted the courſe of the Nile, which before waſhed the foot of the ſandy mountain, towards Libya, and built the city of Memphis within the ancient bed of the river. On the north ſide he made a lake, and on the weſt another, both without the walls, and both fed by the Nile, which flowed along the eaſt ſide of the town; and in the city itſelf he built the famous temple of Vulcan. He is ſaid to have been the firſt who inſtructed the Egyptians in religious matters, that introduced magnificence and luxury, and that inſtituted the pomp of feaſts. After an unaſcertained ſucceſſion of kings, the peace and felicity of the country were diſturbed by the approach of a large body of adventurers, diſtinguiſhed in hiſtory by the appellations of Auritæ, Hycſos, and Shepherds. Sir John Marſham places this event 157 years before the exodus of the children of Iſrael. Sir Iſaac Newton places their expulſion in the year 1070 B. C. Their irruption happened, according to archbiſhop Uſher, in the year 2048 B. C., and their expulſion in 1825 B. C.; the reign of Salatis, their firſt king, and his five ſucceſſors, as marked by Manetho, amounting to 259 years. Ancient and modern writers have entertained different opinions concerning theſe enterpriſing people. Manetho, quoted by Joſephus, ſuppoſes that they came from Arabia, and held the whole of Lower Egypt in ſubjection for 259 years, at the end of which period they were obliged, by a king of Upper Egypt, named Amoſis, and Thethmoſis, to quit the country, and retire elſewhere. When the Shepherds withdrew from Egypt with their families, their number amounted to 240.000; and, taking the way of the deſert, they entered Syria; but, fearing the Aſſyrians, who were then very powerful, they built for themſelves, in the land now known by the name of Judea, a city capable of holding ſo great a multitude, and called it Jeruſalem: ſuch is the account of Manetho. Others, as Tatian, Juſtin Martyr, Clemens of Alexandria, ſuppoſe, that the expulſion of the Shepherds and the exodus of the children of Iſrael were the ſame event. The ingenious and learned Bryant maintains that theſe Shepherds were Cuthites, who had been expelled from Babylon by the ſons of Shem, at the ſecond diſperſion; and that, abandoning a region, which they could no longer poſſeſs in tranquillity, they precipitated themſelves into Egypt, drove the diſunited tribes of Ham from the moſt fertile part of their territories at the upper end of the Delta, and ſettled there. This invaſion happened ſoon after the Aſſyrians had become formidable by the conqueſts of Ninus; for we are told that the Auritæ fortified the eaſtern borders of their new ſettlements towards Arabia and Chaldæa. About this time, as ancient hiſtorians aſſert, the Delta had acquired the conſiſtency of a moraſs. Drained by the Shepherds, it ſoon became a temperate and beautiful, as it naturally was a fertile region. For the ſpace of 2½ centuries, that bold and enterpriſing race kept poſſeſſion of Middle and Lower Egypt. In the courſe of this period, as we are told, they diſcovered many uſeful arts and inventions, and ſent out colonies, from time to time, in queſt of new ſettlements. Two hundred and ſixty years after their arrival in Egypt, the poſterity of the original natives, not finding ſufficient accommodation in Upper Egypt, to which they had been confined, or envying the ſucceſs of their fortunate invaders, commenced hoſtilities againſt them. After a long, doubtful, and bloody conteſt, the Auritæ were compelled to retire. They ſeparated into ſeveral bodies, and migrated into Phœnicia, Syria, Greece, and other regions, carrying with them their inventions and improvements. (See AURITÆ and SHEPHERDS.) This memorable revolution happened not long before the deſcent of Jacob, 1706 B. C. The land of Goſhen, that had been evacuated by the expulſion of the ſhepherds, was allotted as a ſettlement to him and his family. His poſterity poſſeſſed this province for a period of 215 years; and in the year 1491 B. C. they were permitted to depart. Soon after their departure the Egyptian monarch purſued them with a powerful army, determined either to bring them back to ſervitude or to deſtroy them, unarmed and defenceleſs, in the wilderneſs. Providence, however, conducted and preſerved them: and overthrew Pharaoh with his whole hoſt in the Red ſea. Soon after this event, which happened, as ſome ſay, in the reign of Amenophis, this king was ſucceeded (1485 B. C.) by his ſon, as ſome have thought, Seſoſtris, the Seſac or Shiſhak of ſcripture, according to ſir John Marſham, who ſays that the more ancient kings of Egypt are ſtyled Pharaoh. Whiſton has laboured to ſhew, that Seſoſtris is the Typhon of the mythologiſts, and the ſame Pharaoh who periſhed in the Red ſea. Sir Iſaac Newton, as we have already ſaid, maintains, that Seſoſtris is the Oſiris of the Egyptians, the Bacchus of the Greeks, and the Seſac or Shiſhak of the ſcriptures. However this be, his reign, which laſted 68 years according to Blair's tables, formed the moſt extraordinary part of the Egyptian hiſtory. He is repreſented as having been very powerful, both by ſea and land, wiſe, juſt, generous, valiant, and magnificent, but ambitious. (See SESOSTRIS.) After the death of Sethon, about 675 years B. C., Egypt was divided into 12 kingdoms, and as many of the Egyptian lords were appointed rulers or ſovereigns, who entered into the ſtricteſt aſſociation for the public welfare. The ſea-coaſts fell to the lot of one of them, called Pſammetichus, who, encouraging commerce with the Greeks and Phœnicians, not only accumulated great wealth, but acquired the favour and friendſhip of ſeveral foreign kings and nations. The other ſovereigns became jealous and envious, and declared war againſt him. Finding himſelf unequal to the conflict, he hired an army of mercenaries, conſiſting chiefly of Ionians, Carians, and Arabians, and repelling force by force, he at length ſubdued the other kings, and put an end to the duodecemvirate, after it had ſubſiſted 15 years. In the year 660 B. C. he became maſter of the whole kingdom of Egypt, and reigned with as much wiſdom, magnanimity, and ſplendour, as any of his predeceſſors had ever diſplayed. After a long and proſperous reign, he was ſucceeded (616 B. C.) by his ſon Pharaoh-Necho, who was defeated by Nebuchadnezzar king of Babylon. Soon after this defeat, Nebuchadnezzar returned to Egypt with a powerful army, laid waſte the kingdom, dethroned Apries, Necho's ſucceſſor, (587 B. C.) inveſted Amaſis with the ſupreme power (569 B. C.), and carried an incredible quantity of captives and ſpoils to Babylon. Amaſis, conſulting his own ſafety, entered into an alliance with the Grecian ſtates, and with Crœſus, king of Lydia. About this time the Perſian empire had been much elevated by the victories and triumphs of Cyrus. Twenty-three years after the conqueſt of Lydia, Cambyſes, the ſon of Cyrus, reduced Egypt, and made it tributary to Perſia, 525 years B C. In the ſecond year of Artaxerxes Longimanus (463 B. C.) Egypt revolted from the Perſians, under Inarus, who procured for them the aſſiſtance of the Athenians; but they were again compelled to ſubmiſſion. In the 10th year of Darius Nothus (414 B. C.) another revolt took place; and Egypt had for a ſhort interval its own kings, the laſt of whom was Nectanebus, when it was compelled to ſubmit to the Perſians in the 9th year of Artaxerxes Ochus, 350 years B. C. In a few years Alexander the Great, having ſubdued Perſia (331 B.C.) marched towards Egypt, and the whole kingdom ſubmitted without reſiſtance to his victorious army. After his death Ptolemy, one of his generals, took poſſeſſion of it, 323 years B. C.; and his poſterity maintained themſelves upon the throne for about 280 years. Upon the defeat of Antony, and the death of Cleopatra, Egypt ſhared the fate of other kingdoms, and was reduced by Auguſtus into a Roman province, in the 2d year of his reign, 30 B. C. Auguſtus divided the government among ſeveral perſons of equeſtrian order; not venturing to confide in ſenators, who were already too powerful. No circumſtances pertaining to Egypt of ſufficient moment to be here recited, occurred during the reigns of the firſt emperors: but in that of Gallienus, (about A. D. 254) Emilian, who had been prefect for ſome years, aſſumed the imperial purple, and gratified the people by delivering them from the yoke of Gallienus, who was hated and deſpiſed. The people and the ſoldiers concurred in acknowledging his ſovereign authority, and he governed the country for ſome time with prudence and vigour. At length, however, he was taken by Theodotus, and ſent to Gallienus, who ordered him to be ſtrangled in priſon. Under Claudius (A. D. 269) Zenobia, who called herſelf a deſcendant of the kings of Egypt, and decorated her pedigree with the names of the Ptolemies and Cleopatras, from whom ſhe pretended to derive her origin, took poſſeſſion of Egypt; but whilſt Aurelian made war upon this ambitious ſovereign in the Eaſt, his lieutenant Probus re-conquered Egypt and annexed it to the Roman empire. In the year 640 Egypt was ſubdued by Amrou, the famous general of Omar, caliph of the Saracens. (See ALEXANDRIA.) Under the adminiſtration of Amrou Egypt proſpered; and his genius renewed the maritime communication, which had been attempted or atchieved by the Pharaohs, the Ptolemies, and the Cæſars; and a canal, at leaſt 80 miles in length, was opened from the Nile to the Red ſea. This inland navigation, which would have joined the Mediterranean and the Indian ocean, was ſoon diſcontinued as uſeleſs and dangerous. Amrou's letter to Omar exhibits in glowing colours the riches and populouſneſs of this country. The Saracens retained poſſeſſion of this country, until Saladin, A.D. 1174, eſtabliſhed the empire of the Turks in Africa. In the year 1250, the Turkiſh government gave way to that of the Mamlouks. (See MAMLOUKS.) This dynaſty terminated in 1517, when Selim, ſultan of the Ottomans, annexed the kingdom of Egypt to the Turkiſh dominions. It ſtill remains in ſubjection to the Sultans, and is governed by Pachas or Baſhaws, and Beys, who, as we have already ſeen, have reduced it to extreme miſery. (See BASHAW and BEY.) Of the attempts that have been lately made both by the Engliſh and French, to take poſſeſſion of this country, it is unneceſſary to take notice, as they have terminated by alternate victories and defeats between the contending parties, and in the withdrawment of the forces of England and France from this ſcene of conteſt. Anc. Un. Hiſt. vol. i. Savary's Travels in Egypt, vol. ii. Volney's Travels in Egypt and Syria, vol. i. Sonnini's Travels in Egypt. Browne's Travels in Egypt. Brucker's Hiſt. Philoſ. by Enfield, vol. i.

EGYPTIAN GNOSTICS. See GNOSTICS.

EGYPTIAN *Pebble.* See JASPER.

EGYPTIAN *Year.* See YEAR.

EGYPTIANS, popularly *Gypſies*, in our ſtatutes, impoſtors and jugglers, forming a kind of commonwealth among themſelves, who diſguiſe themſelves in uncouth habits, ſmearing their faces and bodies, and framing to themſelves a canting language, wander up and down, and, under pretence of telling fortunes, curing diſeaſes, &c. abuſe the common people, trick them of their money, and ſteal all that they can come at.

The origin of this tribe of vagabonds is ſomewhat obſcure; at leaſt, the reaſon of the denomination is ſo. It is certain, the ancient Egyptians had the character of great cheats, and were famous for the ſubtlety of their impoſtures, whence the name might afterwards paſs proverbially into other languages, as it is pretty certain it did into the Greek and Latin; or elſe, the ancient Egyptians being much verſed in aſtronomy, which in thoſe days was little elſe but aſtrology, the name was on that ſcore aſſumed by theſe tellers of good fortune.

Be this as it will, there is ſcarcely any country of Europe but has its Egyptians, though not all of them under that denomination: the Latins call them *Ægyptii:* the Italians, *Cingani* and *Cingari*; the Germans, *Zigeuner*; the French, *Bohemiens*; others, *Saracens*; and others, *Tartars*, &c.

Munſter, Geogr. lib. iii. cap. 5. relates, that they made their firſt appearance in Germany, in 1417, exceedingly tawney and ſun-burnt, and in pitiful array, though they affected quality and travelled with a train of hunting-dogs after them, like nobles. The above date ſhould probably have been 1517, as Munſter himſelf owns, he never ſaw any till 1524. He adds, that they had paſſports from king Sigiſmund of Bohemia, and other princes. Ten years afterwards, they came into France, and thence paſſed into England. Pope Pius II., who died A. D. 1464, mentions them in his hiſtory as thieves and vagabonds, thus wandering with their families over Europe, under the name of Zigari; and whom he ſuppoſes to have migrated from the country of the Zigi, which nearly anſwers to the modern Circaſſia. Several hiſtorians inform us, that when ſultan Selim conquered Egypt, in the year 1517, ſeveral of the natives refuſed to ſubmit to the Turkiſh yoke; but being at length ſubdued and baniſhed, they agreed to diſperſe in ſmall parties over the world, where their ſuppoſed ſkill in the black art gave them an univerſal reception, in that age of ſuperſtition and credulity. In a few years the number of their proſelytes multiplied, and they became formidable in moſt of the ſtates of Europe. Paſquier, in his Recherch. liv. iv. chap. 19. relates a leſs probable origin of the Gypſies, thus: on the 17th of April 1427, there came to Paris twelve penitents, or perſons, as they ſaid, adjudged to penance, *viz.* one duke, one count, and ten cavaliers, or perſons on horſeback: they took on themſelves the character of "Chriſtians of the Lower Egypt," expelled by the Saracens; who, having made application to the pope, and confeſſed their ſins, received for penance, that they ſhould travel through the world for ſeven years, without ever lying on a bed. Their train conſiſted of 120 perſons, men, women, and children, which were all that were left of 1200, who came together out of Egypt. They had lodgings aſſigned them in the chapel, and people went in crowds to ſee them. Their ears were perforated, and ſilver buckles hung to them; their hair was exceedingly black, and frizzled; their women were ugly, thieviſh, and pretenders to telling of fortunes. The biſhop ſoon afterwards obliged them to retire, and excommunicated ſuch as had ſhewn them their hands.

Ralph. Volaterranus, making mention of them, affirms, that they firſt proceeded or ſtrolled from among the Uxii, a people of Perſis or Perſia. Mr. Grellman, in a German "Diſſertation on the Gypſies," of which an Engliſh tranſlation by Matthew Raper, eſq. was publiſhed in 1787, has given a circumſtantial and connected account of theſe wandering tribes and their manner of living in different parts of Europe. Having collected the opinions of ſeveral writers on the origin of the Gypſies, and, as he conceived, refuted the arguments alleged in ſupport of them, he aſſerts, that they came from Hindooſtan: this hypotheſis he grounds chiefly on the ſimilarity of the Gipſy language to the Hindooſtanic; and upon a compariſon it muſt be acknowledged that many words are the ſame, whilſt many are different. Many of theſe words, as ſir William Jones has obſerved (Aſiatic Ref. v. iii. p. 7.) are pure Sancrit, ſcarcely changed in a ſingle letter. Mr. Grellman, moreover, ſuppoſes, that the Gypſies are of the loweſt claſs of Indians, *viz.* "Parias," or, as they are called in Hindooſtan, "Suders."

He compares the manners of this claſs with thoſe of the Gypſies, and enumerates many circumſtances in which they agree; but ſome of his compariſons are frivolous, and prove nothing. In anſwer to the queſtion, How and when did the Gypſies migrate from Hindooſtan, he replies, that there is no cauſe to be aſſigned for their retreat from thence by any means ſo plauſible as the war of Timur Beg in India. The date of their arrival, he ſays, marks it very plainly. It was in the year 1408 and 1409 that this conqueror ravaged India; and his progreſs was ſo alarming and deſtructive, that theſe, among other terrified inhabitants, ſaved themſelves by flight. Accordingly this author endeavours to trace their route from Hindooſtan to Europe; but he acknowledges that nothing can be ſaid on this ſubject beyond mere ſurmiſe. Sir W. Jones (ubi ſupra) ſuggeſts, that, in ſome piratical expedition, they might have landed on the coaſt of Arabia, or Africa, whence they might have rambled to Egypt, and, at length, have migrated, or been driven into Europe. A race of banditti, reſembling them in their habits and features, is found among the Troglodytes, in the rocks near Thebes.

Mr. Grellman eſtimates the number of theſe wanderers in Europe to be between 7 and 800 000. As to the favourite food of theſe people our author ſays, that they are ſo far from being diſguſted with the carrion of a ſheep, hog, cow, or other beaſt, horſe-fleſh only excepted, that their fill of ſuch a meal is with them the height of epicuriſm. He has then deſcribed their dreſs, their family-economy, their occupations and trades, their marriages and education, their diſeaſes and burials, their political regulations and religion. In theſe particulars we cannot follow him. With regard to their character he ſays, that they are lively, and uncommonly loquacious, extremely fickle and inconſtant in their purſuits, and faithleſs to every body even of their own caſt, deſtitute of gratitude, and frequently recompenſing benefits with the moſt inſidious malice: ſlaviſh when intimidated, and cruel when unapprehenſive of danger, revengeful and violent in their reſentments; ſo addicted to drinking as to part with any neceſſary for ſpirits; and exceedingly vain and fond of fine clothes. Such are the levity and inſenſibility of a Gipſy's temper, that in the ſpace of an hour he forgets that he has been juſt releaſed from the whipping poſt.

But there are other traits of character much more atrocious than any we have already mentioned. The depravity of their manners, with regard to the intercourſe of the ſexes, is extreme. The mother, ſays our author, endeavours, by the moſt ſcandalous arts, to train up her daughter for an offering to ſenſuality, and the daughter is ſcarcely grown up to maturity, before ſhe becomes a ſeducer of others. Lazineſs is ſo predominant among them, that if they were to ſubſiſt merely by their own labour, they would hardly have bread for two days in the week. This indolence increaſes their propenſity to ſtealing and cheating. It is not matter of ſurpriſe, if this picture be fairly drawn, that almoſt every European ſtate has exerted its utmoſt power to get rid of theſe noxious intruders. Mr. Grellman enumerates ſeveral edicts that have been paſſed for the baniſhment of the Gypſies out of Spain, France, Italy, England, Denmark, Sweden, the Netherlands, Holland, and Germany. He diſapproves of theſe laws, and recommends other methods for making them uſeful ſubjects in the ſeveral kingdoms, where they are now dangerous and miſchievous vagabonds. One of the means which he propoſes is not likely to anſwer any valuable purpoſe. The civilization of a ſavage muſt be effected by gentle treatment, and not by corporeal puniſhment, which he recommends.

By an ordonnance of the ſtates of Orleans, in the year 1560, it was enjoined all theſe impoſtors, under the name of *Bohemians* and *Egyptians*, to quit the kingdom, on penalty of the gallies. Upon this they diſperſed into leſſer companies, and ſpread themſelves over Europe. They were expelled from Spain in 1591. The firſt time we hear of them in England was in the year 1530, when they were deſcribed by the ſtatute 22 Hen. VIII. cap 10. as "an outlandiſh people, calling themſelves Egyptians, uſing no craft nor feat of merchandize, who have come into this realm, and gone from ſhire to ſhire and place to place in great company, and uſed great, ſubtile, and crafty means to deceive the people; bearing them in hand, that they by palmiſtry could tell men's and women's fortunes; and ſo many times by craft and ſubtlety have deceived the people of their money, and alſo have committed many heinous felonies and robberies." Wherefore they are directed to avoid the realm, and not to return under pain of impriſonment, and forfeiture of their goods and chattels; and upon their trials for any felony which they may have committed, they ſhall not be entitled to a jury "de Medietate linguæ." And afterwards, it is enacted by ſtatutes 1 and 2 Ph. and M. c. 4, and 5 Eliz. c. 20. that if any ſuch perſon ſhall be imported into this kingdom, the importer ſhall forfeit 40 *l.* And if the Egyptians themſelves remain one month in this kingdom, or if any perſon, being fourteen years old, (whether natural born ſubject or ſtranger,) which hath been ſeen or found in the fellowſhip of ſuch Egyptians, or which hath diſguiſed him or herſelf like them, ſhall remain in the ſame one month, at one or ſeveral times; it is felony without benefit of clergy: and ſir Matthew Hale informs us, that at one Suffolk aſſizes no leſs than 13 Gypſies were executed upon theſe ſtatutes, a few years before the Reſtoration. But to the honour of our national humanity, there are no inſtances more modern than this of carrying theſe laws into practice. Now, indeed, by ſtat. 23 Geo. III. c. 51. the ſaid act of 5 Eliz. c. 20. is repealed: and the ſtatute 17 Geo. II. c. 5. regards them only under the denomination of rogues and vagabonds. See VAGRANTS.

EHENHEIM, or UPPER EHENHEIM, relatively to the village of the ſame name, called *Lower Ehenheim*, in *Geography*, is a ſmall town of France, in the department of the Lower Rhine, on the river Ergel, or Ergers; 15 miles S.W. of Straſbourg. It was anciently a free imperial city.

EHINGEN, a ſmall town of Germany, in the kingdom of Wirtemberg, ſituated on the Danube; 12 miles S.W. of Ulm, remarkable for a very ancient nunnery.—Alſo, a ſmall town of Germany of the ſame kingdom, ſituated on the Necker; 6 miles W. of Tubingen.

EHLE, a river of Germany, in the circle of Upper Saxony, which runs into the Elbe, near Magdeburg.

EHRENBERG, a ſmall town of Germany, in the kingdom of Bavaria, ſituated in the Tyrol, on the frontiers of Suabia, in the lordſhip of the ſame name. It is remarkable for an ancient caſtle, which formerly was conſidered as very ſtrong. It is 30 miles S.E. of Kempten.—Alſo, a ſmall town of Germany, in the former principality of Fulda, with a chapel dedicated to the Virgin Mary on the top of a very high hill, which its termination *berg*, the German for mountain, denotes.

EHRENBREITSTEIN, (*the broad rock of honour*,) an important fortreſs of Germany, near the Rhine, on a high mountain oppoſite Coblentz, at the place where the river Moſelle falls into the Rhine. The rock is ſo ſteep, and the fortifications are ſo ſtrong, that it can be reduced only by famine. It ſurrendered to the French in 1798, after a blockade of eighteen months. The electoral palace of the archbiſhops and electors of Trêves, whoſe territory was ceded to France by the peace of Luneville, is at the foot of the rock, and ſurrounded with works of defence. Ehrenbreitſtein is now in the territory of the grand duke of Naſſau Weilburg, one of the princes of the Confederation of the Rhine.

EHRENBURG, a town of Germany, in the kingdom of Weſtphalia, and county of Hoya; 18 miles W.S.W. of Hoya.

EHRENFRIEDERSDORF, anciently Irbersdorf, a ſmall town of the kingdom of Saxony, in the circle of the Ertzgebirge, on a ſmall rivulet, which, after having received ſeveral other brooks, takes the name of Wiſch, and falls into the Zſchopau near Grieſbach. It is chiefly inhabited by miners occupied in the adjacent mines; its population amounts to 1300 individuals, and its chief manufacture is that of thread, lace, and yarn.

EHRENSTEIN, a town and caſtle of Germany, in the circle of Upper Saxony, and principality of Schwartzburg Rudolſtadt; 10 miles N.W. of Saalfeld.

EHRETIA, in *Botany*, ſo named by Browne, in honour of George Dionyſius Ehret, a German, much celebrated for his beautiful botanical drawings, which now fetch a high price among collectors. Mr. Ehret was the friend of Miller, as well as a correſpondent of Linnæus. He drew from dried ſpecimens the excellent plates of Browne's Natural Hiſtory of Jamaica, and after reſiding long in England, where he had many pupils, even among the nobility, who highly reſpected him, he died about 40 years ago, and was interred near his friend Miller, in the burial ground of the King's-road, Chelſea. He was born in 1708. Browne's Jam. 168. t. 16. f. 1. Linn. Gen. 102. Schreb. 139. Willd. Sp. Pl. v. 1. 1077. Mart. Mill. Dict. v. 2. Juſſ. 128. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Aſperifoliæ*, Linn. *Borragineæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, bell-ſhaped, ſmall, permanent, divided half-way down into five obtuſe ſegments. *Cor.* of one petal; tube twice as long as the calyx; limb in five, nearly ovate, recurved, obtuſe ſegments. *Stam.* Filaments five, inſerted into the baſe of the tube, awl-ſhaped, ſpreading, the length of the corolla; anthers roundiſh, incumbent. *Piſt.* Germen ſuperior, roundiſh; ſtyle thread-ſhaped, ſwelling upwards, the length of the ſtamens; ſtigma obtuſe, cloven. *Peric.* Berry, according to Juſſieu, of four cells, but ſeparable into two hemiſpheres, each of two cells. *Seeds* one in each cell, convex on one ſide, angular on the other.

Obſ. E. *Beurreria* has the fruit ſeparable into four parts, each of which has two cells and two ſeeds. *Juſſ.* Hence Linnæus's paradoxical account, that each *ſeed* is of two cells in that ſpecies.

Eſſ. Ch. Corolla of one petal, inferior. Berry of four or eight cells. Seeds ſolitary. Stigma cloven.

This genus in Willdenow conſiſts of ſeven ſpecies. E. *tinifolia* is the original one. "Leaves oblong-ovate, entire, ſmooth. Flowers panicled."—Figured in Browne as aboveſaid, and in Trew's Plantæ Selectæ, t. 25, where it is repreſented as hexandrous, with ſix ſegments to the corolla, which the editor erroneouſly terms ſo many petals. This tree grows in Jamaica "in the lower lands," and is from 16 to 20 feet high. The *flowers* are white, not remarkable for beauty. *Berries* yellowiſh, about the ſize of currants. Browne ſays they ſerve to feed poultry, and are ſometimes eaten by the poorer ſort of people. The plant having not much to recommend it to general notice, is only occaſionally cultivated in the Engliſh ſtoves. Miller introduced it in 1734.

E. *Beurreria* is ſtill more unfrequent in our collections. "Leaves ovate, entire, ſmooth. Flowers ſomewhat corymboſe. Calyx ſmooth."—Native of Jamaica, figured in Browne t. 15. f. 2, who deſcribes it as growing in the Savannahs, to the height of 14 or 15 feet only. The *flowers* are white, fewer, but much larger, than in the former. *Berries* ſaffron-coloured, with eight ſeeds.

E. *buxifolia*, Roxburgh Coromand. v. 1. t. 57, is an Eaſt Indian ſpecies, unknown to Linnæus, and as yet a ſtranger in England. "Leaves cluſtered, obovate, beſprinkled with callous points, obſcurely three-toothed at the ſummit. Stalks many-flowered." A rigid ſhrub, remarkable for the white calloſities on its *leaves*. From three to ſix white ſmall *flowers* grow on each flower-ſtalk. *Berry* red, the ſize of a pea.

Juſſieu ſuſpects this genus may be the ſame with the *Menais* of Linnæus; but the latter has been ſeen by Loefling and Aymen only, and we know not how the queſtion is to be clearly determined.

If it ſhould prove ſo, the name of *Ehretia* has a prior claim, in point of time, to *Menais*, not to mention the greater inconveniences of changing it. If, however, the calyx of *Menais* be correctly deſcribed, as "of three looſely ſpreading leaves," this genus muſt be diſtinct, and the linear and ſeſſile anthers moreover abundantly mark it as ſuch.

EHRFELDEN, in *Geography*, a town of Germany, in the circle of the Upper Rhine, and principality of Heſſe Darmſtadt; 8 miles W. of Darmſtadt.

EHRHARTA, in *Botany*, named by Thunberg and the younger Linnæus after their friend Frederick Ehrhart, a Swiſs botaniſt of great diligence and acuteneſs, who ſtudied at Upſal, and ſettled as an apothecary at Hanover, where he died ſome years ſince. He publiſhed ſeveral collections of dried plants, with authentic names, for the uſe of the medical practitioner as well as botaniſt, and a miſcellaneous work, entitled *Beiträge*, in 7 vols. 8vo. in German, full of excellent botanical remarks, with ſome peculiarities of opinion and ſtyle. He beſtowed great and commendable attention upon many common garden trees and flowers, which other botaniſts had confounded or neglected, as well as on cryptogamic plants. Being employed to ſuperintend the printing of the *Supplementum Plantarum*, he introduced ſome of his own genera of moſſes, with new, affected, and unauthorized terms, which gave ſo much diſpleaſure to Linnæus, that the ſheet was cancelled. Thunb. Stockholm Tranſ. for 1779, 216, t. 8. Linn. fil. Nov. Gram. Gen. 32. fig. Suppl. 28. Smith Pl. Ic. faſc. 1. t. 9. Schreb. 236. Willd. Sp. Pl. v. 2. 246. Juſſ. 32. Mart. Mill. Dict. v. 2. Swartz Tr. of Linn. Soc. v. 6. 40. t. 3, 4. (Trochera; Rozier Journ. for 1779, 225.) Claſs and order, *Hexandria Digynia*. Nat. Ord. *Gramina*, near *Oryza*.

Gen. Ch. *Cal.* Glume of two valves, ſingle-flowered; valves uſually ſhorter than the corolla, ovate, acute, concave, channelled, beardleſs, a little ſpreading, unequal; the outer generally ſmaller, ovato-lanceolate, embracing the inner by its baſe; inner rather larger, ovate, broad, acute. *Cor.* double, longer than the calyx, ſcarcely gaping. Outer of two-folded, compreſſed, unequal valves, embracing each other, often furniſhed with one or two tufts of hairs at the baſe; the inner valve narroweſt, with a notch at each ſide of its baſe; outer valve in an early ſtate almoſt concealing the other, and connected with it by a ſort of joint at the very bottom. Inner corolla compreſſed, two edged, of two valves, which are folded, membranous, keeled, unequal; the outer valve broadeſt, embracing the oppoſite glume of the outer corolla with its baſe, at the notched ſides of that glume; inner valve tapering, ſomewhat incurved. At the baſe of the interior corolla, adjoining to the inner valve of the outer corolla, is a ſeſſile, roundiſh, uneven tubercle; perhaps the rudiment of another floret. Nectary of two minute membranes, thickened at their baſe, very thin at the ſummit, enfolding the organs of impregnation. *Stam.* Filaments ſix, very ſhort, inſerted round the germen; anthers linear, erect, notched at the baſe, cloven at the ſummit, of two cells, each of which burſts obliquely at the top. *Piſt.* Germen ſuperior, ovate, minute, ſmooth; ſtyles two, very ſhort, erect, contiguous; ſtigmas long, approaching each other, at length divaricated, each conſiſting of two oppoſite, feathery rows. *Peric.* none, except the permanent valves of the corolla. *Seed* ſolitary, ſmooth.

The above deſcription is taken from Dr. Swartz's paper, the only correct hiſtory of this curious and elegant genus, in which the contrarieties and errors of preceding authors are explained and corrected. Dr. Swartz remarks, that in thoſe ſpecies where the tubercle, or rudiment of a floret, is wanting, a petal-like ſcale is found in its ſtead, on both ſides, where the inner valve is notched.

Eſſ. Ch. Calyx a glume of two valves, ſingle-flowered. Corolla double, each of two valves; the outer corolla notched at the baſe.

The celebrated Thunberg firſt founded this genus upon a ſingle ſpecies in 1779; about the ſame time the abbé Rozier publiſhed a deſcription of another ſpecies by Richard, under the name of *Trochera*. The name of Thunberg however was adopted by Linnæus in the *Supplementum*, who deſcribed his original *E. capenſis*, by the name of *E. Mnemateia*, a name probably ſuggeſted by Ehrhart himſelf, who was partial to words of Greek derivation. Dr. Smith firſt diſtinguiſhed theſe two ſpecies, and added three others to the genus, in his *Plantarum Icones*. Finally, Profeſſor Swartz has inveſtigated the whole, and aſcertained four more ſpecies, making nine in all. Profeſſor Willdenow was not acquainted with this excellent treatiſe when he deſcribed the genus in his *Sp. Plantarum;* and this popular work being therefore deficient, as well as the ſubject very curious, we ſhall briefly elucidate all the ſpecies. They all grow, as far as is at preſent known, near the Cape of Good Hope only. In habit they moſt reſemble *Melicæ*, but the flowers have a ſingular and elegant aſpect, eſpecially ſuch as have the outer corolla tranſverſely wrinkled. Some bear terminal awns on that part, others none.

* *Beardleſs.*

1. E. *mnematea*, Sw. in Tr. of L. Soc. v. 6. 44. f. 1. Linn. Suppl. 209. Thunb. Prod. 66 (E. capenſis; Thunb. Stockh. Tranſ. for 1779, 216. t. 8. E. cartilaginea; Sm. Pl. Ic. faſc. 2. ſub t. 33. Willd. Sp. Pl. v. 2. 246. E. nutans; Lamarck Encycl. v. 2. 346.) "Outer corolla rugoſe, obtuſe, beardleſs. Panicle ſimple, lax. Stem ſimple. Margin of the leaves cartilaginous and criſped."—The *leaves* have a cartilaginous edge, very elegantly notched and criſped. *Flowers* tinged with purple, on capillary drooping ſtalks.

2. E. *panicea*, Sw. 47. f. 2. Sm. Pl. Ic. faſc. 1. t. 9. Willd. Sp. Pl. v. 2. 247. (E. erecta; Lamarck 347.) "Outer corolla ſmooth, ſomewhat rugged, obtuſe. Panicle ſlightly branched, drooping. Stem ſubdivided."—Cultivated in the ſtoves at Kew and Cambridge, flowering in June and July. It has the habit and ſmall green flowers of a *Panicum* or *Poa*, but the ſlighteſt inſpection ſhews its true genus.

3. E. *ramoſa*. Sw. 49. f. 3. (Melica ramoſa; Thunb. Prod. 21. Willd. Sp. Pl. v. 1. 383.) "Outer corolla rough, abrupt. Panicle cloſe. Stem much branched, rather ſhrubby."—Dr. Swartz informs us this is alſo the *Ehrharta digyna* of Thunberg, the only botaniſt who ſeems to have found it; and that the flowers ſomewhat reſemble *Feſtuca decumbens* of Linnæus. The *calyx* is nearly as long as the *corolla*. The *ſtem* jointed, branched, and almoſt woody.

4. E. *melicoides*, Sw. 51. f. 4. (Melica capenſis; Thunb. Prod. 21. Willd. Sp. Pl. v. 1. 383.) "Outer corolla very ſmooth and obtuſe. Panicle widely ſpreading."—Much reſembling a *Melica*. Glumes of the *corolla* peculiarly bare and rounded, and *panicle* very much branched. Sw.

5. E. *calycina*, Sw. 53. f. 5. Sm. Pl. Ic. faſc. 2. t. 33. Willd. Sp. Pl. v. 2. 247. (Aira capenſis; Linn. Suppl. 108.) "Outer corolla ſomewhat hairy, obtuſe with a ſhort point. Panicle cloſe, nearly ſimple. Stem branched."—Sparrman was the diſcoverer of this ſpecies, whoſe pointed hairy *glumes* diſtinguiſh it from the laſt, as well as its cloſe *panicle*.

** *Awned.*

6. E. *geniculata*, Sw. 55. f. 6. (Melica geniculata; Thunb. Prod. 21. Willd. Sp. Pl. v. 1. 382.) "Outer corolla hairy; one valve awned. Panicle cloſe. Stem decumbent, bent at the joints."—Habit of the laſt, but its criſped *leaves*, and pointed awned *corolla* diſtinguiſh it.

7. E. *longiflora*, Sw. 56. f. 7. Sm. Pl. Ic. faſc. 2. t. 32. Willd. Sp. Pl. v. 2. 246. (E. ariſtata; Thunb. Prod. 66.) "Outer corolla rugged, hiſpid, both valves awned. Panicle rather lax, branched."—A large ſpecies, with the habit of an *Avena*. Dr. Swartz found ſix ſtamens, Dr. Smith but three, in the flowers they ſeverally examined. The length of the awns varies.

8. E. *gigantea*, Sw. 58. f. 8. (Melica gigantea; Thunb. Prod. 21. Willd. Sp. Pl. v. 1. 382. Aira villoſa; Linn. Suppl. 109.) "Outer corolla hairy, both valves awned. Panicle cloſe, ſomewhat whorled. Stem remotely jointed. Leaves involute."—One of the largeſt ſpecies, being ſix feet high. The *flowers* alſo are larger and more hairy than in any other. *Calyx* very membranous, half as long as the corolla.

9. E. *bulboſa*, Sw. 60. f. 9. Sm. Pl. Ic. faſc. 2. ſub t. 33. (Trochera ſtriata; Richard in Rozier's Journal, v. 13. 225. t. 3.) "Outer corolla with obovate, emarginate, rugged, ſhort-awned glumes. Panicle lax."—The *root* is more bulboſe in this than in ſome others. It was deſcribed by Richard from a plant in ſome of the French gardens, and he attributes "but three ſtamens to the flowers." We have found four, with appearance of abortive filaments, ſo that the number probably varies. This moſt reſembles the firſt ſpecies, with which indeed Lamarck confounded it.

EHRIAH, Gross, in *Geography*, a town of Germany, in the circle of Upper Saxony, and county of Schwartzburg; 4 miles W. of Greuſſen.

EHRNAU, a town of Germany, in the duchy of Stiria; ſix miles N. of Knittelfeld.

EHRNHAUSEN, a town of Germany, in the duchy of Stiria, at the conflux of the Salm and the Muehr; 10 miles N. of Mahrburg.

EHRNSPRUNN, a town of Germany, in the archduchy of Auſtria; 8 miles S. of Laab.

EIA, a river of Ruſſia, which runs into the ſea of Azoph, at Eiſkoi.

Eia, or *Ey*, in our *Old Writers*, are uſed for an iſland. Hence the names of places ending in *ey*, denote them to be iſlands. Thus, Ramſey, the iſle of Rams; Sheppey, the iſle of Sheep, &c.

Eia is alſo ſometimes uſed for water; and hence the names of places near waters or lakes, terminate in *ey*.

EJACULATION, in *Medicine*, the act of emitting ſeed, from the Latin, *ejaculare*, to caſt outwards. See Emission.

EJACULATOR Seminis, in *Anatomy*, a muſcle of the urethra, called alſo accelerator urinæ; which ſee.

EJACULATORY Ducts, a term which has been applied to the openings of the vaſa deferentia in the urethra. See Generation, *Organs of*.

EIBESWALD, in *Geography*, a town of Germany, in the duchy of Stiria; 16 miles S. of Voitſberg.

EICETÆ, called alſo *Heicetæ* and *Hicetæ*, heretics of the ſeventh century, who made profeſſion of the monaſtic life.

From that paſſage in Exodus, where Moſes and the children of Iſrael are ſaid to have ſung a ſong in praiſe of the Lord, after they had paſſed the Red ſea, wherein their enemies had periſhed, the Eicetæ concluded, that they muſt ſing and dance, to praiſe God aright; and as Mary the propheteſs, ſiſter of Moſes and Aaron, took a drum in her hand, on the ſame occaſion, and all the women did the like, to teſtify their joy, by playing, beating, and dancing, the Eicetæ, the better to imitate their conduct herein, endeavoured to draw women to them to make profeſſion of the monaſtic life, and aſſiſt in their mirth.

EICHENBUHL, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and electorate of Mentz; 3 miles S.E. of Miltenberg.

EICHHOLZ, a town of Germany, in the circle of Upper Saxony, and principality of Anhalt Zerbſt; 3 miles S.W. of Zerbſt.

EICHMED, a town of Pruſſia, in the province of Natangen; ſix miles S.S.E. of Raſtenburg.

EICHNER, M. in *Biography*, an eminent performer on the baſſoon, and an excellent compoſer, not only for his own inſtrument, but for the harpſichord and piano-forte. He was in this country about five and twenty years ago, and introduced a ſtyle between that of Schobert and the preſent; with leſs fire than Schobert, and more taſte and expreſſion. He was accuſed by the critics of his own country of being too modern. He was in a bad ſtate of health during his reſidence in England, and played but little in public; yet from that little it was eaſy to diſcover a ſtyle, taſte, and expreſſion, of the moſt refined and poliſhed kind. His pieces for keyed-inſtruments, printed by Bremner, were elegant, correct, and extremely pleaſing. He died at Berlin the beginning of 1778.

EICHSFELD, in *Geography*, frequently but improperly called the *Eisfeld*, is a country of Germany, ſituated in the Electoral Rheniſh circle, bounded by Hanover, Heſſe, and Thuringia, about 35 miles in its greateſt length from ſouth to north, and 24 miles in breadth from eaſt to weſt, having altogether a territorial extent of 185 ſquare miles. It is divided into Lower and Upper Eichsfeld, the Lower being the northern, and the Upper the ſouthern part. The latter is very mountainous, and gives birth to ſeveral rivers, as the Leine; the Lutter, which firſt runs into the Wieſel, and then conjointly with this into the Werre; the Unſtrut; the Wipper, and the Rume.

The Eichsfeld contains four cities, three boroughs, and one hundred and fifty villages. Duderſtadt, in the Lower Eichsfeld, was conſidered as the capital. Its population, at the peace of Luneville, was about 120,000 individuals.

Anciently the Eichsfeld belonged to Thuringia. The Upper Eichsfeld was ceded by Henry, count of Gleichen, in the year 1294 to Gerhard II. elector of Mayence; the remaining parts of this country were ſucceſſively added to the electorate in 1334, 1563, and 1692. But at the peace of Luneville, the archbiſhop of Mayence was ſecularized, and the Eicshfeld given as an indemnity to Pruſſia for the Pruſſian provinces on the weſt ſide of the Rhine. This ceſſion was confirmed by the convention of the 26th of December 1802, between Auſtria, Ruſſia, and France. But Pruſſia loſt the Eichsfeld again at the peace of Tilſit in 1807, and by Napoleon's decree of the 18th of Auguſt of the ſame year, the Eichsfeld was conſtituted a part of the new kingdom of Weſtphalia.

EICHSTAEDT, Eichstett, or *Aichſtadt*, an ancient town of Germany, in the circle of Franconia, formerly the chief city and epiſcopal reſidence of the biſhopric of the ſame name, is ſituated in a fertile valley on the river Altmuhl, 45 miles S. of Nuremberg, in a tract of country called the Nordgau. The place on which the town of Eichſtett ſtands belonged anciently to the counts of Hirſchberg, one of whom ceded it to St. Boniface, and the latter to his ſiſter's ſon Willibald, who founded a convent, near which houſes were gradually built, and this aſſemblage of buildings obtained the name of Eichſtett from the number of large oaks with which it was ſurrounded. In 745 Boniface conſecrated Willibald biſhop of Eichſtett.

The biſhopric of Eichſtett, which was nearly 54 miles long and about 21 in breadth, contained 10 towns and one borough: but it was ſecularized at the peace of Luneville, and firſt given to the king of Bavaria, who ſtill retains a ſmall portion of it. The principal part, together with the town of Eichſtett, was afterwards transferred as part of his indemnities to the grand duke of Tuſcany, who was created elector of Salzburg, and whoſe poſſeſſions in Germany are now known by the name of the grand duchy of Salzburg. They are conſidered as under the protection of Auſtria.

EIDA, in *Modern Hiſtory*, a Mahometan ſpring feſtival, celebrated annually by the Nawab of Lucknow, in Hindooſtan, on the 1ſt of March, after the new moon becomes viſible, and kept, as it is ſaid, in commemoration of Abraham's ſacrifice. A camel is here ſubſtituted for a ram. The princes of Hindooſtan march in proceſſion, at this ceremony, with all their courtiers, and a large military eſcort. On ſuch occaſions, the oriental taſte for ſhew and gaudy magnificence is diſplayed with extraordinary attention. The howdahs, palankeens, and harneſſing of the elephants, are ſo contrived, as to exhibit a blaze of gold, in which the numerous ornaments cannot be well diſtinguiſhed. After the pomp and oſtentation of the proceſſion, during which alms are diſtributed, when the firſt part of it arrives on the ground, the ceremony conſiſts in a ſolemn invocation of the Deity for plenty and proſperity during the enſuing ſeaſon. It is obſerved, however, that the tranſitions from outward acts of devotion to the groſſeſt crimes is ſhort and frequent. This feſtival ſeems to reſemble the feaſt of Tabernacles among the Jews, which, as we learn from the complaint of the prophet, was obſerved by that people with as little moral effect, or purity of intention, as this is by the Muſſulmans. Both Jews and Muſſulmans have, in too many inſtances, equally regarded ſuperſtitious obſervances, as a ſubſtitute for every moral virtue, and a compenſation to the Deity for the violation of his laws.

EIDE, in *Geography*, a town of Norway; 36 miles E.S.E. of Berghen.

EIDER, a river, which, in a great part of its courſe, divides the duchy of Sleſwick from that of Holſtein, and runs into the German ocean; 12 miles W.S.W. of Lunden.

Eider-*Duck*, in *Ornithology*. See Duck.

EIDWALD, in *Geography*, a town of Bohemia, in the circle of Leitmeritz; 16 miles W.N.W. of Leitmeritz.

EJECIT Infra Terminum. See Quare *Ejecit*.

EJECTION, the act of throwing out, or diſcharging any thing at ſome of the emunctories, as by ſtool, vomiting, or the like.

EJECTIONE Custodiæ, *Ejectment de Garde*, in *Law*, a writ which lies againſt him that caſts out the guardian from any land during the minority of the heir. See Guardian.

Ejectione *firmæ*, a writ that lies for the leſſee for years, who is ejected before the expiration of his term, either by the leſſor, or a ſtranger.

Alſo ejectment may be brought by a leſſor againſt the leſſee, for rent in arrears, or holding over his term, &c. Reg. Orig. 227. This writ of *ejectione firmæ*, or action of treſpaſs in *ejectment*, lieth where lands or tenements are let for a term of years, and afterwards the leſſor, reverſioner, remainder-man, or any ſtranger, doth eject, or ouſt the leſſee of his term. (1 Inſt. 45.) In this caſe, he ſhall have his writ of *ejection*, to call the defendant to anſwer for entering on the lands ſo demiſed to the plaintiff for a term that is not yet expired, and ejecting him. And by this writ the plaintiff ſhall recover back his term, or the remainder of it, with damages. Ejectment is now become an action in the place of many real actions, as writs of right, formedons, &c. which are very difficult, as well as tedious and chargeable; and this is the common action for trying of titles, and recovering of lands, &c. illegally kept from the right owner. However, all titles cannot be tried by this action. This method ſeems to have been ſettled as early as the reign of Edward IV. (7 Edw. IV. 6.); though it hath been ſaid (F.N.B. 220.) to have firſt begun under Henry VII., becauſe it was then firſt applied to its preſent principal uſe, that of trying the title to the land. In order to apprehend the contrivance, by which this end is effected, it ſhould be recollected, that the remedy by ejectment is, in its original, an action brought by one, who hath a leaſe for years, to repair the injury done him by diſpoſſeſſion. For the purpoſe of converting it into a method of trying titles to the freehold, it is firſt neceſſary that the claimant do take poſſeſſion of the lands, to empower him to conſtitute a leſſee for years, that may be capable of receiving this injury of diſpoſſeſſion. For it would be an offence, called in our law "Maintenance," to convey a title to another, when the grantor is not in poſſeſſion of the land. When, therefore, a perſon, who hath right of entry into lands, determines to acquire that poſſeſſion, which is wrongfully withheld by the preſent tenant, he makes (as by law he may) a formal entry on the premiſes; and being ſo in poſſeſſion of the ſoil, he there, upon the land, ſeals and delivers a leaſe for years to ſome third perſon or leſſee; and, having thus given him entry, leaves him in poſſeſſion of the premiſes. This leſſee is to ſtay upon the land, till the prior tenant, or he who had the previous poſſeſſion, enters thereon afreſh and ouſts him; or till ſome other perſon (either by accident, or by agreement, before-hand) comes upon the land, and turns him out or ejects him. For this injury the leſſee is entitled to his action of ejectment againſt the tenant, or this "caſual ejector," which-ever it was that ouſted him, to recover back his term and damages. But where this action is brought againſt ſuch a caſual ejector, before-mentioned, and not againſt the very tenant in poſſeſſion, the court will not ſuffer the tenant to loſe his poſſeſſion, without any opportunity to defend it. Accordingly, it is a ſtanding rule, that no plaintiff ſhall proceed in ejectment to recover lands againſt a caſual ejector, without notice given to the tenant in poſſeſſion (if there be any), and making him a defendant, if he pleaſes. In order to maintain the action, the plaintiff muſt, in caſe of any defence, make out four points before the court; *viz. title, leaſe, entry,* and *ouſter*. He muſt, firſt, ſhew a good *title* in his leſſor, which brings the matter of right entirely before the court; then, that the leſſor, being ſeiſed or poſſeſſed by virtue of ſuch a title, did not make him the *leaſe* for the preſent term; thirdly, that he, the leſſee, or plaintiff, did *enter*, or take poſſeſſion, in conſequence of ſuch leaſe; and, laſtly, that the defendant *ouſted*, or ejected him. Whereupon he ſhall have judgment to recover his term and damages; and ſhall, in conſequence, have a *writ of poſſeſſion*, which the ſheriff is to execute, by delivering him the undiſturbed and peaceable poſſeſſion of his term.

This is the regular method of bringing an action of ejectment; and this method muſt ſtill be continued in due form and ſtrictneſs, except only as to the notice to the tenant, whenever the poſſeſſion is vacant, or there is no actual occupant of the premiſes; and alſo in ſome other caſes. But, as much trouble and formality were found to attend the actual making of the *leaſe, entry,* and *ouſter*, a new and more eaſy method of trying titles by ejectment, when there is any actual tenant, or occupier of the premiſes in diſpute, was invented above a century ago by the lord chief juſtice Rolle, who then ſat in the court of *upper* bench, ſo called during the exile of king Charles II.

This new method entirely depends upon a ſtring of legal fictions: no actual leaſe is made, no actual entry by the plaintiff, no actual ouſter by the defendant; but all are merely ideal, for the ſole purpoſe of trying the title. To this end, in the proceedings, a leaſe for a term of years is ſtated to have been made by him who claims title, to the plaintiff, who brings the action, as by John Rogers to Richard Smith, which plaintiff ought to be ſome real perſon, and not merely an ideal fictitious one, as is frequently, though unwarrantably, practiſed (6 Mod. 309.): it is alſo ſtated, that Smith, the leſſee, entered; and that the defendant, William Styles, called the "caſual ejector," ouſted him; for which ouſter he brings this action. As ſoon as this action is brought, and the complaint fully ſtated in the declaration, Styles, the caſual ejector, or defendant, ſends a written notice to the tenant in poſſeſſion of the lands, *e. g.* George Saunders, informing him of the action brought by Richard Smith, and tranſmitting him a copy of the declaration; aſſuring him that he, Styles, the defendant, has no title at all to the premiſes, and ſhall make no defence; and therefore adviſing the tenant to appear in court, and defend his own title; otherwiſe, he, the caſual ejector, will ſuffer judgment to be had againſt him; and thereby the actual tenant, Saunders, will inevitably be turned out of poſſeſſion. On receipt of this friendly caution, if the tenant in poſſeſſion does not, within a limited time, apply to the court to be admitted a defendant in the ſtead of Styles, he is ſuppoſed to have no right at all; and, upon judgment being had againſt Styles, the caſual ejector; Saunders, the real tenant, will be turned out of poſſeſſion by the ſheriff.

But, if the tenant in poſſeſſion applies to be made a defendant, it is allowed him upon this condition; that he enter into a rule of court to confeſs, at the trial of the cauſe, three of the four requiſites for the maintenance of the plaintiff's action, *viz.* the *leaſe* of Rogers the leſſor, the *entry* of Smith the plaintiff, and his *ouſter* by Saunders himſelf, now made the defendant inſtead of Styles; which requiſites being wholly fictitious, ſhould the defendant put the plaintiff to prove them, he muſt of courſe be non-ſuited for want of evidence; but by ſuch ſtipulated confeſſion of *leaſe, entry,* and *ouſter*, the trial will now ſtand upon the merits of the *title* only. When this is done, the declaration is altered by inſerting the name of George Saunders inſtead of William Styles, and the cauſe goes down to trial under the name of Smith, the plaintiff, on the demiſe of Rogers the leſſor, againſt Saunders, the now defendant. And herein the leſſor of the plaintiff is bound to make out a clear title: otherwiſe his fictitious leſſee cannot obtain judgment to have poſſeſſion of the land for the term ſuppoſed to be granted. But if the leſſor makes out his title in a ſatisfactory manner, then judgment and a writ of poſſeſſion ſhall go for Richard Smith, the nominal plaintiff, who by this trial has proved the right of John Rogers his ſuppoſed leſſor. Yet to prevent fraudulent recoveries of the poſſeſſion, by colluſion with the tenant of the land, all tenants are obliged by ſtatute 11 Geo. II. c. 19. on pain of forfeiting three years' rent, to give notice to their landlords, when ſerved with any declaration in ejectment: and any landlord may, by leave of the court, be made a co-defendant to the action, in caſe the tenant himſelf appears to it; or if he makes default, though judgment muſt be then ſigned againſt the caſual ejector, yet execution ſhall be ſtayed in caſe the landlord applies to be made a defendant, and enters into the common rule;— a right, which indeed the landlord had, long before the proviſion of this ſtatute; in like manner as (previous to the ſtatute of Weſtm. 2. c. 3.) if in a real action the tenant of the freehold made default, the remainder-man or reverſioner had a right to come in and defend the poſſeſſion; leſt, if judgment were had againſt the tenant, the eſtate of thoſe behind ſhould be turned to a naked right. (Bracton, l. 5. c. 10. § 14.) But if the new defendants, whether landlord or tenant, or both, after entering into the common rule, fail to appear at the trial, and to confeſs leaſe, entry, and ouſter, the plaintiff Smith muſt be non-ſuited, for want of proving theſe requiſites; but judgment will in the end be entered againſt the caſual ejector Styles; for the condition, on which Saunders, or his landlord, was admitted a defendant, is broken, and therefore the plaintiff is put again in the ſame ſituation as if he never had appeared at all; the conſequence of which would have been, that judgment would have been entered for the plaintiff, and the ſheriff, by virtue of a writ for that purpoſe, would have turned out Saunders, and delivered poſſeſſion to Smith. The ſame proceſs, therefore, as would have been had, provided no conditional rule had been ever made, muſt now be purſued as ſoon as the condition is broken.

The damages recovered in theſe actions, though formerly their only intent, are now uſually (the title being conſidered as the principal queſtion) very ſmall and inadequate; amounting commonly to one ſhilling or ſome other trivial ſum. In order, therefore, to complete the remedy, when the poſſeſſion has been long detained from him that had the right to it, an action of treſpaſs alſo lies, after a recovery in ejectment, to recover the meſne profits which the tenant in poſſeſſion has wrongfully received. This action may be brought in the name of either the nominal plaintiff in the ejectment, or his leſſor, againſt the tenant in poſſeſſion; whether he be made party to the ejectment, or ſuffers judgment to go by default, (4 Burr. 668.) In this caſe the judgment in ejectment is concluſive evidence againſt the defendant, for all profits which have accrued ſince the date of the demiſe ſtated in the former declaration of the plaintiff; but if the plaintiff ſues for any antecedent profits, the defendant may make a new defence.

This is the modern way, now univerſally adopted, of obliquely bringing in queſtion the title to lands and tenements. It is founded on the ſame principle as the ancient writs of aſſiſe, being calculated to try the mere *poſſeſſory* title to an eſtate, and hath ſucceeded to thoſe real actions, as being infinitely more convenient for attaining the ends of juſtice; becauſe the form of the proceeding being entirely fictitious, it is wholly in the power of the court to direct the application of that fiction, ſo as to prevent fraud and chicane, and eviſcerate the very truth of the title. The writ of ejectment, and its nominal parties, as was reſolved by all the judges (Mich. 32 Geo. II. 4 Burr. 668. Stra. 54.) are "judicially to be conſidered as the fictitious form of an action, really brought by the leſſor of the plaintiff againſt the tenant in poſſeſſion: invented, under the controul and power of the court, for the advancement of juſtice in many reſpects; and to force the parties to go to trial on the merits, without being entangled in the nicety of pleadings on either ſide."

But a writ of ejectment is not an adequate means to try the title of all eſtates; for on thoſe things, whereon an entry cannot in fact be made, no entry ſhall be ſuppoſed by any fiction of the parties. Therefore an ejectment will not lie of an advowſon, a rent, a common, or other incorporeal hereditaments. (Brownl. 129. Cro. Car. 492): except for tithes in the hands of lay appropriators, by the expreſs purview of ſtat. 32 Hen. VIII. c. 7., which doctrine hath ſince been extended by analogy to tithes in the hands of the clergy (Cro. Car. 301. 2 Lord Raym. 789.): nor will it lie in ſuch caſes, where the entry of him that hath right is taken away by deſcent, diſcontinuance, twenty years' diſpoſſeſſion, or otherwiſe.

The action of ejectment is, however, rendered a very eaſy and expeditious remedy to landlords, whoſe tenants are in arrears, by ſtatute 4 Geo. II. c. 28, which enacts, that every landlord, who hath by his leaſe a right of re-entry in caſe of non-payment of rent, when half a year's rent is due, and no ſufficient diſtreſs is to be had, may ſerve a declaration in ejectment on his tenant, or fix the ſame upon ſome notorious part of the premiſes, which ſhall be valid, without any formal re-entry or previous demand of rent; and a recovery in ſuch ejectment ſhall be final and concluſive, both in law and equity, unleſs the rent, and all coſts, be paid or tendered within ſix calendar months afterwards. Blackſt. Comm. B. iii. c. 11. For the practice relating to ejectments, ſee Jacob's Dict. by Tomlins, art. *Ejectment.* See alſo Bull. Ni. Pri. and Gilbert's *Ejectments* by Runnington.

EIGHT-FOIL, or *Double Quarter foil*, in *Heraldry*, a modern difference, denoting the ninth ſon of the firſt houſe.

Eight, *Piece of.* See Piece *of Eight.*

EIGHTH *Pair of Nerves*, in *Anatomy*, the ſame with the par vagum. See Nerves.

Eighth, in *Muſic*, is, next to the uniſon, the moſt perfect concord, and the boundary of the preſent muſical ſyſtem; it includes 12 ſemitones, which produce 24 keys, 12 major and 12 minor; it contains all the intervals, concords and diſcords; as all beyond the octave are but replicates, or recurrences of the ſame ſounds: the flat 9th being but the octave of the flat 2d, and the major 9th of the major 2d; the 10th of the 3d, &c. It is an eſſential note of the triad or common chord, and is ſo near uniſon in its effects, that when a male and female, or a man and an adoleſcent ſing the ſame melody together, it ſeems, to perſons ignorant of muſic, as if they ſung in the ſame pitch of voice. In inſtrumental muſic, as well as in the accompaniment to vocal, the tenor often plays *Col. Baſſo;* that is, an octave above the baſe; and the 2d violin playing an octave below the firſt, has ſometimes a beautiful effect. See Octave.

EIGNE, from the French *eiſne,* in *Law Books,* is uſed for eldeſt, or firſt-born. Thus we ſay, baſtard eigne, and mulier puiſne, for the elder baſtard, and the younger lawfully born.

EIGNOTZ, in *Modern Hiſtory*, the name of a party which ſprung up in Geneva about the year 1530, denoting a confederacy in defence of liberty, ſo called in oppoſition to another, reproachfully denominated *Mamelukes*, or ſlaves. When the proteſtant opinions began to ſpread among the citizens, A. D. 1532, theſe opinions inſpired ſuch as embraced them with a bold enterprizing ſpirit, which always accompanied, or was naturally produced by them in their firſt operations. As both the duke of Savoy and the biſhop were, from intereſt, from prejudice, and from political conſiderations, violent enemies of the reformation, all the new converts joined with warmth the party of the Eignotz; and zeal for religion, blended with the love of liberty, added ſtrength to that generous paſſion. The rage and animoſity of two factions, ſhut up within the ſame walls, occaſioned frequent inſurrections, which terminated moſtly to the advantage of the friends of liberty; and therefore they daily gained ground.

EIKON BASILIKE, a poſthumous publication bearing this anonymous title, is generally ſuppoſed to have been the compoſition of king Charles I. and to have been written by his own hand. It was entitled *Eikon Baſilike*, that is, *the royal image*, "or portraiture of his ſacred majeſty in his ſolitude and ſufferings," becauſe intended to repreſent the religious diſpoſition of that unfortunate monarch, and depict the unmerited treatment he experienced at the hands of his ſubjects. It was firſt printed in the year 1649, and paſſed through 50 editions in different languages within 12 months. By the friends of royalty it has been conſidered as the king's pious meditations and confeſſions, during the long period of his trying perils, and unavailing ſtruggles againſt the uſurped power of his parliament: and by the eſpouſers of republican principles, as an apology in which he vindicates his own character, endeavours to ſupport the juſtice of his cauſe, and to ſhew the unprecedented and unjuſtifiable conduct of his opponents. The book compriſes twenty-ſeven ſections; the firſt containing the king's thoughts on calling his laſt parliament, and the laſt, meditations on death. This work produced an animated and ſevere reply from a moſt able writer, entitled *Eikonoklaſtes*; for which title the author in his preface gives the following reaſon: "In one thing I muſt commend his openneſs, who gave the title to this book, Εικων Βασιλικη, that is to ſay, the king's image; and by the ſhrine he dreſſes out for him, certainly would have the people come and worſhip him. For which reaſon this anſwer alſo is entitled Εικωνοκλαϛης, the famous ſurname of many Greek emperors, who in their zeal to the command of God, after long tradition of idolatry in the church, took courage and brake all ſuperſtitious images to pieces." Whatever ſentiments the reader of the work and its anſwer may entertain, there can exiſt but one opinion, as to which performance ſhould be aſſigned the palm of victory. Indeed, whatever cauſe ſuch a writer as the author of Paradiſe Loſt were induced to defend, leaving the merits of the queſtion totally out of conſideration, he would not fail, by logical ſubtlety and eloquent elucidation, to make it appear incontrovertibly the beſt. After the work made its appearance, the queſtion was ſtrongly agitated, whether the Eikon Baſilike was the production of the deceaſed monarch, and the honour or diſgrace attached to the writing of it was affixed to different perſons among the abettors of the royal cauſe:—Lord Clarendon, author of the "Hiſtory of the Rebellion;" biſhop Burnet, who in his youth accompanied prince Charles in his exile; biſhop Juxon, the king's chaplain, who poſſeſſed his confidence, was his ſecret adviſer, and attended the monarch in his laſt moments, &c. &c.

The grounds and evidences of the ſpuriouſneſs of the book are theſe: 1. That lord Clarendon, in his Hiſtory of the Grand Rebellion, makes no mention of it. 2. Biſhop Burnet ſays, the duke of York, afterwards king James II., told him in the year 1673, that the book called Eikon Baſilike was not of his father's writing, but that Dr. Gauden writ it: that after the reſtoration, the doctor brought the duke of Somerſet to the king and to the duke of York, who both affirmed that they knew it to be his (the doctor's) writing, and that it was carried down by the earl of Southampton, and ſhewed the king during the treaty of Newport, who read and approved it. 3. The earl of Angleſey gave it under his hand, that king Charles II. and the duke of York declared to him, in the year 1675, that they were very ſure the ſaid book was not written by the king their father, but by Dr. Gauden, biſhop of Exeter. 4. Dr. Gauden himſelf, after the reſtoration, pleaded the merit of this performance in a letter to lord chancellor Hyde, who returned for anſwer, that the particular he mentioned (*i. e.* of his being the author of that book,) was communicated to him as a ſecret: I am ſorry, ſays his lordſhip, that it was told me, for when it ceaſes to be a ſecret it will pleaſe nobody but Mr. Milton. 5. Dr. Walker, a clergyman of the church of England, after invoking the great God, the ſearcher of hearts, to witneſs to the truth of what he declares, ſays, in his treatiſe entitled "A True Account of the Author of Eikon Baſilike," I know and believe the book was written by Dr. Gauden, except chap. 16th and 24th by Dr. Duppa. "Dr. Gauden, ſays he, acquainted me with his deſign, and ſhewed me the heads of ſeveral chapters, and ſome of the diſcourſes. Some time after the king's death I aſked him, whether his majeſty had ever ſeen the book? He replied, I know it certainly no more than you; but I uſed my beſt endeavours that he might, for I delivered a copy of it to the marquis of Hertford, when he went to the treaty of the Iſle of Wight." Dr. Gauden delivered the MS. to this Walker, and Walker carried it to the preſs; it was copied by Mr. Gifford, and both the doctor's ſon and his wife affirm, that they believe it was written in the houſe where they lived. Notwithſtanding all this evidence, Mr. archdeacon Eachard ſays, the book is inconteſtably the king's; and biſhop Kennet adds, that thoſe who pretend Eikon Baſilike was a ſham put upon the world, are a ſet of men that delight to judge and execute the royal martyr over again by murdering his name. Dr. Hollingworth, Dugdale, Wagſtaffe, and others, have endeavoured to invalidate the above-mentioned authorities, by ſhewing that Dr. Gauden was not capable of writing ſuch a book; but the evidence already produced is as ſtrong and convincing as any thing of this nature can poſſibly be. Neal's Hiſt. of the Puritans, vol. ii. p. 369, &c. 4to.

When the Eikonoklaſtes was publiſhed the writer was not known, or it would doubtleſs have been mentioned. The author of that treatiſe was in doubt, and ſtill "ſtat nominis umbra." Whoever was the writer, there can no doubt remain as to the ſcope and tendency of the facts produced, and the arguments uſed in the Eikon Baſilike. It appears to have been written, not merely as an apology for the paſt, but a vindication of the then preſent meaſures, and to further the cauſe of royalty. In this view it has been conſidered by the favourers of a republican form of government. To counteract the effects likely to be produced by it on the minds of the public, Milton was aſſigned the taſk of drawing up a confutation. In the light above ſtated he ſaw it; for "it appears manifeſtly the cunning drift of a factious and defeated party, to make the ſame advantage of his (the king's) book, which they did before of his regal name and authority; and intend it not ſo much the defence of his former actions, as the promoting of their own *future deſigns*; and that by publiſhing, diſperſing, commending, and almoſt adoring it, ſeem to place therein the chief ſtrength and nerves of their cauſe. For how much their intent, who publiſhed theſe over-late apologies, and meditations of the dead king, drives to the ſame end of ſtirring up the people, to bring him that honour, that affection, and, by conſequence, that revenge to his dead corpſe, which he himſelf living could never gain to his perſon; it appears both by the concerted portraiture before his book, drawn out to the full meaſure of a maſking ſcene; and ſet theſe to catch fools and ſilly gazers; and by thoſe Latin words after the end, "Vola dabunt quæ bella negarunt;"

negarunt;" intimating, "that what he could not compaſs by war, he ſhould atchieve by his meditations." See preface to Milton's Eikonoklaſtes, edition by Baron.

EILAMIDES, from ειλεω, *I involve*, a word uſed by Hippocrates, to expreſs the meninges, or membranes of the brain, and dura mater and pia mater.

EILENBURG, in *Geography*, in old times called Ileburck, Ileburg, Ilinburg, Iiingenburg, Ilburg, is a very ancient town of the kingdom of Saxony, in the circle of Leipzic, on the high road leading to Breſlau, 15 miles from Leipzic, pleaſantly ſituated in an iſland formed by the river Mulde, over which there is a wooden bridge. Brewing conſtituted its chief induſtry before and ſome time after the thirty years' war, during which it ſuffered ſeverely. It is now chiefly remarkable for its hops, which are reckoned the beſt in Saxony. Eilenburg has about 3500 inhabitants. There is cloſe to the town an ancient caſtle, in which Margaret, the widow of the elector of Saxony, Frederick II. ſurnamed the Mild, reſided 22 years, from 1464 to 1486.

EIMBECK, or Einbeck, anciently *Embike*, a town of Germany, in the principality of Grubenhagen, which conſtituted part of the electorate of Hanover, and now, by Napoleon's decree of the 18th of Auguſt, 1807, forms part of the new kingdom of Weſtphalia, is ſituated on the river Ilme, which, at a ſmall diſtance from the town, falls into the river Leine, 15 miles N. of Goettingen, and 30 S. W. of Hildeſheim. It contains about 5000 inhabitants, and is remarkable for its manufactures of woollen cloth, flannel, ſerge, crape, dimity, and other cotton ſtuffs. Eimbeck is ſurrounded with mountains, part of the Hartz or Hercynian foreſt, which yield ſilver, copper, iron, and lead.

EIMĒO, or Imao, one of the Society Iſlands, in the ſouth Pacific ocean; about four leagues W. from the N.W. part of Otaheite. It has two harbours, *viz.* Taloo and Parowroah; the former is ſituated upon the north ſide of the iſland, in the diſtrict of Oboonohoo or Poonohoo, S. lat. 17° 30′. E. long. 210° 0′. It runs in S. or S. by E. between the hills above two miles. This is not inferior, ſays Capt. Cook, for ſecurity and goodneſs of its bottom, to any harbour belonging to the iſlands in this ocean; and it has this advantage over moſt of them, that a ſhip can ſail in and out with the reigning trade-wind, ſo that the acceſs and receſs are equally eaſy. There are ſeveral rivulets that fall into it. Wood and water are to be procured here with great facility. The harbour of Parowroah, on the ſame ſide of the iſland, is much larger within, than that of Taloo, but the entrance is much narrower, and lies to leeward of the harbour. The inhabitants of this iſland were anxious to trade in bread-fruit, cocoa-nuts, and hogs, which they exchanged for hatchets, nails, and beads. Eimēo ſupplies abundance of fire-wood. There is little difference between the produce of this iſland and that of Otaheite; but there is a ſtriking difference in their women. Thoſe of Eimēo are of low ſtature and dark hue, and their features are generally forbidding. The general appearance of this iſland is very different from that of Otaheite. The latter riſes in one ſteep hilly body, has little low land, except ſome deep vallies, and a flat border that ſurrounds it, towards the ſea. Eimēo, on the contrary, has hills running in every direction, which are ſteep and rugged, incloſing large valleys, and covered almoſt to their tops with trees. Near the harbour where Capt. Cook lay, in October 1777, were two large ſtones, or rather rocks, concerning which the natives have ſome ſuperſtitious notions. They conſider them as "Eatooas" or divinities, ſaying that they are brother and ſiſter, and that they came, by ſome ſupernatural means, from Ulietea. Cook's Third Voyage, vol. ii.

EINABI, a town of Aſiatic Turkey, in the province of Natolia; 36 miles N. of Degnizlu.

EINBLINDER, in *Ichthyology*, the name of a ſort of lamprey, without eyes, called by the writers on theſe ſubjects the *lampetra cæca*, or blind lamprey. See Petromyzon *branchialis*.

EINECIA, in our *Old Writers*, is uſed for primogeniture. It is ſometimes writ *eſnecia* and *eſnecy*. See Esnecy.

EINICH, in *Geography*, a town of Aſiatic Turkey, in the province of Natolia; 44 miles S.W. of Artaki.

EINSIEDLEN, or Einsiedel, a ſmall town of Switzerland, in the canton of Surtz, remarkable for the ancient and rich abbey of the ſame name.

This abbey, which is alſo called "St. Meinrad's Cell in the Dark Foreſt," in Latin Eremus Deiparæ Matris; Eremus Divæ Virginis; Monaſterium Eremitarum; Eremitarium Cœnobium in Helvetiis; in ancient records Monaſterium in Silva, Meginradi Cella; in French, Notre Dame des Hermites; in Italian, La Madonna di Waldo, is ſituated in a thick gloomy foreſt, to which St. Meinrad or Meginrad is ſaid to have retired. In 838, the firſt abbeſs of the Frauenmünſter at Zurich, cauſed a chapel and cell to be built for him, but after the murder of the hermit in 863, they fell to ruin. About the year 906 St. Benno laid the foundation of the abbey, which is the ſecond of the Benedictine order in Switzerland. In 1704 the convent was rebuilt, and is now a large ſplendid edifice. It has an extenſive library, and rooms for the reception of ſtrangers. The church of our Lady was rebuilt in 1719. In a chapel is an image of the Virgin, which particularly uſed to attract a great number of pilgrims, and which has been productive of conſiderable wealth to the abbey. The manors of Erlibach and Mannedorf, in the canton of Zurich, the lordſhips of Sonnenberg, Gachrang, and Freudenfels, in the canton of Thurgau, the pariſh of Oberkirch, and ſeveral villages in Germany, belonged to Einſiedlen.

EINVILLE, a ſmall town of France, in the department of the Meurthe, in the diſtrict of Luneville, 3 miles N. of that place, remarkable for a palace which king Staniſlaus of Poland built here during his retreat at Nancy.

EINZELLEE, one of the Perſian havens of the Caſpian, which, though it be only a wretched village, is the moſt frequented for the Perſian commerce. Formerly veſſels ventured through the channel into a bay; but this bay being choaked up, they are now obliged to lie at anchor in the road. Einzellee is ſituated on the ſouth-weſtern coaſt, a few miles N. of Reſhd, capital of the province of Ghilan: it conſiſts of Old and New Einzellee; the former inhabited by the Perſians and Armenians, under the juriſdiction of the ſophy; the latter by the Ruſſian merchants, and thoſe Armenians who are ſubject to Ruſſia. A garriſon of 30 ſoldiers is ſtationed under the command of the conſul. It contains a Ruſſian and Armenian church, and about 300 houſes, moſtly formed with mud. The refuſe only of the Perſian and European commodities is expoſed to ſale at Einzellee: the great mart being at *Reſhd*, which ſee.

EION, in *Ancient Geography*, a town of Thrace, near the mouth of the river Strymon; four miles from Amphipolis and its port.

EIRE. See Eyre.

EIRESIONE, Ειρεσιωνη, from ειρος, *wool*, in *Antiquity*, an olive branch, bound about with wool, and crowned with all ſorts of firſt fruits, which was carried in proceſſion in the Athenian feſtival, called *Pyanepſia*. Pott. Archæol. Græc. lib. ii. cap. 20. tom. i. p. 428.

EIRON, in *Geography*, a river of South Wales, in Carciganſhire, diganſhire, which, deſcending through a narrow vale between ſteep impending hills, falls into the ſea, a little below a pictureſque bridge at Abereiron, in the road from Cardigan to Aberyſtwith.

EISENACH, in Latin *Iſenacum*, a town of Germany, in the duchy of Saxe Weimar, formerly the chief city of the principality of Saxe Eiſenach, which devolved to the dukes of Weimar in 1741, is ſituated in an agreeable fertile valley on the ſmall river Neſſe, 45 miles S. W. of Erfurt, and has an ancient palace, which has been converted into ſtables. Eiſenach contains between 8 and 9000 inhabitants; it has ſeveral manufactures of woollen cloth, ſerge, and woollen and cotton ſtuffs, which are conſiderably benefited by an excellent fuller's earth, that abounds in the neighbourhood. The grammar ſchool, which was founded by the duke John-William in 1707, has a very extenſive and valuable library. The town has been much improved of late, the ſtreets are regular, well paved, and well lighted. The vicinity of Eiſenach is alſo remarkable for hops and madder. At a diſtance of two miles is an ancient caſtle, called the Wartburg, in which Luther was confined in the year 1521; and at nearly the ſame diſtance is the ſummer-palace of Wilhelm's Thal (William's Dale) with a large park, founded in 1729, by the duke John-William.

EISENBACH, a ſmall town of Hungary, near Schemnitz, remarkable for a warm bath, and ſurrounded by limeſtone rocks.

EISENBERG, a ſmall town of Germany, in the duchy of Saxe Gotha, principality of Altenburg, 6 miles from Zeitz, with an ancient ducal palace, and a good grammar ſchool. It contains 3500 inhabitants, and has a briſk timber and deal trade, beſides ſeveral manufactures of chairs, waggons, woollen ſtuffs, and leather.—Alſo, a ſmall town of Germany, with an old ruined caſtle, in the principality of Waldeck.

EISENHARTZ, a town of Germany, in the duchy of Stiria, enriched by iron mines, diſcovered in 702; 10 miles N. of Leoben.

EISENSTADT, a ſmall town of Hungary, three miles to the left of the road from Vienna to Oedinburgh, with a palace, which is the reſidence of prince Eſterhazy, who has large eſtates in its neighbourhood.

EISETERIA, Εισιτηρια, from εισειμι, *I enter*, in *Antiquity*, the day on which the magiſtrates at Athens entered upon their office; upon which it was cuſtomary for them to offer a ſolemn ſacrifice, praying for the preſervation and proſperity of the commonwealth, in the temple of Jupiter Βȣλαιος, and Minerva Βȣλαια, *i. e.* the Counſellors. Pott. Archæol. Græc. lib. ii. cap. 20. tom. 1. p. 385.

EISFELD, anciently *Aſifeld*, *Eſefeld*, *Eſſefeld*, or *Eſzfeld*, in *Geography*, a ſmall town of Germany, in the duchy of Saxe Cobourg, on the river Werra, 9 miles from Cobourg, with a good grammar ſchool and an old ducal palace, uſually the reſidence of the ducheſs dowager, if any.

EISKOI, a town of Ruſſia, in the government of Caucaſus, ſituated at the mouth of the river Eia, on the eaſt coaſt of the ſea of Azoph; 50 miles S.W. of Azoph.

EISLEBEN, or EISZLEBEN, in Latin *Iſleba*, an ancient and conſiderable town of the kingdom of Saxony, chief city of the county of Mansfeld, ſituated on a hill near a brook, called the Klippenbach, 15 miles E. of Halle, 20 of Merſeburg, and 30 of Leipzic, containing 993 houſes, and a population of 5000 individuals. It is divided into the Old and New Town. The former, which was known as a flouriſhing city in 1024, has an ancient caſtle, three pariſh churches, and an excellent grammar ſchool, attended by ſeven profeſſors. Brewing was the principal occupation of the inhabitants in former times. They brewed a ſtrong beer called *krappel*, which uſed to be exported to a great part of Germany; they are now chiefly employed in agriculture, and in the making of ſaltpetre and potaſh. There are alſo ſome mines of importance in the neighbourhood. The New Town has only one pariſh church.

But Eiſleben derives its principal celebrity from being the birth-place of Martin Luther. The houſe in which he was born has been rebuilt, after the great conflagration of 1594, and is ſtill viſited by travellers. The furniture of the room in which this eminent reformer firſt ſaw the light, is reported to have been ſaved from the fire, and is ſhewn as a curioſity, to which the ſuperſtition of the vulgar attaches the ſanctity of a relick, and the power of healing certain diſeaſes. Since the year 1772 a part of the houſe has been converted into a charity ſchool, than which nothing could have been more appropriate, to honour the memory of him who reſtored the freedom of conſcience, and enforced the extenſion of a more enlightened inſtruction in the ſacred records of revealed religion to all and every member of the community.

EISTEDDFOD, in *Antiquities*, was an annual ſeſſion of the Britiſh bards. The learned Mr. Owen, in his Sketch of Bardiſm, prefixed to his tranſlation of the Heroic Elegies, by Llywarc Hen, obſerves, that the bards generally held annual aſſemblies, called *Gorſeddau*; at which the traditions of the bardic ſyſtem were rehearſed, and all matters reſpecting their religion and policy tranſacted. But, ſubſequent to the introduction of Chriſtianity, genuine bardiſm declined. A ſchiſm took place in the bardic body, not, as he ſuppoſes, from the two ſyſtems claſhing with each other; but through the introduction of ſuperſtitions from the practice of the Romiſh church. A prince, by the name of Belus, propoſed numerous deviations from the tenets of the original inſtitution, with which moſt of the order complied. Among many of the privileges of which they were deprived on that occaſion, *eligibility to the prieſthood* appears to have been one. But from the tenor of hiſtory, it is moſt probable, that the nonjuring bards were ſuch as were tenacious of their Ethnic opinions; and that the Beirdd-Beli, Over-Veirdd, or Pſeudo-bards, on the other hand, were ſuch as complied with the inſtitutes of Chriſtianity. This ſchiſm took place in the 5th century. After which, the diſſenting party continued to hold gorſeddau, and propagate their tenets, till the death of the laſt Llywelyn; when, by the cruelty of the Engliſh monarch, bardiſm was nearly annihilated. From the time of the ſchiſm, the character of the bardic orders, generally acknowledged as ſuch, was materially changed; and their occupations became widely different. They appear, however, to have been divided into three claſſes, or orders, as poets, minſtrels, and ſingers; and, in imitation of their ancient aſſemblies, or gorſeddau, they held annual meetings, which, from the ſpirit of party, they termed Eiſteddfodau. The learned author of the Welſh Dictionary, however, conſiders them as a ſpurious race, and although they were an incorporated ſociety, governed by peculiar laws, yet they were not bards. The eiſteddfod, or congreſs, was held under the ſanction of the Welſh princes; and as North Wales was the laſt part of the country which preſerved its independency, and with that its peculiar laws; the moſt authentic veſtiges are there to be traced of the ancient uſages of Cambria. At this meeting the princes and chieftains, as well as bards, attended. It was uſually held at one of the royal reſidences, Aberfraw, Mathraval, or Caerwys; which circumſtance has induced ſome to ſuppoſe it a triennial, rather than an annual meeting. For the calling of theſe aſſemblies, a ſpecial commiſſion was iſſued by the Welſh princes, while they continued maſters of the country, and afterwards by royal authority under the Engliſh monarchs.

narchs. At theſe Britiſh olympics were collected in a focus the ſcattered rays of muſical and poetic genius. Britiſh bards poured forth their moſt animated ſtrains, and minſtrels tuned their faſcinating harps to melody. This was conſidered not only as an opportunity of diſplaying ſkill, but as a college of harmony, where genius was regiſtered, and merit rewarded with honours and emoluments. Candidates for bardic profeſſions were admitted, others were aſſigned precedence, and the bard moſt diſtinguiſhed for his talents on the occaſion was ſolemnly chaired, and had awarded to him, as the higheſt mark of reſpect, the badge of merit, the *ſilver harp*." Without an examination at this public meeting, and receiving a diploma in conſequence of being approved, none was qualified to exerciſe the profeſſion, either of bard, or minſtrel. The laſt eiſteddfod convened by royal authority was held in the reign of Elizabeth. The commiſſion for the purpoſe was granted to ſir Richard Bulkley, and other perſons of diſtinction, October 20th, in the year 1567." In purſuance of that, an eiſteddfod was held at the town of Caerwys, in Flintſhire, the requiſite notice having been previouſly given to the principality. The aſſembly was numerous, and many perſons of eminent genius diſplayed extraordinary talents, both in muſic and poetry. Fifty-five bardic degrees were conferred; ſeventeen in vocal, and thirty-eight in inſtrumental muſic. From that period, the eiſteddfod was diſcontinued, bards and minſtrels ſunk into inſignificance; and bardiſm may now be ſaid to have expired. The cruelty of Edward was the preparatory ſtep to the downfal of the inſtitution, and the ſubjecting of the Welſh to the juriſprudence of England, in the reign of Henry VIII, has been operating to accompliſh it. A public ſpirited ſociety in London, aſſociated under the name of the Gwynedigion, determined to revive a practice calculated to elicit genius; and, by rivalſhip, to produce poetical and muſical excellence. The ancient notice of a year and a day was given previous to the meeting, and the enthuſiaſm of the country was increaſed by the aid of locality. Caerwys was appointed as the place of meeting, and the old town-hall was fitted up on the occaſion, for the reception of the company. It was numerouſly and reſpectably attended, and many excellent performers on the harp, as well as poetical compoſers, and others of great vocal powers, diſplayed abilities; which evinced, that however the genius of harmony had been neglected, or the bardic ſpirit ſuppreſſed, it was not extinguiſhed among the inhabitants of North Wales. The number of bards in attendance was twenty, of minſtrels twelve, and of datceiniaid, or ſingers, eighteen. Having elected a proper perſon to fill the *cader*, or chair, the firſt day was occupied in hearing the poetical compoſitions recited; and on the ſecond, the vocal and inſtrumental candidates diſplayed their reſpective abilities. The diſtinguiſhing honours of bardd braint, or principal bard; pencerdd dant, or chief performer on the harp; and pencerdd dafod, or chief of vocal powers,

> "Who gave to ſong reſiſtleſs powers to charm,"

were then conferred: and the meeting, which had been highly gratifying to the lovers of genuine muſic and poetry, then adjourned, *ſine die*. Evans's Tour in North Wales.

EITHON, or Ython, in *Geography*, a river of Scotland, which runs into the German ſea; 26 miles N. of Aberdeen.

EITIAT, a town of Africa, in the empire of Morocco, and province of Tedla, defended with walls, and containing about 3000 inhabitants.

EKA, a town of Sweden, in the province of Smoland; 11 miles N. of Wexio.

EKANGA, a river of Ruſſia, which runs into the Frozen ſea; 140 miles E. of Kola.

EKARMA, one of the ſmaller Kurile iſlands, in the North Pacific ocean. N. lat. 49° 30′. E. long. 154° 29′.

EKASTROV, a town of Ruſſia, in the government of Archangel; 80 miles S. of Kola.

EKATERINGBURG. See Catherinenburg.

EKATERINOGRAD, a town of Ruſſia, in the government of Caucaſus, on the Malva; 260 miles S.E. of Azoph. N. lat. 44° 15′. E. long. 43° 38′.

EKATERINOSLAV. See Catharinenslaf.

EKATERINOSLAVSKOI, a province of Ruſſia, in the government of Ekaterinoſlav, comprehending what was formerly called Budziac Tartary, and the Ukraine, now part of the government of Ekaterinoſlav. See Catharinenslaf.

EKATERINSKAIA, a bay of the North ſea, in Ruſſian Lapland, near Kola. N. lat. 68° 50′. E. long. 32° 24′.

EKEBERGIA, in *Botany*, named by Sparrman after ſir Charles Guſtavus Ekeberg, knight of the order of Waſa, captain of a Swediſh Indiaman, who took him to China for the purpoſe of making inquiries in natural hiſtory, and who firſt brought the tea plant alive to Europe. (See Amœn. Acad. v. 7. 498.) Sparmann finding this tree, of a new genus, during their viſit to the Cape of Good Hope, juſtly dedicated it to his friend and patron, and has deſcribed it, with a figure, in the Stockholm Tranſactions for 1779, 282. t. 9. Thunb. Nov. Gen. 43. Murray in Linn. Syſt. Veg. ed. 14. 399. Schreb. 284. Willd. Sp. Pl. v. 2. 549. Juſſ. 265. Mart. Mill. Dict. v. 2. Claſs and order, *Decandria Monogynia*. Nat. Ord. *Trihilatæ*, Linn. *Meliæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, bell-ſhaped, downy, in four or five deep, ovate, obtuſe ſegments. *Cor.* Petals four or five, oblong, obtuſe, rather larger than the ſegments of the calyx, being about a line long, externally downy. Nectary a ring encompaſſing the baſe of the germen. *Stam.* Filaments ten, inſerted into the nectary, broad and ſhort, downy, ſomewhat cohering together; anthers erect, oblong, acute, much longer than the filaments. *Piſt.* Germen ſuperior, round; ſtyle cylindrical, very ſhort; ſtigma large, capitate, umbilicated. *Peric.* Berry globoſe, mealy. *Seeds* from two to five, oblong, angular.

Eſſ. Ch. Calyx in four or five ſegments. Petals four or five. Nectary a ring round the germen, bearing the ſtamens. Berry ſuperior, with from two to five ſeeds.

Obſ. Juſſieu doubts, with great reaſon, that the corolla can really be of four petals, while the ſtamens are ten, and accordingly we find on diſſection that the flowers are, ſometimes at leaſt, five-cleft, the ſtamens being twice as numerous as the petals. From the hairineſs and minuteneſs of the parts, it is difficult to aſcertain preciſely the mode of connection between the filaments and the nectary, or to define the limits of each, but analogy ſeems to have rightly guided Juſſieu to improve the deſcriptions of Thunberg and Sparrman.

E. *capenſis*, the only known ſpecies, is reported by Thunberg to grow in the woods of Hauteniquas and Eſſenboch at the Cape. The Dutch coloniſts call it Eſſen or Eſſchenboom, and Hauteniquas Eſſen, from its reſemblance to the European aſh. It forms a tall tree, with greyiſh bark, and a hard wood uſed for many utenſils. *Branches* alternate, knotty, rugged, ſcarred, downy when young. *Leaves* cluſtered about the tops of each branch, alternate, much reſembling thoſe of the aſh in general appearance, being pinnate and ſmooth, but the leaflets are entire. The panicles of whitiſh ſmall *flowers* come forth in November and the following months, and are axillary, much ſhorter than the leaves. Sparrman deſcribes the fruit as about half an inch in diameter, mealy and rather bitter, with five ſeeds reſembling thoſe of an orange. Thunberg obſerves that they vary from two to five, probably from partial abortion, and not from any original diverſity of number in the germs.

EKENAS, in *Geography*, a ſea-port town of Sweden, in the province of Nyland, on the north coaſt of the gulf of Finland, with an indifferent harbour; 50 miles S.E. of Abo.

EKERDEN, a town of Aſiatic Turkey, in the province of Natolia; 16 miles E. of Iſbarteh.

EKESIO, a town of Sweden, in the province of Smoland; 60 miles N.W. of Calmar.

EKHONT, Gerbrant Vanden, or rather Eckhont, in *Biography*, a painter born at Amſterdam in 1621. He is better known by the excellence of the manner in which he imitated the peculiarities of his maſter Rembrandt, than for original genius in thought, or execution. He is eſteemed as one of the moſt perfect diſciples of that great man; but he never obtained that juſt perception of truth and taſteful arrangement of the materials compoſing his pictures, which was Rembrandt's grand characteriſtic; although many of his pictures are highly eſteemed for their force and colour. He painted portraits principally; but oftentimes he attempted hiſtorical compoſitions, in which he was not ſo ſucceſsful. He died in 1674, aged 53.

Eckhont, Anthony Vanden, a fruit and flower painter, born at Bruſſels in 1656. His works are much eſteemed for the peculiarities of their compoſition, more than for the truth of their execution. He travelled to Liſbon, where he was married to a young lady of quality and great fortune: this ſucceſs and affluence excited the envy of ſome abandoned ruffians, who ſhot him in his carriage, in 1695, and remained undiſcovered.

EKIE, in *Geography*, a town of Aſia, in Tibet; 55 miles S. of Toſſon-Hotun.

EKKI-TEKKI, a town of Africa, in the country of Commendo.

EKRAD, a town of Egypt; 10 miles S.E. of Monfalout.

EKRON, in *Ancient Geography*. See Accaron.

EKSAS, in *Geography*, a town of Egypt; 21 miles S. of Cairo.

EKSENIDE, a town of Aſiatic Turkey, in Natolia; 84 miles S. of Degnizlu. N. lat. 36° 27′. E. long. 28° 59′.

ELABORATION, the act of finiſhing or perfecting any thing with labour and time.

The term is chiefly uſed in *Medicine*, where the chyle, blood, and ſemen, are ſaid to be *well elaborated*, when they are well conditioned, have undergone all the ſecretions, mixtions, impregnations, and circulations, neceſſary to bring them to perfection.

If the chyle went directly from its receptaculum to the breaſts, it would not be ſufficiently elaborated to afford good milk. See Milk.

ELABORATORY. See Laboratory.

ELABUGA, in *Geography*, a town of Ruſſia, in the government of Viatka, on the Bielaia; 156 miles S. of Viatka.

ELACATÆUM, in *Ancient Geography*, a mountain of Greece in Theſſaly.

EL-ADDA, in *Zoology*. See *El* Adda.

ELÆA, in *Ancient Geography*, a maritime town of Aſia Minor, in the Eolide, at the mouth of the river Caicus, oppoſite to the S.E. part of the iſle of Leſbos.—Alſo, a town of Phœnicia, between Tyre and Sidon.—Alſo, a promontory in the eaſtern part of the iſle of Cyprus, S.E. of Serapis. Ptolemy.—Alſo, an iſland of the Propontis, ſo called on account of its olives. Pliny.—Alſo, a mountain of Paleſtine, ſix ſtadia E. of Jeruſalem. Joſephus.—Alſo, a town and ſea-port of Aſia Minor, in Bithynia, near Myſia. Steph. Byz.—Alſo, a port of Ethiopia. Id.

ELÆAGNUS, in *Botany*, ελαιαγνος of Theophraſtus, from ελαια, *the olive*, and αγνος, *the chaſte tree*. Linn. Gen. 62. Schreb. 85. Willd. Sp. Pl. v. 1. 688. Mart. Mill. Dict. v. 2. Juſſ. 75. Tourn. t. 489. Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Calycifloræ*, Linn. *Elæagni*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, four-cleft, ſuperior, erect, bell-ſhaped, rough on the outſide, coloured within, deciduous. *Cor.* Petals none. Nectary in the bottom of the flower, globoſe, four-cleft at its ſummit, ſurrounding the baſe of the ſtyle. *Stam.* Filaments four, very ſhort, inſerted below, and alternate with, the ſegments of the calyx; anthers oblong, incumbent. *Piſt.* Germen inferior, oblong; ſtyle ſimple, rather ſhorter than the calyx; ſtigma ſimple. *Peric.* Drupa ovate, obtuſe, ſmooth, with a minute point at the top. *Seed.* Nut ſolitary, oblong, obtuſe, of one cell. Some flowers, according to Adanſon, are male.

Eſſ. Ch. Corolla none. Calyx four-cleft, bell-ſhaped, coloured. Drupa inferior.

A genus of ſhrubs, elegant for their white ſcaly ſilvery pubeſcence, which is moſt copious on the under ſide of the leaves, the upper being nearly ſmooth and naked. Flowers axillary, ſolitary, or cluſtered, ſmall, externally ſcaly, yellow or greeniſh within, the calyx partaking of the nature of a corolla. The fruit is uſually reddiſh, pulpy, but uſeleſs. Willdenow enumerates ten ſpecies, ſix of which are natives of Japan.

E. *anguſtifolia*, Linn. Sp. Pl. 176. Sm. Prod. Fl. Græc. v. 1. 105. Pallaſ. Roſſ. v. 1. 10. t. 4. Duhamel Arb. v. 1. 213. t. 89. (ελαια αιθιοπικη Dioſc. book 1. chap. 137.) "Leaves lanceolate." Native of the eaſtern and ſouthern parts of Europe; it is very hardy in our gardens, but ſeldom bears fruit. The flowers have a ſtrong ſcent, eſpecially at night, and are yellow. Tournefort and Pallas deſcribe the fruit as ſweetiſh. The ancients thought this tree barren of fruit. The leaves they celebrate as aſtringent. Its natural ſoil, according to Pallas, is moiſt and ſandy.

E. *orientalis* and *ſpinoſa* are very nearly akin to the above; the thorns appear to be a variable character of the latter ſpecies, as in *Amygdalus*, *Pyrus*, &c.—E. *latifolia*, "leaves ovate," is a native of Ceylon, of which we know little, and ſtill leſs of the ſix Japaneſe ſpecies deſcribed by Thunberg and partly by Kæmpfer.

ELÆAS, in *Ancient Geography*, a port of Greece, in Epirus.

ELÆGNON. See Agnus *Caſtus*.

ELÆIS, in *Botany*, ſo named by Jacquin from ελαια, the *olive*, in alluſion to its oily fruit. Jacq. Amer. 288. t. 172. Linn. Mant. 21. Schreb. 776. Juſſ. 38. Gærtn. t. 6. Mart. Mill. Dict. v. 2. Claſs and order, *Diœcia Hexandria*, Thunb. and Gærtner. (*Monoecia*, Jacq.) Nat. Ord. *Palmæ*.

Gen. Ch. Male, *Cal.* Perianth of ſix concave upright leaves. *Cor.* of one petal, the length of the calyx, with ſix acute upright ſegments. *Stam.* Filaments ſix, awl-ſhaped, the length of the corolla; anthers oblong, acute.

Female, *Cal.* as in the male. *Cor.* of ſix petals. *Piſt.* Germen ſuperior, ovate, of three cells; ſtyle thickiſh, triangular; ſtigmas three, obovate, depreſſed, reflexed. *Peric.* Drupa ovate, ſomewhat angular, internally fibrous and oily, of one cell. *Seed.* Nut ſolitary, ovate, obſcurely triangular, thick and hard, of one cell, without any valves, with three pores at the baſe. Embryo at the baſe of the ſeed.

Eſſ. Ch. Male, Calyx of ſix leaves. Corolla ſix-cleft.

Female, Calyx of ſix leaves. Corolla of ſix petals. Stigmas three, dilated. Drupa fibrous. Nut ſolitary, ſtony.

Gærtner has improved Jacquin's deſcription of the fruit, but we apprehend the latter to be moſt correct as to the female flower.

E. *guineenſis*, Linn. Mant. 137. Gærtn. v. 1. 17. (Palma foliorum pediculis ſpinoſis, fructu pruniformi luteo oleoſo; Sloane Jam. v. 2. 113. t. 214.) The Oily Palm. Native of Guinea, from whence it is ſaid to have been carried to America. Jacquin found it cultivated, though rarely, in the gardens of Martinico. The tree he deſcribed and figured was 30 feet high, and, as he conceived, 10 years old. *Trunk* erect, beſet with the remains of old leaf-ſtalks, and crowned by a tuft of long, pinnated, *leaves*, unarmed, but having hooked ſpines on the edges of their ſtalks; leaflets ſword-ſhaped, a foot and half long, entire. *Spadixes* axillary, ſolitary, large, repeatedly compound, and very denſe; their ſtalks imbricated, compreſſed, covered, (except their naked triangular points,) with *flowers*, which in the evening eſpecially exhale a ſtrong aniſe-like ſmell. *Fruit* about the ſize of a pidgeon's egg, yellowiſh variegated with black and red, its pulp abounding. with oil, which exudes on the ſligheſt preſſure between the fingers. *Nut* very black, marked with whitiſh, longitudinal, interrupted ſtreaks.

Gærtner deſcribes and figures the fruit of an *E. melanococca* which he eſteems a mere variety of the above. It is ſmaller, more oblong, and internally blacker, but no clear ſpecific mark of diſtinction appears.

ELÆOCARPUS, compounded of ελαια, the *olive*, and καρπος, *fruit*, the drupa bearing ſome reſemblance to an olive. Burm. Zeyl. 93. t. 40. Linn. Gen. 268. Schreb. 356. Willd. Sp. Pl. v. 2. 1169. Mart. Mill. Dict. v. 2. Juſſ. 258. Gærtn. t. 43. (Dicera; Forſt. Gen. 40.) Claſs and order, *Polyandria Monogynia*. Nat. Ord. Akin to *Guttiferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, permanent, divided to the baſe into five linear-lanceolate, concave, acute ſegments. *Cor.* Petals commonly five, with claws, three-cleft, and uſually deeply laciniated, equal, ſcarcely longer than the calyx, inſerted at the baſe of the nectary; their ultimate ſegments often capillary. Nectary an orbicular, depreſſed, fleſhy, lobed, villous gland, in the centre of the calyx. *Stam.* Filaments from 20 to 30, capillary, ſhort and ſlender, erect, inſerted into the nectary; anthers ſhorter than the corolla, erect, linear, rough, taper-pointed, of two cells, opening by two common reflexed valves, uſually more or leſs unequal in length. *Piſt.* Germen ſomewhat globoſe, hairy, ſeated on the nectary; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma acute. *Peric.* Drupa oblong or globoſe, ſmooth and poliſhed. *Seed.* Nut oblong or roundiſh, furrowed and tuberculated, with an imperfectly three-valved ſhell, and one cell; kernel bluntly triangular.

Obſ. The number of ſegments of the calyx, as well as the petals, and the ſegments of the latter, vary from three to five. The number of ſtamens alſo is from 8 to about 30, ſome ſay 40.

Eſſ. Ch. Petals three to five, torn. Anthers with two valves at the ſummit. Calyx in three to five deep ſegments. Drupa ſuperior, with a furrowed criſped nut.

The ſpecies of this genus are ſo ill defined by authors, that although we are not furniſhed with ſufficient materials to elucidate them all as we could wiſh, we will not withhold ſuch information as we have. In arranging the known ſpecies we find new ſpecific characters requiſite, in order to explain the new ones.

1. E. *ſerrata*. Linn. Sp. Pl. 734. Fl. Zeyl. 92. Burm. Zeyl. 93. t. 40.—Leaves elliptical, obtuſe, bluntly ſerrated, ſmooth; divarications of their veins glandular, anthers with nearly equal valves, bearded. Native of Ceylon, where it is called Weralu. We have a ſpecimen from thence whoſe *leaves* are two or three inches long, with veins glandular only at their baſe. *Petals* three-cleft, and beautifully laciniated. *Calyx* in five downy ſegments. The *fruit* is ſaid to be oval. Another, either from the ſame iſland or ſome other part of the Eaſt Indies, ſent by Koenig to David Van Royen, has *leaves* but half as long as the former, with veins much ſubdivided, and glandular at moſt of their ſubdiviſions, as well as at the baſe. The *petals* are fallen, but all the other parts agree. Both theſe plants have a pair of glands at the baſe of the leaves, as deſcribed in *Fl. Zeyl.* or rather at the ſummit of their footſtalks, and both have long ſimple axillary cluſters of flowers. We cannot refer any ſynonym of Rumphius or Rheede with ſatisfaction to either, nor dare we aſſert, that the two ſpecimens are diſtinct ſpecies.

2. E. *oblonga*. Gærtn. v. 1. 202. t. 43. (Ganitrum oblongum, Catulampa; Rumph. Amb. v. 3. 163. t. 102.)—Leaves elliptic-oblong, pointed, with ſhallow ſerratures; veins downy underneath. Anthers with nearly equal valves, ſcarcely bearded. Fruit oval. Sent by Dr. Buchanan from the Eaſt Indies, by the name of *E. ſerrata*. It is nevertheleſs manifeſtly diſtinct from the genuine Weralu above deſcribed. The *leaves* are five or ſix inches, or more, in length, ſharp-pointed, with numerous ſhallow, though acute, ſerratures; ſmooth above, but the veins, which are numerous and ſtrong, deſtitute of glands, are downy and ruſty at the under ſide, which gives that ſoftneſs to the touch mentioned by Rumphius. As to the ſize, they accord with his deſcription, and it muſt always be remembered that his figures are diminiſhed. The *footſtalks*, which are bi-glandular at their ſummit, are likewiſe downy, as well as the flower-ſtalks. The latter grow from above the ſcars left by the laſt-year's leaves, not as in *E. ſerrata* (the genuine Ceylon plant at leaſt) from the boſoms of the foliage of the preſent ſeaſon. Each *cluſter* is five or ſix inches long, ſimple, much reſembling thoſe of *Prunus luſitanica*, or Portugal Laurel. *Calyx* in five downy ſegments, ſhorter and rather blunter than in the firſt ſpecies. *Petals* five, each in five moderately deep and equal diviſions, cut into various capillary points. *Stamens* 20 or more; anthers with nearly equal valves, only very ſlightly and occaſionally bearded at their points. *Germen* oblong, furrowed, briſtly; ſtyle hairy; ſtigma naked. The *nectary* ſeems to ſwell into five hairy globoſe glands. *Fruit* oblong, according to Rumphius and Gærtner. Their ſynonyms depend on each other, and we have no doubt of their belonging to our plant.

3. E. *elliptica*.—Leaves elliptical, entire, ſmooth on both ſides; veins deſtitute of glands. Anthers ſlightly bearded. This is the ſpecimen deſcribed by Linnæus Mant. 2. 401, which Willdenow copies. It is a very miſerable ſpecimen, apparently from the Eaſt Indies, and if the *flowers* have, as he ſays, but three petals and eight ſtamens, which we cannot correctly verify, they confirm that ſpecific difference from both the foregoing, which the *leaves* ſufficiently evince. The latter are about three inches long, ſmooth all over, as well as their footſtalks, which have no glands at their ſummit, neither are the veins glandular. *Flowers* ſmall. *Calyx* acute. *Germen* globoſe, ſilky, with five large ſwellings of the nectary under it; ſtyle ſilky near the baſe only, and longer in proportion than the laſt, though the flowers are not above half ſo large.

4. E. *integrifolia*. Lamarck Encycl. v. 2. 604. Willd. Sp. Pl. v. 2. 1170, excluding the ſynonym.—Leaves obovate, obtuſe, entire, ſmooth; divarications of their veins glandular. Petals ſilky on both ſides. Anthers with equal

valves. Gathered by Commerſon in the iſland of Mauritius, and given by Thouin to the younger Linnæus, among the duplicates of his whole herbarium. The *leaves* are about 2½ inches long, obovate, obtuſe at each end, either quite entire, or very rarely and ſlightly ſerrated here and there, ſmooth on both ſides, ſhining above, paler beneath, cluſtered about the points of the branches. At the origin and ſubdiviſions of each vein is a glandular tubercle, open at the top on the under ſide of the leaf, and projecting much more on the upper, where each forms a globoſe red ſwelling. *Footſtalks* thick and ſhort, ſmooth, without glands. *Cluſters* axillary, ſtout, rather longer than the leaves, with finely downy ſtalks. *Flowers* fewer than in *E. oblonga*, and twice as large. *Calyx* four-cleft, broad and bluntiſh. *Petals* four, ſilky on both ſides, not very deeply three-cleft, obtuſely jagged. *Anthers* with equal beardleſs valves. *Nectary* very large and wrinkled. *Germen* roundiſh, hairy, like the lower half of the ſtyle. *Fruit* unknown. Lamarck quotes with a doubt, and Willdenow abſolutely, the ſynonym of Rumphius, which we refer, without any ſcruple, to our *E. oblonga*, and which has no affinity to the ſpecies before us.

5. E. *grandiflora*.—Leaves elliptic-lanceolate, undulated, obtuſe, without glands. Petals ſilky. One valve of the anthers elongated, awl ſhaped. Communicated to the writer of this article by the late ſir G. L. Staunton, bart. who collected it in his voyage to China, but in what country is not mentioned. This is the fineſt ſpecies we have ſeen of its genus, the *flowers* being twice as large as thoſe laſt deſcribed, and diſtinguiſhed from all the foregoing by the long taper points of the anthers, formed by the elongation of one of their valves. The *calyx* has five linear acute downy ſegments. *Petals* five, ſilky on both ſides, except the jagged part. The *cluſters* conſiſt but of few flowers, with ſmooth ſlender ſtalks, and grow among the long, crowded, ſmooth, crenate or undulated *leaves*, about the extremities of the branches.

6. E. *reticulata*. Leaves lanceolate, ſerrated, reticulated with interbranching veins, which are glandular at their origin. Petals laciniated, ſmooth. One valve of the anthers taper-pointed. Gathered near Port Jackſon, New South Wales, by Dr. White. *Leaves* about three inches long, on ſmooth ſomewhat glandular foot-ſtalks, lanceolate, pointed, ſtrongly ſerrated throughout, ſmooth, ſhining above, reticulated on both ſides with innumerable veins, which have uſually a ſmall gland, or pore, at their origin on the back of the leaf. *Cluſters* axillary, ſhorter than the leaves, of eight or ten white flowers, not half ſo large as the laſt, with ſmooth ſtalks. *Calyx* in five or ſix ſmooth, linear-lanceolate ſegments. *Petals* ſmooth, three-cleft, ſcarcely half-way down, finely jagged. One valve of each *anther* terminates in a ſlender point, at length recurved, but much ſhorter than in E. *grandiflora*. *Germen* ovate, ſhort, quite ſmooth, as well as the furrowed annular *nectary* beneath it, and the whole *ſtyle*. *Fruit* globoſe, larger than a pea, blue. *Nut* curiouſly tuberculated and wrinkled. This ſpecies would prove a great acquiſition to our greenhouſes and conſervatories, and poſſibly may be in ſome collections already; but we have not heard of its flowering, till which it would hardly be juſtly appreciated, and might be miſtaken for an *Olea*, or ſome unoſtentatious ſhrub of the claſs *Pentandria*.

7. E. *dentata*, Willd. Sp. Pl. v. 2. 1169. (E. ſerratus; Linn. Suppl. 269, but not, as Willdenow rightly remarks, Syſt. Veg. ed. 13. 410. It may poſſibly be what Murray meant as E. monogynus, Syſt. Veg. ed. 14. 494. Dicera dentata; Forſt. Gen. 40. t. 40. Prod. 41.) Leaves obovato-lanceolate, obſcurely toothed; veins glandular and pouched at their origin. Petals ſimply three-lobed. anthers with taper-pointed valves. Gathered by Forſter in New Zealand. From his ſpecimen given to the younger Linnæus, though a poor one, it is eaſy to perceive its cloſe affinity to our E. *reticulata*, with which it agrees altogether in habit, but differs in the following particulars. The *leaves* are inclining to obovate, finely ſilky beneath, though not perceptibly ſo till examined with a high magnifier, crenate, or ſlightly dentate; the baſe of their lateral veins not merely glandular, but forming a deep triangular pouch, very prominent on the upper ſide. We are aware, however, that this part may, in the different ſpecies, vary, according to the age of the leaf, or other circumſtances, though it appears, in ſome ſhape or other, to be almoſt univerſal in the genus before us. *Cluſters* much like thoſe of the laſt, but the *flowers* are eſſentially different, having *petals* only ſimply three-lobed; the central lobe broader, and longer than the other two, and all of them entire and undivided, not jagged, or torn, as in all the foregoing ſpecies. The *anthers* appear to us to have one of their valves awned, as in the laſt; but Forſter deſcribes them, from this very plant, as having two equal capillary points, or horns. A ſtill greater contrariety occurs in his account of the *fruit*, which we have never ſeen. He deſcribes and figures it as a "capſule of two cells, containing numerous ſeeds." This, if true, would make the plant a moſt diſtinct genus from *Elæocarpus*, and the petals would ſtrengthen its character. But the authority of ſir J. Banks and Dr. Solander, marked by Linnæus the younger in his own copy of Forſter's work, declares it an *Elæocarpus*, and therefore Forſter muſt have fallen into an unaccountable error. The ſame authority makes a new genus of the following ſpecies; but, as Forſter and all his followers have called it a *Dicera*, or *Elæocarpus*, we ſhall deſcribe it under this laſt name, in hopes that Mr. Brown, or ſome ſuch original obſerver, will diſpoſe of it better.

8. E. *Dicera*. Linn. Fil. Suppl. 266. Murray Syſt. Veg. ed. 14. 494. Willd. Sp. Pl. v. 2. 1170. (Dicera ſerrata; Forſt. Gen. 40. Prod. 41.) Leaves oppoſite, ovate inclining to heart-ſhaped, unequally ſerrated. Cluſters compound. Petals ſimply three-lobed. Styles four. Native of New Zealand. The *leaves* are oppoſite, (not alternate, as in all the foregoing), on ſlender ſlightly hairy ſtalks, ovate, broad, pointed, unequally and ſharply ſerrated, thin and pliant, apparently deciduous, ſmooth on both ſides except the rib and veins. Small glandular pores are plentifully ſcattered over the under ſide, generally adjoining to the veins, but ſeldom at their divarications. Theſe ſoon become perforations with a white membranous border. *Cluſters* two, from the baſe of the preſent year's ſhoot, oppoſite, much ſhorter than the leaves, compound, but of few flowers, with ſlightly hairy ſtalks, and oblong *bracteas* in the lower part. *Flowers* ſmall, greeniſh. *Petals* ſmooth, and, as far as we can diſcern, divided into three obtuſe entire lobes. *Anthers* hairy; we cannot perceive any horns, or terminal briſtles. *Styles* four, ſmooth, recurved, with obtuſe ſtigmas. *Fruit*, according to Forſter, a berry with four cells, and two ſeeds in each cell. The ſtudy of botany would be truly ſatiſfactory, and extremely eaſy, were every genus as eaſily defined as this plant is diſtinguiſhable from *Elæocarpus*, and even from that ſpecies with which Forſter aſſociated it. We beg leave to remark, that it muſt not, when eſtabliſhed as a genus, be called *Dicera*, with the characters of which, and the name thence derived, it has nothing in common, merely agreeing in its three-lobed petals only with Forſter's real *Dicera*, which is, according to all appearance, an *Elæocarpus*. Even the ſpecific name, therefore, which we have been forced to retain, for the preſent, is falſe; nor could

could we adopt that of Forſter, *ferrata*, as belonging to the firſt *Elæocarpus*, however excellent, for this plant, when eſtabliſhed as a ſeparate genus.

We have purpoſely omitted E. *integerrima* of Loureiro, being uncertain of its genus and ſpecies. Still leſs reaſon do we find to follow Retzius and Vahl in reducing *Vateria indica* of Linnæus, a plant, indeed, we have never ſeen, to this genus. S.

ELÆOCOCCA, from ελαια, *an olive*, and κοκκος, *a berry*, a name given by Commerſon to a tree called in French *arbre d'huile*, or oily tree. This, Juſſieu tells us, is a ſpecies of *Dryandra*, poſſibly the very ſame plant as D. *cordata*; which ſee.

ELÆODENDRUM, from ελαια, *an olive*, and δενδρον, *a tree*. Jacq. jun. in Nov. Act. Helvet. v. 1. 36. Jacq. Ic. Rar. v. 1. t. 48. Murray Syſt. Veg. ed. 14. 241. Schreb. 152. Willd. Sp. Pl. v. 1. 1148. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 1. 278. Gærtn. t. 57? (Rubentia; Juſſ. 378, and 452.) Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Rhamni*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five ſmall, deep, roundiſh, obtuſe, concave, widely ſpreading, permanent, ſegments. *Cor.* Petals five, roundiſh, obtuſe, concave, widely ſpreading, twice as long as the calyx. Nectary a gland beneath the germen. *Stam.* Filaments five, awl-ſhaped, recurved, inſerted under the nectary; anthers roundiſh, erect. *Piſt.* Germen roundiſh, pointed, ſtanding on the nectary; ſtyle conical, ſhort; ſtigma obtuſe, cloven. *Peric.* Drupa ovate, obtuſe. *Seed.* Nut ovate, of two cells, with a very hard thick ſhell, and two oblong compreſſed kernels.

Eſſ. Ch. Calyx in five deep ſegments. Petals five. Drupa ſuperior, ovate. Nut of two cells.

1. E. *orientale.* Jacq. as above. "Without thorns. Leaves lanceolate, acute." A ſhrub, native of the iſles of Mauritius and Bourbon, where it is called Bois d'Olive, or Bois Rouge. The *branches* are ſpreading, and, at length, pendulous. *Leaves* lanceolate; thoſe of the lower branches entire, longeſt, and narroweſt, elegantly marked with a red nerve; the upper ones broader, crenate, with a pale nerve. In the boſoms of theſe laſt ſtand ſmall ſtalked cluſters of greeniſh ſweet-ſmelling *flowers*. *Fruit* a reddiſh drupa, uſually perfecting but one ſeed, from which an oil is expreſſed.

2. E. *Argan.* Retz. Obſ. Faſc. 6. 26. Willd. Sp. Pl. v. 1. 1148. (Rhamnus pentaphyllus; Jacq. Obſ. v. 2. 17. Murray Syſt. Veg. ed. 14. 233. R. ſiculus; Linn. Syſt. Nat. v. 3. 229. R. ſiculus pentaphyllus; Bocc. Sic. 43. t. 21. Raii Hiſt. 1626.) "Branches ſpinous. Leaves obovate, obtuſe." Native of Sicily and Morocco, in which laſt country it is called Argan, and the expreſſed oil of the ſeed is uſed for food and other purpoſes. It forms a thorny buſh. The *leaves* grow uſually about five together, on long ſtalks. *Flowers* in denſe cluſters. Linnæus deſcribes five barren filaments between the ſtamens. *Fruit* ovate, generally perfecting but one ſeed.

ELÆOMELI, in the writings of the ancient *Phyſicians*, the name of a ſubſtance, thus deſcribed by Dioſcorides. In Palmyra, a country of Syria, the elæomeli, which is an oil thicker than honey, and of a ſweet taſte, flows from the trunk of a tree. Two cyathi of this oil, he adds, drank with a hemina of water, evacuate crude and bilious humours by ſtool. There was much good obtained from the giving of this medicine; but it had this remarkable effect, that thoſe who took it were ſeized with a torpor, and privation of ſtrength for a time: this was, however, of no ill conſequence, but people knew of and expected it, and uſed always to keep thoſe perſons awake who had taken it, and the ſymptoms ſoon went off. The ſame author alſo adds, that the oil was ſometimes prepared from the buds of the tree; and ſuch of this kind was eſteemed the beſt that was old, thick, fatty, and not foul, or turbid. It was judged of a heating nature, and frequently applied externally to the eyes, with good effect in the cure of dimneſs of ſight, and contributed to the cure of leproſies, and pains of the nerves. Hermolaus Barbarus has a ſtrange conjecture in regard to the ſubſtance, which is, that it was the ſame with the manna mentioned in Scripture, only uſed in medicine inſtead of food: but the account which Dioſcorides gives of the effects of it is a very ſufficient anſwer to the abſurdity of ſuch an opinion. Dioſcorides, lib. i. cap. 37.

ELÆON, in *Ancient Geography*, a mountain of Paleſtine, one ſtadium from Jeruſalem. See *Mount* of Olives.—Alſo, a maritime town of Greece, on the coaſt of Bœotia.

ELÆOSACCHARUM, in *Pharmacy*, is the term given to a powder compoſed of ſugar rubbed with a little eſſential oil, or other aromatic matter, ſo as to give it the fragrant ſmell and aromatic taſte when diſſolved in any watery liquid, in which the ſugar promotes the ſolution of the eſſential oil.

As an example, the *elæoſaccharum aniſi* is compoſed of an ounce of white ſugar candy, or, in the room of it, of the fineſt and drieſt loaf ſugar, rubbed into fine powder. with 20 drops of oil of aniſeed. About a dram of this, diſſolved in barley-water, or any other watery liquid, may be taken for a doſe, and it is a convenient and elegant way of exhibiting this eſſential oil.

The *elæoſaccharum citri corticis*, or ſugar imbued with the oil of lemon-peel, is commonly in uſe in confectionary, and is prepared by rubbing a lump of hard loaf ſugar upon the rind of a whole lemon, by which the cells in which the flavoury eſſential oil is contained are broken down, and the ſugar abſorbs it. In this way a very perfect extemporaneous lemonade may be made by the elæoſaccharum of lemon peel, and the concrete acid of lemons mixed with water, when wanted, and the dry materials will keep unimpaired for any length of time.

ELÆOTHESIUM, Ελαιοθεσιον, in *Antiquity*. See Alipterium.

ELÆUS, in *Ancient Geography*, a town of Aſia Minor, in Lycia.—Alſo, a town of the Thracian Cherſoneſus, on the bank of the Helleſpont; now a caſtle on the ſtrait of the Dardanelles.—Alſo, a town placed by Strabo and Pliny in the gulf of the Doride.—Alſo, a town of the Peloponneſus, in the Argolide. Steph. Byz.—Alſo, a town of Greece, in Epirus, according to Ptolemy; probably the ſame with that placed by Polybius in Calydonia, a country in the vicinity of Epirus.

ELÆUSSA, an iſland ſituated upon the coaſt of Cilicia, near *Corycos*. It was ſmall according to Strabo, who ſays, that Archelaus made it his place of reſidence.—Alſo, an iſland of Aſia Minor, near Smyrna. Pliny and Livy, the latter of whom calls it *Elæa*.

ELAGABALUS. See Heliogabalus.

ELAHAJAN, in *Geography*, a town of Arabia, in the country of Yemen; 100 miles S. E. of Amanzirifdin.

ELAIS, in *Ancient Geography*, a town of Phœnicia, between Joppa, Gaza, and Tyre.

ELAITIS, a ſmall country of Aſia Minor, in the Eolide, adjoining to the territory of Pergamus, and watered by the Caicus.

ELAIUS, a mountain of Arcadia, S.W. of Megalopolis, and N. of Phigalia. In this mountain Ceres had a grotto, in which ſacrifices were offered to her, at which a female preſided, who had for her aſſiſtant one of the prieſts, called "Hierothytes." The grotto was ſituated in the midſt of a ſacred wood.

ELAM, in *Scripture Hiſtory*, one of the ſons of Shem, and grandſon of Noah, who is ſuppoſed to have ſettled in the ſouthern tract beyond the Tigris or Euphrates. This is inferred not only from the authority of Scripture, in which the inhabitants of the ſaid tract are plainly and frequently denoted by the name of Elam; but alſo from the teſtimony of heathen writers, who mention a country in this tract called Elymais, and a city of the ſame name. The name Elam, however, is ſometimes taken in a ſtricter ſenſe, as when it is diſtinguiſhed from Suſiana and the adjoining provinces, and ſometimes in a larger ſenſe, ſo as to include Suſiana and other adjacent provinces. Hence Pliny and Ptolemy mention the Elymæi, as a people inhabiting on the Perſian gulf; and hence the prophet Daniel ſpeaks of Shuſhan, the chief city of Suſiana, as lying in the province of Elam. (Dan. viii. 2.) The Elamites were a warlike people, living by rapine, and fighting with bows and arrows, (Iſ. xxii. 6. Jer. xlix. 35.) and they were joined to Suſia, as Strabo ſays, and there was an ingreſs to them from Perſia, and the Suſians and Elamites are mentioned apart. (Ezra iv. 3.)

Elam, in *Ancient Geography*, a city of Edom, on the Elanitic gulf of the Red ſea. It was taken by David when he ſubdued the Edomites; and again, after they had recovered their liberty and independence, by Uzziah or Azariah. (2 Kings, xiv. 23.) But Rezin, king of Syria, drove the Jews out of it. Elam is by the ancients named Elana, Elath, Elas, Ælan, or Elon: and hence the gulf near the iſthmus of Suez is called the Elanitic gulf. Strabo places it 1260 furlongs from Gaza. St. Jerom ſays, that Elam lies at the extreme of Paleſtine: and Procopius places it at the eaſtern extremity of Paleſtine.

ELAN, in *Geography*, a town of Ruſſia, in the country of the Coſſacks, on the Don; 68 miles S.W. of Achadiaſkaia.

Elan *of Buffon*, in *Zoology*. See Cervus *Alces*. See alſo Tapir.

ELANITIC Gulf. See Elam.

ELAPHEBOLIA, Ελαφηϐολια, in *Antiquity*, a feſtival kept in honour of Diana Ελαφηϐολος, *i.e.* the Huntreſs, for which reaſon, a cake, made in form of a deer, and upon that account called ελαφος, was offered to her. For a farther account of it, ſee Pott. Archæol. Græc. lib. ii. cap. 20.

ELAPHEBOLION, Ελαφηϐολιων, in *Ancient Chronology*, the ninth month of the Athenian year. It conſiſted of thirty days, and anſwered to the latter part of our February and beginning of March. See Month.

It was thus called from the feſtival *Elaphebolia* kept in it.

ELAPHIS. See Elaps.

ELAPHITES, in *Ancient Geography*, iſlands on the coaſt of Illyria, ſo called on account of the deer, with which they abounded. Pliny enumerates three of them, which he places 15 miles from Melita.

ELAPHITIS, an iſland of the Ionian ſea, in the vicinity of Epheſus. Pliny.

ELAPHOCAMELOS, in *Zoology*, a name by which ſeveral authors have called the Peruvian camel, uſually called *glama*, and employed there as a beaſt of burden. See Camelus.

ELAPHONESUM Marmor, a name uſed by the ancients to expreſs a ſpecies of marble uſed in ſtatuary, and called alſo *Proconneſium marmor*; it was of a blueiſh white, variegated with ſlender veins of black. See Proconnesium.

ELAPHONNESUS, in *Ancient Geography*, an iſland of the Propontide, over-againſt the town of Cyzicus. Hence was obtained the marble to which it gave name.

ELAPHUS, a mountain of Aſia, in the iſland of Arginuſſa.—Alſo a river of the Peloponneſus, in Arcadia, called lake *Elatum* by Pliny.—Alſo, a rapid ſtream of Arcadia, N.E. of Megalopolis.

ELAPHUS. See Cervus.

ELAPHUSA, an iſland of the Ionian ſea, near that of Corcyra. Pliny.

ELAPS, or Elaphis, by ſome called alſo *elops*, the name of a ſerpent deſcribed by many authors, and met with by Bellonius in the iſland of Lemnos: it grows to about three feet long, and is on the back of a dark grey, with three longitudinal black lines, running from the head to the tail, and on the belly of a bright yellow, according to Aldrovandus. The people of Lemnos call it *laphiati*.

ELARABAD, or El Harabad, in *Geography*, a town of Spain, in the province of Seville; 20 miles N.W. of Seville.

ELASERE, a town of Arabia, in the country of Yemen; 28 miles N. of Chamir.

ELASMIS, in *Natural Hiſtory*, the name of a genus of foſſil bodies, of the talc claſs, the diſtinguiſhing characters of which are, that they are compoſed of ſmall plates, in form of ſpangles, each of which is either ſingle, and not farther fiſſile; or, if complex, fiſſile only to a certain degree, and that into ſomewhat thick laminæ.

The word is derived from the Greek ἐλασμος, a *lamina*, or *plate*: the ſeveral component parts of theſe maſſes being ſo many ſmall plates.

The bodies of this genus have been uſed to be named mica, glimmer, and catſilver, by authors, in the ſame manner with the bractearia. There are only four known ſpecies of this foſſil.

ELASTIC, (from the Greek ελαστης, *impulſor*, of ελαῦνειν, *to impel*, *puſh*, &c.) ſpringy, *viz.* having the power of returning to the form from which it has been forced to deviate, or from which it is withheld. Thus a branch of a tree, the blade of a ſword, &c. are ſaid to be elaſtic, becauſe if they are bent to a certain degree, and then let go, they will of themſelves return to their former ſituation.

Elastic *Bodies* are ſuch as will ſuffer their form to be altered by the application of a force or preſſure, and will recover it on the removal of that preſſure. In this reſpect all the bodies which come within our knowledge are comprehended under the following diſtinctions. If two bodies, when preſſed towards each other, ſuffer an alteration of their forms, and if afterwards, on removing that preſſure, they recover their original forms, then they are ſaid to be *elaſtic*; if, when preſſed, their forms are not altered in the leaſt, or if their forms, when once altered by preſſure, are never afterwards recovered, then the bodies are ſaid to be *non-elaſtic*, and the former are called *perfectly hard*, whilſt the latter are called *perfectly ſoft*. So that a hard body is that whoſe parts do not yield to any preſſure or percuſſion; but retains its original form unaltered; a body *perfectly elaſtic*, is that whoſe parts yield to any ſtroke or preſſure, but recover their original form as ſoon as the preſſure is removed; and a body *perfectly ſoft*, is that whoſe parts yield to any ſtroke or preſſure, but does not after the removal of the preſſure in the leaſt endeavour to recover its original form.

As far as we know, there do not exiſt in nature bodies that are perfectly hard or perfectly ſoft; for they all ſeem to be elaſtic in a greater or leſs degree. With reſpect to perfect elaſticity, perhaps air alone may be ſaid to poſſeſs it; for a long continued preſſure does not ſeem to affect its elaſticity. A quantity of air has been left for ſeveral years, much compreſſed in proper veſſels, wherein there was nothing that could have any chemical action upon it; and afterwards on removing that preſſure, and replacing it in the ſame temperature,

perature, under the ſame barometrical altitude, as it had before; that air has been found to recover its original bulk without any perceptible difference. Moſt other aerial fluids, or gaſſes, as far as they have been tried, ſeem to be equally elaſtic; but they have not been ſubmitted to trials equally long.

Glaſs, certain metals, ivory, moſt woods, feathers, and a few others, are the moſt elaſtic bodies, next to the aerial fluids. Soft clay, wax mixed with oil, butter, and ſome other bodies, in a temperate degree of heat, come neareſt to a ſtate of perfect ſoftneſs. It has long been doubted whether water had any elaſticity or not; but Mr. Canton's diſcovery of the compreſſibility of water, determined the queſtion, by ſhewing that by the application of force, water may be compreſſed in a ſmall degree. See the article COMPRESSION.

The form of an elaſtic body may be altered by force, three different ways; *viz.* by compreſſion, by diſtenſion, and by bending, which laſt mode, in fact, is only a combination of the other two; for when an oblong ſtraight body is bent, thoſe particles of it which are on the concave ſide are compreſſed, whilſt thoſe of the convex ſide are diſtended. In an elaſtic body the change of form is greater when the preſſure is greater and *vice verſâ*; but it is not always exactly proportionate to it, excepting in the caſe of air and other aerial fluids, the bulk of which is always inverſely proportional to the compreſſing force.

In the recovery of their form from a ſtate of compreſſion, after the removal of the compreſſing force, elaſtic bodies exert a greater power at firſt than at laſt, ſo that the whole progreſs of reſtoration is a retarded motion. Thus, let a quantity of air be condenſed in a ſtrong metallic veſſel, and then let the ſtop cock, or any other ſmall orifice, be opened, and it will be found that the air ruſhes out of it with great violence at firſt, but it ſlackens its power gradually, until at laſt it can hardly be perceived to move.

The elaſticity of moſt bodies, eſpecially of long and ſlender forms, may be eaſily ſhewn, but even in very hard and compact bodies their elaſticity may be manifeſted without much difficulty; for inſtance, let a marble ſlab, or a flat and ſmooth iron, be covered with black-lead, or with printing ink, then drop an ivory ball upon it ſucceſſively from different heights, and the degree of compreſſion will be indicated by the magnitude of the ſpot which will be found upon the ivory ball.

The elaſticity of ſolids appears to be more perfect when they are ſubjected to a low degree of compreſſion, than when they are expoſed to a higher degree of it. Or, in other words, an elaſtic ſolid in general will recover its full original form after having been little deflected from it; but not after a violent diſtortion; for in the latter caſe its parts ſuffer another ſort of derangement, from which they are not capable of recovering. Thus, take a watch ſpring, bend it in a moderate degree, and afterwards on removing the hand, the ſpring will be found to recover its original direction without any perceivable deviation; but if you bend it to a ſharp angle as far as it will bear without breaking, then it will remain conſiderably bent, or deflected from its original direction. Thus alſo, if a muſical chord be ſtruck gently, it will expreſs a certain ſound which is produced by its vibrations, and theſe vibrations are performed in conſequence of its elaſticity. And if it be thus repeatedly ſtruck, it will expreſs the ſame ſound preciſely; but if it be ſtruck violently, then, on being ſtruck again, it will expreſs a lower ſound, which ſhews that it has ſuffered an elongation, that is, a derangement of its parts.

Elaſtic bodies are either ſolid or fluid, and it is neceſſary to conſider them ſeparately on account of their poſſeſſing ſome remarkable peculiar properties. The elaſtic ſolids are very numerous; for all ſolid bodies are more or leſs elaſtic; but ſome of them are elaſtic in ſo ſmall a degree as almoſt to deſerve the appellation of *ſoft*, whilſt others poſſeſs that property in an eminent degree, on which account they are extremely uſeful in the arts, in civil economy, and, above all, in mechanics; for there is hardly a machine, wherein the elaſticity of one or more ſolids is not eſſentially concerned. The principal bodies of this latter ſort are certain metallic bodies, moſt kinds of wood, glaſs, bones, ivory, dry membranes, and feathers, caout-chouc, and a few others.

The metallic bodies, in the ſtate in which they remain after fuſion, are not very elaſtic, but they may be rendered ſo, more or leſs, by various operations. Steel, whether perfectly hard, or of the ſofteſt temper, reſiſts flexure with equal force, when the deviations from the natural ſtate are ſmall; but at a certain point of the ſteel, if ſoft, it begins to undergo an alteration of form; at another point it breaks if much hardened: but when the hardneſs is moderate, it is capable of a much greater curvature without either permanent alteration or fracture. In order to give it the abovementioned degree of hardneſs, a piece of ſteel is firſt of all rendered quite hard and rigid by plunging it, when red or white hot, in cold water, and it is then heated to about the 500th degree of Fahrenheit's thermometer, which gives it what the workmen call *a ſpring temper*; for by heating it more or leſs, ſteel, that has been hardened in the abovementioned manner, may be rendered more or leſs elaſtic. Platina, gold, ſilver, copper, and ſteel, may be rendered elaſtic to a conſiderable degree, by hammering, or by treatments of the like nature, ſuch as wire-drawing, milling, &c. Amongſt all the other metallic bodies, there are few which will acquire any moderate degree of elaſticity by any known method. Metallic alloys generally are (or they may be rendered, by hammering, milling, &c.) much more elaſtic than any of the ſimple metals which enter into their compoſition. Thus, braſs may be rendered much more elaſtic than either the zinc or the copper, which are its component ſimple metals.

The elaſticity of ſolids is apt to be diminiſhed by heat; and a high temperature ſoftens metallic bodies ſo as to deprive them of all the hardneſs and elaſticity which had been given them by any of the above-mentioned means. But the preſence or abſence of air does not appear to affect the elaſticity of ſolids.

Thus much relates to the bending and unbending of elaſtic ſolids; but with reſpect to diſtenſion and compreſſion, it has been found by experiment, that the meaſure of the extenſion and compreſſion of uniform elaſtic bodies is ſimply proportional to the force which occaſions it, at leaſt when the forces are comparatively ſmall. Thus, if a weight of 100lbs. lengthened a rod of ſteel one hundredth of an inch, a weight of 200 would lengthen it very nearly two hundredths, and a weight of 300lbs. three hundredths. The ſame weights, acting in a contrary direction, would alſo ſhorten it one, two, or three hundredths reſpectively. The former part of this law was diſcovered by Dr. Hooke, and the effects appear to be analogous to thoſe which are more eaſily obſervable in elaſtic fluids.

The elaſticity of the ſame metallic body ſeems to be greater or leſs, according as that metal is more or leſs compact; thus, by hammering or milling, a piece of ſilver is rendered more elaſtic and more compact; for its ſpecific gravity is thereby increaſed; but this is not the caſe with ſteel hardened and tempered, as appears from the following ſtatement. The ſpecific gravity of ſoft ſteel is 7.833; that of ſteel hardened in water is 7.816. Mr. Cavallo mentions the following experiment of Mr. R. Pennington, as a confirmation

tion of the expanſion of ſteel by hardening. Mr. Pennington found, that a piece of ſteel, which when ſoft meaſured in length 2.769 inches, after having been hardened by plunging it, when red hot, in cold water, was found to meaſure 2.7785 inches; and after having been let down to a blue temper, it meaſured 2.768 inches. Cavallo's Philoſophy, vol. ii. p. 77.

The elaſtic fluids have a tendency to expand, when at liberty, with an elaſtic force which is proportional to their denſity, and of contracting when preſſed into a ſpace which is inverſely proportional to the preſſing force. It has been queſtioned, however, whether this rule holds good in all degrees of rarefaction or of condenſation. But no limit has been found to the rarefaction or condenſation of air. (See the articles Air and Atmosphere.) Not only common air, but all the gaſſes, or permanently elaſtic fluids, follow the ſame law, as alſo thoſe which are not permanently ſo, ſuch as vapour, or the ſteam of water, and of other ſubſtances, provided they be kept in the ſame temperature. (See the articles Gas and Pneumatics.) The elaſtic power of theſe fluids (contrary to that of ſolids) is increaſed by heat, *viz.* by an elevation of temperature, and is diminiſhed by cold. The bulk of common air becomes augmented of 412 thouſandths, or (according to more recent experiments,) of 375 thouſandths, by the heat of boiling water above that of freezing. The elaſtic power of ſteam is capable of being raiſed to a prodigious degree by the application of heat. Thus, in diſtilleries the vapour of ſpirit of wine has often occaſioned terrible exploſions; the vapours of mercury have burſt an iron box; and thoſe of nitrous acid, muriatic acid, and various others, when confined in veſſels, have burſt forth with great violence. In founderies a ſmall quantity of water accidentally poured over the melted metal, has often occaſioned the total deſtruction of the foundery. It is in conſequence of this property, that the elaſticity of ſteam has been employed with wonderful ſucceſs in ſteam-engines; and that it has been ſuppoſed to be the cauſe of earthquakes, of volcanoes, &c. ſince, by the increaſe of heat, its force may be rendered ſuperior to any obſtacle.

The elaſtic force of ſteam, or the vapour of water, in different temperatures, has been examined by various philoſophers, and their intereſting experiments, which have been conducted different ways, do not materially diſagree in their reſults. The principle upon which theſe experiments are in general conducted is as follows; though the peculiar conſtruction and application of the apparatus may be varied at pleaſure. An inverted glaſs ſiphon is connected with a cloſe veſſel containing ſome water, *viz.* one extremity of the ſiphon is cemented tight into the veſſel, and ſome mercury is poured into the arched part of the ſiphon. Now, in a natural ſtate, *viz.* when the preſſure of the atmoſphere only acts upon the ſiphon, the mercury muſt have the ſame altitude in both legs; but if the vapour of water begins to preſs upon the ſurface of the mercury in that leg which communicates with the above-mentioned veſſel, then the ſurface of the mercury muſt deſcend in the ſaid leg, and muſt riſe in the oppoſite one; therefore the altitude of the ſurface of the mercury in the latter, above the level of the former, indicates, or meaſures, the elaſtic power of the ſteam; and hence that power is expreſſed in perpendicular altitudes of mercury: and when that altitude is about 29.89 inches, then the elaſtic force of ſteam is ſaid to be equivalent to the ordinary preſſure of the atmoſphere, becauſe, at a mean, the preſſure of the atmoſphere balances a perpendicular column of quickſilver 29.89 inches high in a common barometer. The principal reſults of the experiments of the Chev. de Bettancourt (De Prony's Archit. Hydraul. vol. i. p. 557.) are conciſely expreſſed in the following table; the firſt column of which contains the temperature of the water in degrees of Fahrenheit's ſcale; and the ſecond contains the correſpondent altitudes of mercury in inches and decimals, which the ſteam of the water can ſuſtain, ſuppoſing the barometer to ſtand at its mean altitude, *viz.* 29.89.

50°	0.106
100	1.600
150	6.715
160	8.740
170	11.405
180	14.709
190	18.227
200	22.703
212	29.89

Beyond the boiling point, the Chev. de Bettancourt found that every additional 30° of heat nearly double the elaſtic force of ſteam; ſo that at the temperature of 242°, that elaſtic force is equal to twice the preſſure of the atmoſphere; at 272° it is equal to four times the preſſure of the atmoſphere; at 302° it is equal to eight times the preſſure of the atmoſphere, and ſo on.

The following table contains the reſults of Mr. Dalton's valuable and accurate experiments, together with thoſe of other experimenters. The firſt column contains the degrees of heat according to Fahrenheit's ſcale; the ſecond ſhews the correſponding elaſtic powers of ſteam according to Dalton; and the third contains promiſcuous obſervations made by various philoſophers.

Heat.	Elaſticity of ſteam in perpendicular inches of mercury.	
2°	0.068	
12	0.096	
22	0.139	
23	0.144	
24	0.150	
25	0.156	
26	0.162	
27	0.168	
28	0.174	
29	0.180	
30	0.186	
31	0.193	
32	0.200	
33	0.207	
34	0.214	
35	0.221	
36	0.229	
37	0.237	
38	0.245	
39	0.254	
40	0.263	
41	0.273	
42	0.283	
43	0.294	
44	0.305	
45	0.316	
46	0.328	
47	0.339	
48	0.351	
49	0.363	

Heat.	Elaſticity of ſteam in perpendicular inches of mercury.	
50°	0.375	
51	0.388	
52	0.401	
53	0.415	
54	0.429	
55	0.443	Muriate of lime .022 Dalt. as water 18° lower.
56	0.45	Alcohol 1.5 ; as water 36° higher. Ammonia 7.7 ; as water 95° higher. Ether 13.3 ; as water 118° higher.
57	0.474	
58	0 490	
59	0 507	
60	0.524	Alcohol 1.45 D. as water 30° higher. Ammonia 4.3 D.; as water 69° higher.
61	0.542	
62	0.560	Ether 12.75; as water 110° higher. Dalt.
63	0 578	
64	0.597	
65	0.616	Muriate of lime 0.3 Dalt.; as water 19° lower.
66	0.635	
67	0.655	
68	0.676	
69	0.698	
70	0.721	Muriate of lime 0.4 D. as water 18° lower.
71	0.745	
72	0.770	
73	0.796	
74	0.823	
75	0.851	
76	0.880	
77	0.910	
78	0.940	
79	0.971	
80	1.000	
81	1.04	
82	1.07	
83	1.10	
84	1.14	
85	1.17	
86	1.21	
87	1.24	
88	1.28	
89	1.32	
90	1.36	
91	1.40	
92	1.44	
93	1.48	
94	1.53	
95	1.58	Muriate of lime 0.9 Dalt.; as water 18° lower.
96	1 63	
97	1.68	
98	1.74	
99	1.80	
100	1.86	
101	1.92	
102	1.98	Ether 30; as water 110° higher. Dalt.

Heat.	Elaſticity of ſteam in perpendicular inches of mercury.	
103°	2.04	
104	2.11	
105	2.18	
106	2.25	
107	2.32	
108	2 39	
109	2.46	
110	2.53	
111	2.60	
112	2.68	
113	2.76	
114	2.84	
115	2.92	
116	3.00	
117	3.08	
118	3 16	
119	3.25	
120	3.33	Alc. as water 6° higher. Robiſon.
121	3.42	
122	3.50	
123	3.59	
124	3.69	
125	3.79	
126	3.89	
127	4.00	
128	4.11	
129	4.22	
130	4.34	
131	4.47	
132	4.60	
133	4 73	
134	4.86	Alc. as water 29°. Achard.
135	5.00	
136	5.14	
137	5.29	
138	5.44	
139	5.59	
140	5.74	Alc. as water 30° higher. Robiſon. Ammonia 30, as water 72° higher. Dalton.
141	5.90	
142	6.05	
143	6.21	
144	6.37	
145	6.53	
146	6.70	
147	6.87	Alcohol, as water 35°.5 higher. Ach. Ether 64.75 D. as water 105° higher.
148	7.05	
149	7.23	
150	7.42	
151	7.61	
152	7.81	
153	8.01	
154	8.20	
155	8 40	
156	8.60	
157	8.81	
158	9 02	
159	9.24	
160	9.46	

Heat.	Elaſticity of ſteam in perpendicular inches of mercury.	Biker.	
161°	9.68		
162	9.91		
163	10.15		
164	10.41		
165	10.68		
166	10.96		
167	11.25		Alc. as water 33° higher. Achard.
168	11.54		
169	11.83		
170	12.13		
171	12.43		Alc. as water 36° higher. Achard.
172	12.73		
173	13.02		
174	13.32		
175	13.62		Alc. 30. Dalt. as water 37° higher.
176	13.92		
177	14.22		
178	14.52		
179	14.83		
180	15.15		Alc. as water 37° higher. Robiſon.
181	15.50		
182	15.86		
183	16.23		
184	16.61		
185	17.00		
186	17.40		
187	17.80		
188	18.20		
189	18.60		
190	19.00		
191	19.42		
192	19.86		
193	20.32		
194	20.77		
195	21.22		
196	21.68		
197	22.13		
198	22.69		
199	23.16		
200	23.64		
201	24.12		
202	24.61		
203	25.10		
204	25.61		
205	26.13		
206	26.66		
207	27.20		
208	27.74		
209	28.29		
210	28.84		
211	29.41		
212	30.00		Ether 137 0 D. as water 84° higher. Alc. 58.5 D. as water 35° higher.
213		31.3	
214		31.9	
215		32.5	
216		33.2	
217		33.7	
218		34.6	
219°		35.1	
220		35.9	Alc. as water 42° higher. Robiſon.
221		36.4	
222	36.25	37.0	
230		43.2	
231			Muriate of lime 30 D. as water 18° lower.
232	43.24	44.8	
240		52.2	Alc. as water 46° higher. Robiſon.
242	51.34	53.9	
248			60.76 Schmidt.
250		62.7	66.8 Robiſon.
252	60.05	64.8	
257			71.57 Schmidt ; 76.9 Bettancourt.
260		75.0	80.3 Robiſon.
262	69.72	77.0	
266			83 81 Schmidt ; 90 Bettancourt.
270		88.6	94.0 Robiſon.
272	79.94	92.3	
275			98.53 Schmidt.
278		105.2	
280			109 Schmidt ; 105.9 Robiſon ; 106 Bettan.
282	90.99		
284			116.98 Schmidt.
286			120.5 Schmidt.
290			126 Schmidt.
292	102.45		
302	114.15		

We ſhall not in this article take any notice of the elaſtic powers of the electric fluid, of the magnetic fluid, of light, or of caloric, becauſe the nature of thoſe powers is merely hypothetical, and their properties will be deſcribed elſewhere.

The contemplation of the elaſtic powers of bodies, ſo common, ſo evident, and ſo uſeful, naturally induced philoſophers to enquire into the cauſe of it ; and accordingly various hypotheſes have been formed and publiſhed in explanation of thoſe phenomena. But as yet no ſatisfactory information has been obtained either from conjecture, or from the reſult of the numerous experiments that have been inſtituted expreſsly for that purpoſe. Air being one of the moſt elaſtic ſubſtances known, the ſpeculations of philoſophers were principally directed towards it ; but of the hypotheſes previous to ſir I. Newton's, we need not take any particular notice, ſince their inſufficiency is too evident to need any formal refutation ; it was thought, for inſtance, that the particles of air were like watch ſprings coiled up, or that they were a kind of elaſtic flakes, &c. Newton contented himſelf with ſaying, that the phenomena of the air's elaſticity could not be ſolved on any other ſuppoſition, but that of a repulſive power diffuſed all round each of its particles, which became ſtronger as they approached, and weaker as they receded, from each other. And he farther ſuppoſed, that this repulſive power was increaſed by heat.

A ſimilar uncertainty exiſts with reſpect to the elaſtic power of ſolids ; it being abſolutely unknown how the particles

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ticles of a ſolid can approach one another on one ſide of it, and recede from each other on the oppoſite ſide of the ſame body; (for this muſt actually take place when an elaſtic body is bent;) and then recover their former poſition when the preſſure is removed. Or how the pores of the elaſtic body can undergo an alteration, and a ſubſequent reſtoration of their forms. The Carteſians account for it from the effort of a *materia ſubtilis*, to paſs through pores that are too narrow for it. But as neither the mechanical action of this effort, nor the exiſtence of their materia ſubtilis is at all known, we need not delineate their hypotheſis more at large. Other philoſophers have endeavoured to modify the Carteſian hypotheſis by ſubſtituting an etherial elaſtic fluid to the materia ſubtilis; but if the elaſtic property of a ſolid is ſaid to depend upon the elaſticity of that ether; the cauſe of elaſticity ſtill remains unexplained. But the exiſtence of this ether is merely hypothetical. The preſſure of the atmoſphere certainly is unconcerned in it; for the elaſtic power of bodies is the ſame either in vacuo, or in the open air. Malebranche's idea of the elaſticity being cauſed by vortices of matter included within all bodies, is too ſtrange to require long examination. The particles of all ſolid bodies have been ſuppoſed to be endowed with a ſort of polarity ſomewhat like magnets; ſo that they are diſpoſed to attract each other with their friendly poles or extremities, and to repel each other with their oppoſite extremities; and this indeed ſeems to be corroborated by the phenomena of cryſtallization; for the particles of almoſt all bodies, in the act of aſſuming a ſolid form, arrange, or endeavour to arrange, themſelves in particular orders. Thus all metallic ſubſtances, after fuſion, ſhew that tendency;—earthy and ſaline particles, ſlowly depoſited from their ſolution in water, ſhew the ſame tendency;—the ſame thing takes place in ſublimations; and even water, in the act of freezing, (which may be conſidered as a depoſition from its ſolution in caloric,) aſſumes a peculiar cryſtallized form. This tendency, however, of the particles of bodies to arrange themſelves in certain orders, will go a very ſhort way towards elucidating the phenomena of elaſtic bodies; for, in the firſt place, it is not applicable to thoſe bodies which become elaſtic by hammering, or by being put in a ſtate of tenſion; and ſecondly, it would, even in the moſt favourable caſes, go no further than to explain the cauſe of elaſticity by another unintelligible property; meaning the attraction and repulſion between the friendly or unfriendly poles of the particles of bodies. See Deſaguliers on the Cauſe of Elaſticity. Phil. Tranſ. vol. xli. for 1739.

Upon the whole it muſt be acknowledged, that the cauſe or cauſes, upon which the elaſtic property of bodies depends, are utterly unknown. Various uſeful particulars have been aſcertained with reſpect to the variety, the powers and the durability of elaſtic bodies; and whilſt we remain ſatisfied with the knowledge and the application of thoſe important facts, we muſt leave the inveſtigation of their cauſe to future exertions.

Several other obſervations reſpecting the elaſtic property of bodies, will be found under the articles Steel, Springs, and Tension.

Elastic *Bitumen*. See Bitumen.

Elastic *Curve*. See Catenaria.

Elastic *Gum*. See Caoutchouc.

ELASTICITY, or Elastic *Force*, is that property in natural bodies, in conſequence of which they are ſaid to be *elaſtic*; it being a diſpoſition to have their form altered by preſſure, and to recover it on the removal of that preſſure. See Elastic *Bodies*.

Elasticity *of Air.*
Elasticity *of Fluids.*
Elasticity *of Solids.*
Elasticity *of Steam.*
See Elastic *Bodies*.

Elasticity *of Springs*. See Springs, and Elastic *Bodies*.

ELASUS, in *Ancient Geography*, a river of Aſia Minor, in Bithynia, the mouth of which is placed by Ptolemy between that of the Hypius and the town of Dioſpolis.

ELATAS, a river of Aſia Minor, in Bithynia, which diſcharged itſelf into the Euxine ſea, near Parthenium.

ELATE, in *Botany*, ("ſo named παρα το ελαν, from its great height; ελατη ουρανομηκης, Homer. Suppoſed to be a fir. It is however put for a palm, or perhaps rather the fruit or ſpathe of a palm, in Galen and Dioſcorides." Martyn.) Linn. Gen. 564. Schreb. 777. Willd. Sp. Pl. v. 4. 403. Ait. Hort. Kew. v. 3. 477. Mart. Mill. Dict. v. 2. Juſſ. Gen. 38. Claſs and order, *Monœcia Hexandria*. Nat. Ord. *Palmæ*.

Gen. Ch. Male, *Cal.* Spathe of two valves; ſpadix branched; perianth with three teeth. *Cor.* Petals three, roundiſh. *Stam.* Filaments none; anthers ſix, ſeſſile. Female in the ſame ſpadix, *Cal.* Spathe as above; perianth with three teeth. *Cor.* Petals three, roundiſh, permanent. *Piſt.* Germen ſuperior, roundiſh; ſtyle awl-ſhaped; ſtigmas three, *Peric.* Drupa ovate, pointed. *Seed.* Nut ovate, marked with a furrow.

Eſſ. Ch. Common ſpathe of two valves; common ſpadix branched. Male, Calyx three-toothed. Petals three, anthers ſeſſile. Female, Calyx three-toothed. Petals three. Stigmas three. Drupa with one nut.

E. *ſylveſtris*. Linn. Sp. Pl. 1659. (Katou-indel; Rheede Malab. v. 3. 15. t. 22—25. Kæmpf. Amœn. 667.) Native of the Eaſt Indies. Deſcribed in the Hortus Malabaricus, where, like other palms, it is illuſtrated with ſplendid and ample figures, as of a moderate height, about 14 feet. *Wood* white and very hard. *Leaves* pinnate, ſpinous in their lower part; leaflets oppoſite, lanceolate, acute, keeled, entire. *Spathe* thick and coriaceous; ſpadix with a thick compreſſed baſe, very much branched upwards, bearing innumerable, ſmall, greeniſh-white, ſcentleſs *flowers*. *Fruit* oval, the ſize of a ſloe, ſharp-pointed, blackiſh and ſhining; its pulp white, ſweet, farinaceous, and aſtringent. *Nut* red, with a white bitter kernel. The natives of Malabar weave hats of the leaves. Elephants are fond of the fruit ſtalks.

ELATEA, in *Ancient Geography*, a town of Greece, which was only inferior to Delphi. It was ſituated on a plain, over which paſſed the Cephiſſus, near Amphiclea; and is ſaid to have been founded by Elatus, who came from Arcadia to aſſiſt the Delphians againſt the Phlegians, in their attempt to plunder the temple. Elatea was one of the towns burned by the Perſians; but though it afterwards repulſed the enterpriſes of the Macedonians, it was ſubdued by Demetrius. It continued faithful to the Macedonians when Titus Flamininus was ſent from Rome to reſcue the Greeks from ſlavery, and ſuſtained a ſiege. The inhabitants were afterwards reconciled to the Romans, and recovered their liberty. Eſculapius had a temple in this place, and his ſtatue exhibited him with a long beard. Here were alſo a theatre and a bronze ſtatue of Minerva, which appeared to be very ancient. Minerva Carnea had a temple ſituated on a craggy rock, at the diſtance of 20 ſtadia from Elatea. The goddeſs was repreſented in the attitude of combat.

ELATER, in *Entomology*, a genus of coleopterous inſects. The antennæ are filiform, and ſituated in a groove under the head and thorax; under ſide of the thorax terminating in an elaſtic ſpine, placed in the cavity of the abdomen.

The ſpecies of this genus are generally of an elongated and ſubcylindrical form, and ſpring to a conſiderable diſtance by means of the ſpine at the extremity of the thorax; when placed on the back, theſe inſects ſtrike the ſpine forcibly againſt the body, and by the ſudden jerk turn over and recover their natural poſition. Many of this genus afford alſo a ſtrong phoſphoric light in the night-time, like the glow-worm, but of greater luſtre. A number of the ſpecies are found in Europe, chiefly thoſe of ſmall ſize, the larger kinds being moſtly natives of hot climates.

Species.

Flabellicornis. Brown; antennæ with fan-like tuft of eight large lamina. Linn.

Native of India, and one of the largeſt ſpecies.

Fascicularis. Thorax mouſe-colour; wing-caſes pale, with brown undulated ſtreaks; antennæ with fan-like tuft. Oliv.

The antennæ are black; wing-caſes ſtriated; body mouſe-colour; legs pitchy. An American ſpecies.

Speciosus. White, ſpotted with black. Linn.

Native of the Eaſt Indies. In this ſpecies the antennæ are ſhort and black.

Luridus. Downy, cinereous; wing-caſes ſomewhat ſtriated; end of the legs black. Olivier.

A large ſpecies found in Coromandel.

Foveatus. Black; thorax with two impreſſed white dots; wing-caſes ſtriated. Fabr.

Inhabits Guinea. This is a large ſpecies, entirely black; the thorax ſmooth; wing-caſes immaculate.

Oculatus. Thorax with two black ocellate ſpots; body black, ſpotted with white. Olivier.

Native of North America.

Luscus. Thorax with two black ocellate ſpots; body black and immaculate. Olivier.

Inhabits the ſame country as the preceding.

Coecus. Black; thorax with two ocellar ſpots; wing-caſes with two arched ſtreaks, and a ferruginous dot behind. Fabr.

An African inſect. The thorax is marked each ſide with a large oblong ferruginous ring; wing-caſes ſmooth.

Lineatus. Black; thorax and wing-caſes with rufous lines. Oliv.

A Braſilian inſect of large ſize, deſcribed by Olivier from a ſpecimen in the muſeum of the late French king.

Noctilucus. Sides of the thorax with a glabrous yellow ſpot. Oliv.

This ſpecies inhabits South America, and emits from the two glabrous ſpots on the thorax a vivid phoſphoric light.

Phosphoreus. Thorax with two yellow ſpots behind. Linn.

Poſſeſſes the ſame luminous property as the laſt. The ſpecies inhabits South America.

Ignitus. Fuſcous; thorax black, with yellow margin. Oliv.

Native of Cayenne.

Fuscipes. Black; antennæ and legs brown. Oliv.

A large ſpecies found in the Eaſt Indies.

4-Maculatus. Cinereous; thorax with four black dots; wing-caſes with two. Fabr.

Native of Africa.

Rubiginosus. Blackiſh, ſpotted with grey; large ſpot on the wing-caſes. Fabr.

Inhabits Sierra Leone. The head of this ſpecies is black; breaſt black, with the ſides ruſt-coloured; legs black.

Ligneus. Ferruginous; wing-caſes mucronate; antennæ black. Oliv.

Native of South America.

Rufus. Ferruginous; head and thorax darker. Fabr.

Inhabits Germany. The head is brown; antennæ ferruginous; thorax brown, ferruginous at the ſides; wing-caſes ſtriated.

Ferrugineus. Thorax and wing-caſes ferruginous; body and poſterior margin of the thorax black. Oliv.

Found in Europe.

Porcatus. Braſſy-green; wing-caſes with villous white grooves. Fabr.

The ſuture of the wing-caſes black and poliſhed. Oliv. Inhabits South America.

Sulcatus. Covered with whitiſh down; wing-caſes with three elevated black glabrous lines. Fabr.

Native of South America.

Virens. Body downy, blackiſh-green; antennæ black. Oliv.

Inhabits American iſlands.

Fulgens. Blue poliſhed, beneath coppery; wing-caſes pointed. Oliv.

Native of India.

Inæquatus. Black blue; thorax uneven; wing-caſes ſtriated, red. Fabr.

The antennæ are black; thorax grooved; ſcutel duſky. An Italian ſpecies.

Aterrimus. Thorax black, and poliſhed; wing-caſes ſtriated and black-brown. Oliv.

An European ſpecies.

Niger. Black-brown, and opake; wing-caſes ſtriated; antennæ and legs ſame colour. Linn.

Found in gardens in Europe.

Murinus. Thorax dull cinereous; wing-caſes clouded with cinereous; ends of the legs rufous. Linn.

Common in gardens in Europe.

Holosericeus. Dull; thorax and wing-caſes ſomewhat ſilky, and clouded with cinereous and brown. Fabr.

Inhabits Germany.

Tessellatus. Wing-caſes braſſy, with crowded paler ſpots; claws red. Linn. Oliv. &c.

Found in gardens in Europe.

Fasciatus. Thorax varied with black and pale; wing-caſes blackiſh, with an undulated white band. Linn.

Native of Sweden, and moſt other parts of Europe.

Varius. Black; edge of the thorax, band on the poſterior part of the wing-caſes and baſe yellowiſh downy. Olivier.

Found in the vicinity of Paris.

Æneus. Thorax and wing-caſes braſſy; antennæ black and ſimple. Olivier.

An European ſpecies.

Germanus. Thorax and wing-caſes black blue; body and legs black. Olivier.

Native of Europe.

Impressus. Pubeſcent, black; thorax with an impreſſed dorſal line and two dots; wing-caſes ſtriated, ſhining, braſſy. Fabr.

Found in Sweden by Schneider.

Pectinicornis. Thorax and wing-caſes braſſy; antennæ of the male pectinated. Linn. *Elater fuſcus viridi æneus*, Geoffr.

Native of Europe.

Furcatus. Thorax ferruginous, with a black dorſal line; wing-caſes tapering; teſtaceous with five black ſtreaks; head furcated. Fabr.

Inhabits India, and is of the middle ſize. Deſcribed from a ſpecimen in the Britiſh Muſeum.

Suturalis. Thorax one-toothed each ſide; ferruginous with a black dorſal line; wing-caſes teſtaceous, with three black fillets. Fabr.

Native of Senegal.

Vittatus. Brown; band on the wing-caſes and legs teſtaceous. Fabr.

The antennæ of this ſpecies is pitchy; head and thorax ſomewhat downy; abdomen ferruginous. Found in Germany.

Cupreus. Coppery; upper half of the wing-caſes yellow. Olivier.

Native of Britain.

Linearis. Thorax rufous, in the middle brown; wing-caſes linear and teſtaceous. Olivier.

Livens. Black; thorax red and glabrous; wing-caſes teſtaceous. Olivier.

This, and the preceding, inhabit Europe, and are ſuppoſed by Hoppe to be varieties of the ſame ſpecies.

Cruciatus. Thorax black, with ferruginous ſides; wing-caſes yellow, with black edge and croſs. Fabr.

Native of Europe.

Denticollis. Linear, black; wing-caſes and thorax rufous. Fabr.

Inhabits Germany.

Castaneus. Thorax teſtaceous and pubeſcent; wing-caſes yellow, tipped with black; body black. Olivier.

Native of Europe.

Obscurus. Piceous; thorax and wing-caſes dull black. Olivier.

Found in Europe, and common in England.

Flavipes. Thorax dull black; wing-caſes ſtriated and brown; legs teſtaceous.

Inhabits Europe.

Castanipes. Brown, with cinereous down; antennæ and ſhanks teſtaceous. Gmel. *Elater caſtaneus*, Fabr.

Native of Guadaloupe. The wing-caſes are ſtriated.

Maculatus. Ferruginous; wing-caſes dotted with black. Olivier.

A South American ſpecies.

Filiformis. Browniſh-aſh, and immaculate. Fabr.

Inhabits Italy.

Tristis. Thorax black and poliſhed; baſe of the wing-caſes and exterior margin livid. Fabr.

Lives in decayed wood in Europe.

Marginatus. Thorax brown; wing-caſes teſtaceous, edged with black. Olivier.

This, and the eleven following ſpecies, inhabit Europe.

Thoracicus. Black; thorax entirely rufous. Fabr.

Ruficollis. Black; thorax, at the poſterior part, red and poliſhed. Fabr.

Brunneus. Thorax rufous, black in the middle; wing-caſes and body ferruginous. Fabr.

Hæmatodes. Black; thorax pubeſcent and fulvous; wing-caſes ſtriated and ſanguineous. Olivier.

Elongatus. Black; wing-caſes teſtaceous, with the tips black. Fabr.

Lateralis. Black and duſky; wing-caſes ſtriated, with an oblong yellowiſh ſpot at the baſe. Fabr.

Sanguineus. Black; wing-caſes ſtriated, ſanguineous and immaculate. Olivier.

Ephippium. Black; wing-caſes ſtriated, ſanguineous with a common dorſal black ſpot. Olivier.

Found on decayed pines.

Præustus. Black; wing-caſes ſtriated, ſanguineous with black tip. Fabr.

Testaceus. Black; ſtriated; wing-caſes and legs teſtaceous. Fabr.

Balteatus. Anterior half of the wing-caſes rufous; body black. Fabr.

Melanocephalus. Sanguineous, head, thorax, dorſal line on the wing-caſes, and tips black. Olivier.

Native of Coromandel. Bankſian cabinet.

Elegans. Black; margin of the thorax and wing-caſes, with the fillet on the latter, and the legs teſtaceous. Fabr.

An American ſpecies. The head is black; antennæ teſtaceous.

Variabilis. Thorax brown duſky; wing-caſes ſtriated and teſtaceous. Fabr.

Native of Germany. The wing caſes in this inſect are ſometimes fuſcous.

Pallipes. Brown; wing-caſes ſtriated; antennæ and legs yellow. Fabr.

A ſpecies of ſmall ſize, and inhabits Tranquebar.

Striatus. Black; wing-caſes brown with four pale lines. Olivier.

Native of Sweden.

Rufipes. Black; thorax poliſhed; wing-caſes ſtriated; legs rufous. Fabr.

Inhabits Saxony. Hybner.

Minutus. Thorax deep black, and poliſhed; wing-caſes and legs blackiſh. Linn.

An European ſpecies of ſmall ſize.

Pallens. Black; wing-caſes ſtriated, and with the legs teſtaceous. Geoffr.

Found by Boſc in France.

Limbatus. Thorax black, and poliſhed; wing-caſes teſtaceous. Thunberg.

Inhabits Kiel.

Riparius. Braſſy black; wing-caſes ſtriated; legs rufous. Fabr.

Found by Paykull in Lapland, where it inhabits principally the banks of lakes and rivers.

Advena. Black; wing-caſes and legs dull cinereous. Fabr.

A ſmall inſect, found in Spain.

Nitidulus. Wing-caſes ſtriated with two yellow ſpots; antennæ and legs yellow. Fabr.

The head is black and deſtitute of ſpots; wing-caſes black. The ſpecies is a native of Cayenne.

Pulchellus. Head and thorax black; wing-caſes blackiſh with yellowiſh ſpots; legs yellow. Fabr.

Inhabits Europe in gardens.

2-Guttatus. Black; wing-caſes ſtriated, with a rufous ſpot in the middle. Olivier.

Found in the ſouth of France.

2-Maculatus. Black; wing-caſes teſtaceous, tip black with a white dot. Olivier.

Inhabits ſame part of Europe as the preceding.

3-Maculatus. Black; wing-caſes ſtriated, teſtaceous, and marked with three black ſpots. Fabr.

Native of Saxony. Hybner.

4-Maculatus. Above black; border of the thorax and two ſpots on the wing-caſes teſtaceous. Fabr.

Inhabits Italy.

Politus. Black, and poliſhed; wing-caſes ſtriated; anterior legs pale. Paykull.

Found on the higher mountains of Dahlikarbia, and is very ſmall.

6-Guttatus. Smooth, black; wing-caſes with three white dots. Thunberg.

Native of the Cape of Good Hope.

Buprestoides. Cylindrical, black and immaculate; head retracted. Hybner.

Inhabits Saxony.

Pygmæus. Dull black, with the ſhanks pitchy. Fabr.

Native of Germany, and is found in rotten wood.

Notatus. Thorax rufous, with two black ſpots; wing-caſes rufous at the baſe, the tip black with two white ſpots. Olivier.

Found in Coromandel.

Festivus. Thorax ferruginous; wing-caſes black with two yellowiſh bands. Forſt.

Native of Egypt.

Tetrastichon. Black ſpotted with yellow; wing-caſes with confluent ſpots; abdomen with four dots. Gmel.

Inhabits Africa.

Deustus. Teſtaceous; thorax and hind part of the wing-caſes with a branched black line. Thunberg.

Native of Ceylon.

Clavicornis. Green, antennæ clavated. Thunberg.

Native of India.

Giganteus. Depreſſed; wing-caſes braſſy green with a yellow ſpot; breaſt and abdomen yellow. Schall.

This and the following inhabit America.

Indicus. Black; thorax convex, punctured with a fulvous margin, ſinuate in the middle; wing-caſes black ſtriate punctured. Herbſt.

Vulgaris. Black; wing-caſes brown with punctured ſtriæ; ſuture black; legs pale. Herbſt.

Found at Berlin, as are likewiſe the three following ſpecies.

Griseus. Dull grey; thorax convex; wing-caſes with punctured ſtriæ; beneath black; antennæ and legs brown. Herbſt.

Cinereus. Black, with hoary down; thorax convex; tarſi ferruginous. Herbſt.

Equiseti. Black, thorax convex; wing-caſes ſtriated; legs yellowiſh. Herbſt.

Montanus. Somewhat villous, ſhining black; baſe of the antennæ and ſhanks fulvous. Scopoli.

Inhabits the alpine regions of Italy.

Pullus. Black, poliſhed and pubeſcent; wing-caſes punctured; legs cheſnut brown. Müll.

Native of Denmark.

Tuberculatus. Black, opake; thorax with two tubercles; wing-caſes finely ſtriated with ferruginous dots. Pontopp.

Inhabits Denmark.

Guineensis. Green bronzed; thorax ſub-pubeſcent; antennæ black; wing-caſes ſtriated. Gronov.

Inhabits America.

Fimbriatus. Black, thorax edged with red; wing-caſes with two yellow interrupted lines at the ſuture. Lepechin.

Found in the deſerts of Ural.

Auratus. Green-gold; legs black. Gmel.

Native of China. Drury.

Vittatus. Black, wing-caſes brown with a longitudinal fulvous ſtripe. Geoffr.

Native of France.

Piceus. Entirely black, and poliſhed; wing-caſes very ſmooth. Degeer.

Native of America.

Lividus. Pale reddiſh-brown; antennæ rufous; legs yellow-teſtaceous. Degeer.

Native of America.

Punctulatus. Dull teſtaceous; anterior part of the thorax black; wing-caſes with two irregular black ſpots. Degeer.

Native of Surinam.

Segetis. Black; antennæ and tarſi brown; wing-caſes with black and brown longitudinal lines. Act. Holm. 1779.

Deſtructive in the larva ſtate to the roots of corn.

Found in Sweden.

Punctatus. Elongated, brown; thorax punctured; wing-caſes with crenate ſtriæ; mouth and legs ferruginous. Leſke.

This and the following ſpecies are natives of Europe.

Pubescens. Pitchy and pubeſcent; wing-caſes ſtriated; ends of the legs ferruginous. Leſke.

Varians. Brown with yellow down; legs rufous; wing-caſes finely ſtriated with brown ſpots. Gmel.

Crassipes. Black, wing-caſes finely ſtriated; thighs thick. Gmel.

Cinerascens. Teſtaceous with cinereous down; thorax browniſh; legs rufous. Gmel.

Quadrisulcus. Black; wing-caſes obſoletely ſtriated with four impreſſed grooves at the baſe; antennæ, ſhanks, and ends of the fore legs ruſty-brown. Gmel.

Suturalis. Brown; margin of the thorax ferruginous; wing-caſes teſtaceous with a brown ſuture. Gmel.

Capucinus. Black; wing-caſes, anterior legs, and ſhanks teſtaceous. Gmel.

Soricinus. Mouſe-colour; thorax gibbous; wing caſes teſtaceous; antennæ and legs ferruginous. Gmel.

Funereus. Teſtaceous; wing-caſes ſtriated; head brown. Gmel.

Chalybeus. Braſſy-black, and poliſhed; baſe of the anterior thighs and ſhanks rufous. Gmel.

Obscurus. Ferruginous; head and thorax brown; the latter on the poſterior part with the wing-caſes and legs teſtaceous. Gmel.

Fuliginosus. Piceous and pubeſcent; antennæ, legs, and wing-caſes teſtaceous, the latter edged with brown. Gmel.

Pusillus. Cheſnut brown; three laſt joints of the antennæ lamellate; wing-caſes finely ſtriated and pubeſcent.

Unicolor. Entirely rufous-teſtaceous; eyes black; thorax elongated with an impreſſed line in the middle. Marſh. Ent. Brit.

This with the following ſpecies are natives of Britain, and have been recently deſcribed in the Entomologia Britannica.

Fulvus. Entirely ferruginous with eyes black. Marſh.

Lateralis. Thorax ferruginous black; wing-caſes braſſy teſtaceous; margin and ſuture browniſh. Marſh.

Rugosus. Dull black; thorax rugoſe; antennæ and legs rufous. Marſh.

Nigro-Æneus. Linear, beneath black; above braſſy black; thorax poliſhed. Marſh.

Elongatus. Entirely cheſnut; wing-caſes ſtriated. Marſh.

Obsoletus. Braſſy black; wing-caſes obſoletely ſtriated; antennæ ſetaceous. Marſh.

Cyaneus. Entirely purple-blue minutely dotted; wing-caſes ſtriated. Marſh.

Nigrinus. Black; thorax punctured; wing-caſes ſtriate downy. Marſh.

ELATERIUM, in *Botany*, (ελατηριον, or *wild cucumber*, of the ancient Greek writers, from ελαυνω, *to urge*, *force*, or *impel*, is certainly *Momordica Elaterium* of Linnæus, well characterized by its fruit Dioſcorides; but the word being unoccupied as a generic name, was adopted by Jacquin for this American genus, whoſe elaſtic fruit agrees in that reſpect with the original ελατηριον.) Jacq. Amer. 241. Linn. Gen. 477. Schreb. 619. Willd. Sp. Pl. v. 4. 192. Juſſ. 394. Claſs and order, *Monœcia Monandria*, or rather perhaps *Monœcia Monadelphia*. Nat. Ord. *Cucurbitaceæ*, Linn. Juſſ.

Gen. Ch. Male, *Cal.* none. *Cor.* of one petal, ſalver-ſhaped; tube cylindrical, ſtraight, abrupt at the baſe; limb in five lanceolate, acute, equal, horizontal ſegments, whoſe edges are deflexed ſo as nearly to meet underneath, and whoſe intermediate notches are each furniſhed with a little tooth. *Stam.* Filaments ſimple, columnar, erect, rather ſhorter than the tube of the corolla; anther linear, continued in a five-folded zig-zag line, ſo as to make a ring crowning the filament. Female, *Cal.* none. *Cor.* as in the male. *Piſt.* Germen inferior, roundiſh, ſomewhat incurved, clothed with ſoft prickles; ſtyle columnar, ſwelling upwards, incloſed within the tube; ſtigma capitate, large, cylindrical, convex at the ſummit. *Peric.* Capſule coriaceous, prickly, kidney-ſhaped, ſlightly compreſſed, of one cell and two unequal valves, of one cell filled with pulp; the dorſal valve is furniſhed with a highly elaſtic appendage, bearing the ſeeds, which it ſcatters at the ſlighteſt touch. *Seeds* ſeveral, about 18, imbricated, ovate, angular, flattened.

Eſſ. Ch. Male, Calyx none. Corolla ſalver-ſhaped. Female, Calyx none. Corolla ſalver-ſhaped. Capſule inferior, prickly, elaſtic, of one cell and two unequal valves. Seeds numerous, imbedded in pulp.

1. E. *carthaginenſe*. Jacq. Amer. 241. t. 154. Linn. Sp. Pl. 1375. "Leaves heart-ſhaped, angular."—Found on the ſummit of a hill at Carthagena by Jacquin, the only botaniſt who ſeems to have ſeen this plant, and from whom Linnæus adopted it. The *root* is ſuppoſed to be annual. *Stems* diffuſe, or climbing by means of tendrils ſo as to cover all the neighbouring buſhes, round, ſmooth, herbaceous. *Leaves* alternate, ſtalked, five-angular, heart-ſhaped, finely ſerrated; roughiſh above, ſmooth beneath. *Flower-ſtalks* axillary, in pairs; one branched, bearing ſeveral male flowers; the other ſimple, with one female flower. *Flowers* white, fragrant in an evening only, not unlike thoſe of Jaſmine. It bloſſoms in October and November, ſoon ripening its fruit, whoſe pulp is watery, with the ſcent of a cucumber.

2. E. *trifoliatum*. Linn. Mant. 123. (Sicyos foliis ternatis; Gron. Virg. part 2. 191. "Leaves three-lobed, cut."—Gathered by Clayton in Virginia. He deſcribes it as a ſmall procumbent plant like a *Convolvulus*. *Leaves* on long ſtalks, three-lobed, cut, eſpecially the ſide lobes. *Flowers* white, ſmall, with a five-leaved hairy calyx, which, if true, does not agree with the generic character. *Capſule* brown, ſlightly hairy, of one cell and two valves burſting elaſtically when ripe. *Seeds* one or two, ovate. The elaſtic capſule induced Linnæus to remove this plant from his *Sicyos angulata*, with which he and others had confounded it, to the preſent genus. He does not appear to have ſeen any ſpecimens, and he ſeems to miſtake Clayton's deſcription with reſpect to the leaves being ternate; we preſume it rather expreſſes their being three-lobed.

Elaterium is the inſpiſſated juice of the wild cucumber, (Momordica *Elaterium*,) an extremely violent purgative, which is ſometimes employed in medicine, in dropſies, and other viſceral diſorders. The juice of the momordica has an unpleaſant ſmell, and a nauſeous bitter taſte; on ſtanding ſome hours it depoſits a thick fecula. According to Beaumé, 230lbs. of the fruit will yield as much juice as when ſlowly evaporated to the proper conſiſtence will produce 6½lbs. of the extract or elaterium. The doſe of this powerful medicine is from one to three grains, and it generally operates violently.

ELATINE, in *Botany*, (ελατινη of the Greek writers, is thought to have been ſo called from ελατη, *a pine*, to which neither its form nor qualities, as mentioned by Dioſcorides at leaſt, ſeem to have any reference. Linnæus, however, took advantage of this alluſion to apply the name to what Buxbaum had called Potamopitys, or Pond Pine, on account of its aſpect.) Linn. Gen. 198. Schreb. 267. Willd. Sp. Pl. v. 2. 472. Sm. Fl. Brit. 433. Mart. Mill. Dict. v. 2. Juſſ. 300. Gærtn. t. 112. (Alſinaſtrum; Vaill. Par. 5. t. 1. f. 6.) Claſs and order, *Octandria Tetragynia*. Nat. Ord. *Inundatæ*, Linn. *Caryophylleæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four roundiſh, flat, permanent leaves. *Cor.* Petals four, ovate, obtuſe, ſeſſile, ſpreading, about the ſize of the calyx-leaves. *Stam.* Filaments eight, the length of the corolla; anthers ſimple. *Piſt.* Germen ſuperior, large, globoſe, a little depreſſed; ſtyles four, erect, parallel, as long as the ſtamens; ſtigmas ſimple. *Peric.* Capſule globoſe, rather depreſſed, large, of four cells and four valves, the partitions fixed in the central column, oppoſite to each future. *Seeds* numerous, oblong, curved, angular, inſerted into the column.

Obſ. Sometimes the flowers are only three-cleft, with ſix ſtamens.

Eſſ. Ch. Calyx of three or four leaves. Petals three or four. Capſule ſuperior, of three or four cells, and as many valves; the partitions oppoſite to the fiſſures. Seeds many. *Sm. Engl. Bot.* 955.

1. E. *Hydropiper*. Linn. Sp. Pl. 527. Fl. Lapp. ed. 2. 124. Oed. in Fl. Dan. t. 156. Engl. Bot. t. 955. (Alſinaſtrum ſerpyllifolium, flore roſeo tripetalo, et flore albo tetrapetalo; Vaill. Par. 5. t. 2. f. 1, 2. Hydropiper; Buxb. Cent. 2. 36. t. 37. f. 3.) Leaves in pairs.—Found in ſandy inundated places throughout Europe, though not obſerved in Britain till the Rev. Mr. Williams found it in Auguſt 1798, on the eaſtern ſhore of Bomere pool, near Condover, Shropſhire. Perhaps its cloſe reſemblance to *Montia fontana* may often have cauſed it to be overlooked.

The *root* is annual, white, and fibrous. *Herb* ſmooth in every part, generally under water, even the flowers, which remain cloſed to ſhelter the ſtamens. When out of the water, it appears from Vaillant that the petals aſſume a red tint. Luxuriant *flowers* are four-cleft, others three-cleft. The *ſtems* are procumbent, and take root as they go. *Leaves* oppoſite, ſpatulate, entire. *Flowers* on ſolitary, ſimple, axillary ſtalks.

2. E. *Alſinaſtrum*. Linn. Sp. Pl. 527. Sm. Fl. Brit. 433. *Huds.* 173. (Alſinaſtrum gratiolæ folio; Tourn. Inſt. 244. Dill. in Raii Syn. 346. A. gallii folio; Vaill. Par. 6. t. 1. f. 6.) Leaves whorled.—Found in France, Switzerland, and Germany, growing in ditches and ponds. Its having been admitted into our Britiſh Floras, from whence it muſt now be excluded, aroſe from a moſt unaccountable error of Dillenius, whoſe memory, it could not be his judgment, miſled him ſo far as to take *Centunculus minimus* for this plant, as his herbarium ſhews. The real E. *Alſinaſtrum* is a ſpan or more in height, with hollow, round, ſtraight, leafy *ſtems*, branched only at the baſe. *Leaves* whorled; thoſe under water linear, narrow, about twelve in a whorl; thoſe above the ſurface four, ovate, entire, ribbed. *Flowers* axillary, ſolitary, ſeſſile, white. It bloſſoms in Auguſt, and is perennial.

What profeſſor Leche found in ditches, near Abo, in Finland, and which Linnæus took for this plant, ſee Fl. Suec. ed. 2. 133, is the *Hippuris tetraphylla*, Linn. Suppl. 81, as appears from his herbarium; where alſo we learn that Pallas made the ſame miſtake in Kamtſchatka. This may almoſt excuſe the above error of Dillenius. Retzius does not appear aware of his *Hippuris lanceolata*, faſc. 3. t. 1, being the *tetraphylla* of Linnæus, any more than the *Elatine Alſinaſtrum* of Fl. Suec. which laſt circumſtance, one would think, might have occurred to this generally acute writer, when he was mentioning the ſimilitude of the two plants being ſuch as to render a deſcription of his new *Hippuris* ſuperfluous.

Elatine, in *Medicine*, has been greatly recommended as an aperient, reſolvent, and vulnerary. Its ſimple water has been uſed for the ſame purpoſes, though it retains very little of the virtues of the plant. The infuſion is much better, and the expreſſed juice preferable ſtill. It has been praiſed by ſome in leprous and ſcrofulous caſes; alſo externally for cancerous and other eating ulcers. An ointment was made of it for theſe purpoſes. At preſent, however, it is very little uſed.

A combination of its active matter with honey, prepared by boiling four pints of the depurated juice with four pounds of clarified honey, was ſometimes kept in the ſhops.

ELATITES, Fir-stone, in *Natural Hiſtory*, a name given by authors to that ſort of petrified wood which ſhews the lineaments of the fir-tree wood, and has been originally either that or ſome wood of a like kind.

Elatites was alſo a name uſed by the ancients for an iron ore, eſteemed a ſpecies of hæmatites: it was of a yellowiſh white colour, and was more uſually called xanthus.

ELATIUM, in *Ancient Geography*, a town of Decapolis, between Jordan to the weſt and Philadelphia to the eaſt, towards the confines of Arabia Deſerta; 90 miles from Damas and as far from Petra. Pliny mentions this town.

ELATMA, in *Geography*, a town of Ruſſia, in the government of Tambof, on the Occa; 132 miles N. of Tambof. N. lat. 55° 2′. E. long. 41° 42′.

ELATOSTEMA, in *Botany*, from ελατος, *elaſtic*, and ϛημα, *the ſtamen of a plant*. Forſt. Gen. t. 53. Juſſ. 403. (Procris; Commerſon MSS. Juſſ. 403. Willd Sp. Pl. v. 4. 344. Poiret in Lamarck Encycl. v. 5. 627. tab. 763. f. 2?) A genus of plants referred by ſubſequent writers to *Dorſtenia*, for Juſſieu and Willdenow were not aware of *Procris* being preciſely the ſame genus as Forſter's *Elatoſtema*. How truly all the ſpecies comprized under both are really *Dorſteniæ*, we have not materials ſufficient to determine. Their habit is more cauleſcent than the original ones, leaves undivided, lanceolate, or oblong, alternate, on ſhort footſtalks. Flowers in lateral round heads, having in one ſpecies, *Procris cephalida* Willd. 346, evidently the habit, ſtructure, and ſeeds of a *Dorſtenia*, but in others, *P. fagifolia* and *maculata*, more the appearance of a compound flower with an imbricated calyx, and ſcales between the florets. Theſe latter ſpecies, however, do not agree with either Forſter's or Commerſon's generic deſcription. Poiret has referred to *Procris* ſeveral plants ſtill more generically diſtinct.

ELATRIA, in *Ancient Geography*, a town of Greece, in Theſprotia, a country of Epirus, ſituated at the mouth of the Aphas, in the lake of Ambracia.

ELATUM, a river of Greece, in Arcadia; the *Elaphus* of Pauſanias.

ELATUS, a mountain of the iſland of Cephalonia. Pliny.

ELAVER, a river of Gaul; the modern Allier.

ELAY, in *Geography*, a river of Wales, in the county of Glamorgan, which runs into the Briſtol channel, near Penarth point.

ELBA, Elbe, *Elve*, an iſland of Italy, which, with the neighbouring iſlands of Capraja, La Pianoſa, Palmajola, and Monte Chriſto, was added to the territory of France on the 26th of Auguſt, 1802, by right of conqueſt, and forms now a ſeparate department, adminiſtered by a commiſſary general and a council of adminiſtration.

The iſland of Elba is ſituated in the Mediterranean ſea, between the Etrurian or Tuſcan coaſt, from which it is ſeparated by a channel, 20 kiliometres, or about 12 Engliſh miles in breadth, and the iſland of Corſica, which is 50 kiliometres, or about 30 Engliſh miles diſtant from its ſhore. It ſhape is nearly triangular; its territorial extent 95 kiliometres, or about 20 leagues; and its chief towns are Porto Ferrajo, Porto Longone, Capolibri, Rio, Marciana, and Campo.

The climate of the iſland of Elba is milder than that of Etruria or Tuſcany, on account of the ſea breezes, which moderate its heat; and ſuch is the influence of this climate, that although but 12 miles diſtant from the Tuſcan coaſt, the ſoil produces plants and fruits which do not grow in Tuſcany.

There is no river in the iſland, but it has a conſiderable number of ſprings. The Rio is the principal brook by which it is irrigated; it has its ſource near the town of Rio, flows through the celebrated mine alſo known by the ſame name, and after a courſe of a kiliometre runs into the ſea. It is chiefly remarkable for the abundance of its waters; in its ſhort progreſs it ſets eighteen different mills in motion, and what is very extraordinary, the volume of its waters is increaſed and diminiſhed with the length of the days; at the ſummer ſolſtice, when other brooks are almoſt dried up, its ſtream is conſiderable.

The iſland of Elba is covered with high mountains, which offer a rich and ſpontaneous vegetation of multifarious odoriferous plants and ſhrubs, by which the atmoſphere is perfumed. There are, however, a few extenſive plains, of which that of Lacona is the principal. It opens a wide field to agricultural ſpeculations, as the leaſt labour would render it uncommonly fertile.

Grapes, which are plentiful, are converted into a wine reſembling that of Spain; there is alſo a great abundance of figs and olives, Turkey corn, peaſe, and beans, but little wheat. The trees which thrive beſt are the cork tree, the green oak, the lemon tree, the orange tree, and all the fruit trees of Europe except the apple tree; it is, however, ſuppoſed that the latter would thrive in the northern part of the mountains. Melons, particularly thoſe known by the name of *Paſtèques*, are excellent.

Notwithſtanding the beauty of its climate and the fertility of its ſoil, the iſland of Elba is moſtly unimproved by tillage. Paſtures are ſcarce; there are no cattle reared, and there are very few horſes and mules. Wood, owing to the careleſsneſs of the inhabitants, is likewiſe ſcarce; pines, oaks, and other trees, would grow in the mountains, which are covered with a luxurious vegetation of various ſhrubs. And, notwithſtanding the many flowers and odoriferous plants that cover the iſland, there are no bees. At the foot of the town of Porto Ferrajo is a ſalt work, but its harbour has a dangerous entrance; many more might be eſtabliſhed in other parts of the iſland.

Nature appears to have heaped together all the treaſures of mineralogy in the iſland of Elba. It has mines of gold, ſilver, copper, iron, magnet, lead, ſulphur, vitriol, and quarries of marble, granite, ſlate, and others. But it is its iron, and chiefly the iron mine of Rio, which conſtitutes its principal riches. According to letters written at Vienna in 1780, on the natural hiſtory of the iſland of Elba, by Mr. Henry Koeſtlin to the Count de Borch, this ſmall iſland ſupplied Corſica, Genoa, Tuſcany, the Papal dominions, and part of the kingdom of Naples, with iron from the ſingle mine of Rio, which afforded the prince of Piombino, to whom the iſland belonged at that time, an annual revenue of nearly 50,000 crowns. The mines are now farmed, and produce annually 500,000 livres to the French government.

The moſt important branch of induſtry next to the mines is the Tunny fiſhery, which is extremely productive; and as its veſſels are now protected againſt the Algerine pirates by the French flag, the commerce of the iſland muſt be benefited by this circumſtance; its ſituation renders it, at leaſt, a moſt important ſtation for the French trade in general.

The whole population of the iſland of Elba amounts to 12,250 individuals; the electoral aſſembly is compoſed of 60 members. It contains three cantons, Porto Longone, Porto Ferrajo, and Marciana, and ſeven communes. Porto Longone is ſo called from the harbour, which is long and narrow, and is divided into the Upper and Lower Towns. The latter lies on the ſhore of the harbour, and the former contains a citadel on the ſummit of the hill. There is at Porto Ferrajo a court of juſtice, conſiſting of ſeven judges. Near this town, on a ſteep rock, ſtands the tower of Voltarajo, which can be reduced only by famine.

During the war, which ended at the peace of Amiens, the iſland of Elba was a long time occupied by the Engliſh; who, from this ſtation, ſucceſsfully annoyed the trade of their enemies in the Mediterranean ſea by their numerous cruizers. Herbin. Statiſtique de la France.

ELBE, a ſmall town of France, in the department of Lot and Garonne; ſix miles W. of Villefranche.

Elbe, in Latin *Albis*, and in the Bohemian language *Labe*, is one of the moſt conſiderable and important rivers in Germany. It has its ſource on the confines of Bohemia and Sileſia, in that part of the Carpathian mountains which is called the *Rieſengebürge*, or the Giants' Mountain, where the Oder and the Viſtula likewiſe take their riſe at an inconſiderable diſtance from each other. Its courſe is at firſt through Bohemia, where it receives the river Moldau above Melnick. It begins to be navigable at Leutmeritz, above which place it receives the river Eger, which comes from the Fichtelberg in Franconia. Leaving Bohemia, the Elbe enters the kingdom of Saxony, paſſes by Dreſden, and in the principality of Anhault Deſſau receives the Mulde not far from Deſſau; in the duchy of Magdeburg, it receives the Saale above Barby, flows afterwards through part of the German dominions of the king of Pruſſia, where, near Werben, not far from Havelberg, it receives the Havel, which communicates with the Oder by means of the Spree, through Berlin. The Elbe then purſues its courſe through the confines of the duchies of Luneburg and Mecklenburg Schwerin, where it receives the Elmenau, up to Hamburg, in the neighbourhood of which it divides itſelf into ſeveral branches that form ſeveral iſlands: but uniting its waters again below Hamburg, it divides Hanover from Holſtein, receives the Stör below Glückſtadt, and about one hundred Engliſh miles farther runs at laſt into the North ſea, not far from the iſland of Heiligeland or Heligoland. At its mouth, as well as in its courſe, particularly below Cuxhaven, which may be conſidered as the port of Hamburg, the Elbe forms ſeveral ſmall iſlands, and has many ſand-banks, which render its navigation extremely difficult.

The principal places whoſe commerce is animated by the Elbe, are Dreſden, Lauenburg, Magdeburg, and Hamburg. The inland commerce of that great emporium of Germany by means of the Elbe was very conſiderable, before the occupation of Hanover by the French cauſed that fine river to be blockaded by an Engliſh ſquadron; it was, indeed, more extenſive than the commerce of the Rhine, or of any other river in Europe, although it laboured under ſeveral reſtrictions and inconveniences, ariſing from an exceſſive number of tolls, extravagantly high duties, and abſurd ſtaple privileges, ſuch as that of Magdeburg, where all veſſels, not under Pruſſian colours, or not laden with Pruſſian produce, were obliged to unload, and to re-ſhip their goods in Pruſſian veſſels, three hundred of which were employed by Magdeburg alone; and beſides this detention and loſs of time, goods ſent, for inſtance, from Pirna in Saxony to Hamburg had not leſs than thirty-two tolls to pay. Well might an old Engliſh chronicler ſtyle the German tolls "Mira inſania Germanorum." (Wicke's Chron. ad annum, 1260.) How far the newly created kingdom of Weſtphalia, through which the Elbe now flows in its progreſs from the kingdom of Saxony towards Hamburg, is likely to be influenced by more liberal maxims of commerce, and whether the circumſtance of both the new kings being members of the confederacy of the Rhine will lead to the adoption of leſs confined views of policy, it is impoſſible to conjecture: but the Elbe certainly appears deſtined to convey the principal commerce of Europe at ſome future period. The inland communication from Hamburg, by means of this river, extends from the weſtern and northern extremity of Germany, through the kingdoms of Weſtphalia and Pruſſia, to Auſtria, and the interior of Ruſſia, and even down the Dneiper to the Black ſea.

Many years ago, a canal was projected between the Elbe and the Weſer, to tranſport goods from Bremen to Stade, and ſo on to Hamburg. A ſluice was built at Stade: but from the nature of the ſoil the canal itſelf was found impracticable. However, the Elbe might eaſily be made to communicate with the Danube by the Moldau, which again might be connected with the Rhine, by either the Mayn or the Necker. (Oddy's European Commerce).

Elbe, a river of Germany, in the circle of the Upper Rhine, which runs into the Eder, two miles S.S.E. of Fritzlar, in the county of Waldeck.

ELBEDOUI, a town of Arabia, in the country of Yemen; 14 miles S. of Abu Ariſch.

ELBENAU, a ſmall town of the kingdom of Saxony, in that part which was formerly called the Electoral circle, (Churkocis) with a royal hunting ſeat. Together with the town of Gommern it conſtituted, in ancient times, the burggraviate of Magdeburg, which was a diſtinct province from the biſhopric of Magdeburg, which was ſecularized in favour of the electors of Brandenburg, by the title of a duchy, and now forms a valuable part of the new kingdom of Weſtphalia.

ELBERFELD, or **Elverfeld**, a town of Germany, in the grand duchy of Berg, which, ſince the late acceſſion of Joachim Murat to the throne of Naples, has been annexed to France. It is ſituated on the Wipper, 18 miles E. of Duſſeldorf. The new town, which is called Gemark, is remarkable for the beauty of its buildings. Its principal manufactures, which are very flouriſhing, are thoſe of linen cloth, thread, and thimbles. There are alſo ſome coal mines in its neighbourhood. Elberfeld counts 8700 inhabitants. It has 2500 weaver-looms, and 100 bleaching grounds; theſe laſt alone employ 700 individuals.

ELBERT, a county of America, in the Upper diſtrict of Georgia, between Tugulo and Broad rivers; the S.E. corner of the county is at their confluence, where ſtands the town of Peterſburgh. On the N.W. it is bounded by Franklin county. It is divided into 17 townſhips, and contains 10,094 inhabitants, of whom 2816 are ſlaves.

ELBERTON, a town in the above county, in which are the poſt-office and the ſeat of juſtice; 23 miles N.W. of Peterſburg.—Alſo, a poſt town of Effingham county, in the ſtate of Georgia, on the N.E. bank of Ogeechee river; about 19 miles W. of Ebenezer, 48 N.W. of Savannah, and 55 S.E. of Louiſville.

ELBEUF, a ſmall town of France, in the department of the Lower Seine, chief place of a canton in the diſtrict of Rouen, ſituated on the river Seine, 12 miles ſouth of Rouen, and 78 miles N.W. of Paris, with a population of 5400 individuals. It is particularly remarkable for its manufacture of woollen cloth, which was eſtabliſhed here under the adminiſtration of Colbert in 1666 by two Proteſtant gentlemen of the name of Le Monnier and Le Cointre, who, during the religious perſecutions, carried this manufacture to Holland. They were, however, replaced by Catholic manufacturers; the number of whom, in 1686, amounted to 28.

In 1687 Elbeuf made 3443 pieces of cloth.
1696 - - 5538
1750 - - 18.771
1768 - only 14,059

And this manufacture has declined ever ſince, and its decline has been much more ſenſible after the revolution of 1789. The canton of Elbeuf contains eight communes, and 16,096 inhabitants, upon a territorial extent of 50 kiliometres.—Alſo, a ſmall town of France, in the department of Eure, 18 miles N. of Andely, with a fine caſtle.

ELBING, a conſiderable town of Pruſſia, in the circle of Marienburg, on the river Elbing, near a bay of the Baltic ſea, called the Friſche Haff. N. lat. 54° 12′. E. long. 20°, in a very fertile diſtrict; 36 miles S.E. of Dantzick, 120 miles N. by W. of Warſaw. Its origin dates from the year 1239; its firſt inhabitants were a colony from Lubeck; and Elbing was in the Hanſeatic league till the end of the 16th century. The fortifications have been demoliſhed ſince the town was ceded to Pruſſia by Poland, in the year 1772. The population in 1802 amounted to 19,200 individuals, without the garriſon, but has probably been reduced by the diſaſtrous war which terminated in the peace of Tilſit in 1807.

The trade of Elbing has always been conſiderable. From 1577 to 1660, there was an Engliſh trading ſociety at Elbing, which owed its diſſolution to political circumſtances. But it is chiefly from the year 1772, that its commercial importance had been progreſſively increaſing till 1806. Capital warehouſes have been erected in an iſland formed by the river Elbing and a moat. The corn warehouſes alone hold 30,000 laſts; and the cuſtom-houſe, which is in the ſame ſituation, keeps all goods that arrive by ſea from Pillau, at a moderate rent, till they are diſpoſed of. At the end of 1803, the ſhipping conſiſted of 7110 tons, beſides 50 coaſters and 25 lighters, which take cargoes to the ſhips loading at Pillau, diſtant about 50 miles. Veſſels of 100 tons may come up to Elbing and load the greateſt part of their cargoes at the warehouſes. But the trade with fir timber, deals, and ſtaves, is trifling, in compariſon with that of Dantzick. Flax is the principal article of exportation. Elbing has alſo a ſhare of the tranſit trade to the Ruſſian and Auſtrian provinces.

Elbing has an extenſive manufacture of ſoap, one of tobacco, two of weed-aſhes, two of ſtarch, a ſugar-houſe, and a ſaw-mill for cutting deals. The diſtrict of Elbing includes ten pariſhes. Oddy's European Commerce.

ELBINGERODE, or ELVELINGERODE, *Elvenigerode*, *Eilgerode*, a handſome town of Germany, in the principality of Grubenhagen, which formed part of the electorate of Hanover, is ſituated on a rivulet called the Bode, or Bude, in the Hercynian foreſt, in German the Hartz; 7 miles of Blankenburg, 5 of Wernigerode, and 15 S.W. of Halberſtadt. Its origin dates from the year 1189: but the oldeſt record which mentions Elbingerode as a walled town is of the year 1571. The walls, however, have long ago been deſtroyed. The number of houſes, which are moſtly new and handſome, having been almoſt all re-built, after a dreadful conflagration that conſumed the town on the 17th of May, 1753, amounts to 400. It contains 2500 inhabitants.

The diſtrict of Elbingerode is nearly ten miles long, and five miles broad. It abounds with wood and excellent paſtures; but is chiefly remarkable for its iron mines, two warm ſprings, quarries of marble and ſlate, and ruins of four ancient caſtles, one of which, called the Königſburg, was a hunting ſeat of the kings and emperors of Germany of the houſe of Saxony.

ELBOCORIS, or ELCOBORIS, a town of Spain, in the interior of Luſitania.

ELBONTIS, a town of Africa, between Egypt and Cyrene.

ELBOW, in *Anatomy*, is the joint formed between the humerus, radius, and ulna. See EXTREMITIES.

ELBOW is alſo uſed by the architects, maſons, &c. for an obtuſe angle of a wall, building, or road, which diverts it from its right line.

ELBOW *in the Hawſe*, in *Sea Language*, denotes a particular twiſt in the cables, by which a ſhip is moored.

ELBOW *Iſland*, in *Geography*, an iſland in the north-weſtern part of lake Superior, in Upper Canada, which lies to the N.E. of the grand Portage, and W. of iſle Maurepas.

ELBUGA, a river of Ruſſia, in the government of Caucaſus, which runs into the Kagalinſk; 12 miles E. of Azoph.

ELBURG, or ELBURCH, a town of Guelderland, ſeated on the eaſtern ſhore of the Zuyder ſea; 34 miles N.N.E. of Utrecht. N. lat. 52° 28′. E. long. 5° 27′.

ELCESAITES, HELCESAITES, or *Elceſaians*, as Theodoret calls them, ancient heretics, thus denominated from their great prophet Elceſai.

This Elceſai, by others called Elxai, was a Jew, attached to the worſhip of one god, and full of veneration for Moſes, who lived in the time of Trajan, and corrupted the religion of his anceſtors, by blending with it a multitude of fictions drawn from the oriental philoſophy; pretending alſo, after the example of the Eſſenes, to give a rational explication of the law of Moſes, he reduced it to a mere allegory. He is likewiſe ſaid to have adopted the ſentiments of the Ebionites, with regard to Jeſus Chriſt; though he altered and reformed them in ſome things, to denominate himſelf the author of a ſect.

His fundamental doctrines were, that Jeſus Chriſt, who was born from the beginning of the world, had appeared from time to time under diverſe bodies; that he was a celeſtial power, or virtue, called *the Chriſt*, whereof the Holy Spirit was ſiſter (note the Hebrew word for *ſpirit* is feminine); and that both of them had deſcended into Jeſus, the ſon of Mary, who was clothed with a corporeal appearance, but not with a real body.

The Elceſaites, according to St. Epiphanius, were by ſome alſo called *Sampſeans*, from the Hebrew word *ſames*, *ſun*. Scaliger was notoriouſly miſtaken, in holding that Elxai was no more than Eſſai, or Eſſene; on which ſuppoſition he made the Elceſaites the ſame with the ſect of Eſſenes, which is contrary to all antiquity.

Origen makes mention of the Elceſaites, in one of his homilies, as a hereſy newly riſen. The retainers hereto, ſays he, do not admit all the books of the canon, but only ſome of them; they allow ſome paſſages out of the Old Teſtament and the Evangeliſts, but reject all the Epiſtles of St. Paul. Add, that they have produced a book, which they pretend deſcended to them from heaven: and maintain, that whoever perform what is enjoined therein, ſhall obtain pardon of all their ſins. See Euſebius, Hiſt. lib. vi. cap. 38, who remarks, that this hereſy became extinct almoſt as ſoon as it aroſe.

St. Epiphanius is very full on the ſubject of this ſect. Hær. 19, where he obſerves, that Elxai was a Jew by birth; and that, not being able to live according to the law of Moſes, he invented new opinions, and gained followers. He was a profeſſed enemy to virginity, and obliged all, who followed his doctrine, to marry. He tutored them to hypocriſy in times of perſecution; pretending it was lawful to adore idols, provided the heart had no ſhare therein.

Some have doubted whether the Elceſaites ſhould be reckoned among the Chriſtian, or Jewiſh ſects; for though they acknowledged Chriſt as a great king, it is not certain whether they meant Jeſus Chriſt, or ſome other pretended Meſſiah.

ELCESIUM, in *Ancient Geography*, a town of Sicily. Ptolemy.

ELCHE, in *Geography*, a town of Spain, in the province of Valencia, in the midſt of plantains and olive-trees. The palm-trees, about the month of May, are loaded with fruit, in pendant cluſters, which, forming a complete circle, reſemble, when ripe, a crown of gold, with a plume of feathers riſing from its centre. Each cluſter, ſays Mr. Townſend, (Travels, vol. iii.) would, to appearance, nearly fill a buſhel, and is ſaid to weigh from ſix to ten arrobas. Elche is divided into three pariſhes, and contains 17,400 perſons. The great church is a beautiful building, with a majeſtic dome, and is elegantly fitted up. This city, which was the "Ilici" of the Romans, and may not be improperly denominated the "city of dates," from the palms that ſurround it, belongs to the count of Aldamira. It is governed by his corregidor, four regidors, as many deputies from the commons, two alcaldes, and one alguazil mayor. The ducal palace is ſituated on the brink of a deep ravin, and bears the marks of the moſt remote antiquity. It was recovered from the Moors by Peter, ſurnamed the Cruel, A. D. 1363. Elche is diſtant four or five leagues S.W. from Alicant. Its environs abound in wine and fruit.

ELCHINGEN, originally *Aichlingen*, formerly a rich imperial abbey of Germany, on a high mountain cloſe by the Danube, ſurrounded on all ſides by the territory of Ulm. At the peace of Luneville it was ſecularized and given as an indemnity to the king of Bavaria. It is from this place that the French marſhal Ney takes his new title of duke.

ELCOSIS, or HELCOSIS, from ἕλκος, *an ulcer*, ſometimes alſo *elcoma*, or *helcoma*, terms ſynonymous with *exulceratio*. Sauvages uſes the word *Elcoſis* as the generic title; and the ulcerations which occur in ſmall-pox, ſyphilis, ſcrofula, &c. conſtitute the ſpecies. See Noſol. Meth. claſs X. gen. 27.

ELDA, in *Geography*, a town of Spain, in the province of Valencia; 20 miles W.N.W. of Alicant.

ELDAGSEN, or ELDAGSHAUSEN, a town of Germany, in the circle of Lower Saxony, and principality of Calenberg; 16 miles N.E. of Hameln.

ELDANA, in *Ancient Geography*, a town of India, on the other ſide of the Ganges.—Alſo, a town of Spain, in the Tarragoneſe territory, in the country of the Vaccæans. Ptolemy.

ELDEN HOLE, in *Geology*, a natural cavern in Derbyſhire, about three miles from Caſtleton, and four from Buxton, is juſtly conſidered one of the wonders in the peak. And a writer, who gives a deſcription of it from an actual ſurvey, near a century ago, properly obſerves, "would former writers have been content with one wonder inſtead of ſeven, it would have done more honour to the peak, than the adding the ſix imaginary miracles to it, that had nothing in them; and which really depreciated the whole." Indeed, the character anciently given of three will all apply to this;

> "Mira alto pecco tria ſunt, barathrum, ſpecus, antrum."

And it may be added, if a modern traveller, who has given an account of this geological curioſity, had not been impoſed upon by the deſcription of thoſe fond of the marvellous, his work would not have been the leſs valued by thoſe who have too much good ſenſe to become the dupes of credulity. Elden Hole is a large, deep, perpendicular chaſm in the limeſtone ſtrata of a hill, which forms part of the elevation termed the *peak*; and from the difficulty which has attended the attempts to aſcertain its real depth, and the variation in the accounts, it has been reckoned unfathomable, or, what is vulgarly termed, without a bottom. From the buſhes, brambles, and projecting maſſes of ſtone which encumber the margin of the aperture, it is not eaſy to obtain a proper ſtation to plumb it with accuracy. More than a century ago, Mr. Cotton affirmed, that, after letting down 884 yards, he was unable to reach the bottom; the plummet ſtill drew, and the line, when drawn up, appeared to have paſſed through deep water. According to this ſtatement, it muſt have been near half a mile in depth. Another gentleman let down a line 933 yards, without diſcovering a bottom. From a probable ſuppoſition, that in all theſe inſtances the plummet might have been unſkilfully uſed, recourſe was had to another mode of diſcovering its depth. Stones were ſeverally let fall into the cavern, and the time, as accurately obſerved from the delivery out of the hand, till the reverberated ſound from the bottom of the abyſs reached the ear, was $9'\ 11''\ 10'''$. Allowing, therefore, with Dr. Halley, that ponderous bodies fall ſixteen feet and a half in one minute, and the velocity of ſound to be 1142 feet *per* ſecond, it will follow, from the compound equation of the deſcending body, and the aſcending ſound, that the depth of the cavern is 1266 feet, or 422 yards. Dr. Snort again tried to aſcertain the truth of this reſult, by plumbing from ſeven different ſtations, from ſix of which he could only ſink the plummet 192 yards; but from the ſeventh, after repeated trials, it ſunk 295 yards, forty of which the line appeared to have paſſed through water. Thus, has the depth been diminiſhing by the repetition of inveſtigation, as the marvellous part of it has been abating, by the extenſion of ſcience. An account of a perſonal deſcent, by Mr. Lloyd, into this fiſſure is given in the ſixty-firſt volume of the Philoſophical Tranſactions: which, as it appears to be a plain unexaggerated deſcription of this celebrated place, may be acceptable to ſuch as might not chooſe to gratify their curioſity, or inform their judgment, by a perſonal ſurvey of this ſubterraneous cavern, "this terrific profound abyſs of ſpace and horror." The entrance into Elden Hole conſiſts of a fiſſure in length from north to ſouth about thirty yards, and nine wide. The deſcent was for twenty yards in an oblique direction, when the aperture of the fiſſure contracted, and the paſſage became narrower, and more difficult from lateral projecting crags. Ten yards beneath this the rope, by which Mr. Lloyd was ſuſpended, inflected full ſix yards from the perpendicular, and at this depth the length of the opening appeared about ſix, and the breadth three yards. The ſides were very irregular, covered with various moſſes, and dripping continually with water. When he had deſcended forty-eight yards, the rock opened on the eaſtern ſide ; and at ſixty-two yards he ſwung to the floor of the cave. The light he deſcribes as ſufficient to ſee to read the ſmalleſt print ; and by means of which he was enabled to explore the interior of the cavern. This conſiſts of two parts ; the one cavity being like a large oven, and the other ſimilar to the dome of a glaſs-houſe, with a vaulted communication between them. The largeſt is about fifty yards in diameter, and the height too great for aſcertaining with facility. At the entrance is a grand ſtalactitical column, ninety feet in height. To the ſouth of the ſecond cavity is a third ſmaller hole twelve feet long, and ſix feet wide, beautifully ceiled with gold-coloured ſtalactites : to the north is another ſmall hole, and a large fragment of rock ſpangled with a ſimilar ſubſtance. From the margin of the ſecond cavern projects a large maſs of rock covered with ſtalactites, and ſhaped like a buttreſs. The cavern, ſixty feet in height, is internally craggy, and lined with ſtalactitical concretions ; ſome of which hang from the roof, like pendent drops and icicles, from four to five feet long, and two in diameter. In different directions are ſeveral columns with incruſtations, covering the lime-ſtone like a party coloured varniſh ; the firſt a deep yellow, the ſecond a ſtone colour, and the third a rough effloreſcence in the ſhape and colour of roſes. Such are the particulars of this extraordinary cavern, as delivered by Mr. Lloyd, and the account as to the depth of it is confirmed by ſeveral miners, who have ſince deſcended for the purpoſe of aſcertaining it. What was the cauſe of ſuch a cavernous ſpace, or by what convulſive throes of earth ſuch fiſſures as this have been made in the moſt ſolid parts of the ſtrata, has exerciſed the ingenuity of the moſt able philoſophers. Some have contended that they are viſible demonſtrations of the univerſality of the deluge, and of the globe having been in a ſtate of ſolution and mixture. And an advocate for this theory in its *fulleſt extent*, Mr. Catcott, conſiders them as *ſwallet holes*, by which the waters, which for the purpoſe of drowning the world had been brought from the great abyſs at the centre of the earth, again retreated at its reformation. But one queſtion does not appear to have been anſwered by the advocates of this ſyſtem. For if, as they ſtate, the power of gravity were removed, ſo that the whole ſubſtance of the globe was in a ſtate of ſolution and intermixture ; how came theſe fiſſures to remain ? or be again formed in the ſolid rocks, when the power of gravity had been reſtored ? Another, but equally improbable account, has been given as a ſatisfactory one. " This cavern ſeems to have been occaſioned by ſome *ſhake*, as it is here provincially termed, or depreſſion of the earth, effected by the force of water. When the ſubterraneous paſſage, which carries off the circulating water from theſe inviſible caverns, is plugged up, ſo that its vent is ſtopped, being an incompreſſible body ; and the impinging weight of ſeveral columns of the ſame fluid are added to the prodigious preſſure, they will force a new vent in ſome direction, and having lifted up the ſuperincumbent earth and once got vent, leave the earth to ſubſide wherever it may." The language of this account is philoſophical, but the reaſoning is unſatisfactory. For as theſe ſhakes, or caverns, are obſerved to exiſt in the drieſt parts of the earth, in indurated rocks ; and almoſt invariably in lime-ſtone ſtrata, a ſubſtance of eaſy ſolubility in water ; a ſimple mode of accounting for ſuch fiſſures inſtantly preſents itſelf, only admitting that at ſome period or other theſe parts of the globe were once ſubmerged, or that " the waters once prevailed over the earth." Nature is ſimple in her energies, and though ſhe exhibits infinite variety, yet a conſtant analogy prevades the whole of her operations. Theſe fiſſures evidently appear to have been formed at the departure of the waters, in the time of ſome deluge, by the ſudden abſorption of moiſture, and condenſation of the derelict matters ; the ſubſtances of ſuch rocks in which they are found exhibiting, by the marine exuviæ imbedded in them and other extraneous matters, that they have once been in a ſtate of ſolution. This is clearly evinced by a fact, which often takes place in modelling, to the great annoyance of the artiſt ; when the ſubſtances under his plaſtic hand, by a too ſudden evaporation of the aqueous particles, crack in various directions : or as is more viſibly exemplified in lands compoſed of argillaceous ſoils, where the ground, after great or ſudden drought, is ſeen to crack, and exhibit clefts or crannies of conſiderable length, breadth, and depth. This ſimple and eaſy ſolution of the phenomenon accords with any theory, in which the earth is ſuppoſed to have been once covered with water. But reſpecting Elden Hole it appears, whether naturally or artificially made, to have been once a mine. For in the floor of the largeſt cavern is a ſhaft now covered, which once reached to the water ; and is by ſome ſuppoſed to be a continuation of the ſubterraneous river, which runs out of the cave at Caſtleton, and there diſcharges a kind of grit only found in Elden Hole.

ELDER, a word uſed in ſome parts of the kingdom for fuel. Dict. Ruſt.

Elder *Tree*, in *Botany*. See Sambucus.

The common elder will grow on any ſoil, or in any ſituation ; the trees are frequently ſeen growing out of old walls, or cloſe to ditches, in very moiſt places, or from the hollow of another tree ; for wherever the ſeeds are ſcattered, the plants will come up. The leaves and ſtalks are ſo bitter and nauſeous, that few animals will browſe upon them

The young ſhoots of this tree are very full of pith ; but as the trees grow old, the wood becomes very hard, and will poliſh almoſt as well as the box-tree ; and is often uſed for the ſame purpoſe.

The bark, leaves, flowers, and berries of this tree, are uſed in medicine. The inner bark is eſteemed good for dropſies. Sydenham directs three handfuls of the inner bark to be boiled in a quart of milk and water, till only a pint remains, of which one half is to be taken in the morning, and the other at night ; and this repeated every day. Boerhaave recommends the expreſſed juice of the middle bark, given from a dram to half an ounce, as the beſt of hydragogues, when the viſcera are ſound. The leaves, which are ſaid to be purgative and emetic, are outwardly uſed for the piles and inflammations. The flowers are inwardly uſed to expel wind ; infuſions made from them while freſh are gently laxative and aperient ; when dry, they are ſaid to promote the cuticular excretion, and to be particularly ſerviceable in eryſipetalous and eruptive diſorders ; and the berries are eſteemed cordial, and uſeful in hyſteric diſorders ; and are frequently put into gargariſms for ſore mouths and throats. Miller and Lewis.

Officinal preparations of the elder, are the aqua florum ſambuci, the oleum ſambucinum, the unguentum ſambucinum, made of the leaves and inner bark, and alſo of the flowers, and the ſyrupus ſambuci. See Sambucus.

On the trunk of this tree frequently grows a fungous excreſcence, wrinkled, and turned up like an ear, whitiſh on the outſide, and black within, with ſeveral little veins. Theſe are called Jew's ears, auriculæ Judæorum ; they are accounted good for inflammations and ſwellings of the tonſils, ſore throats, and quinzies.

Elder, *Marſh*, or *Water*. See Viburnum.

ELDERS, Seniors, in the *Jewiſh Hiſtory*, were the moſt conſiderable perſons, for age, experience, and virtue, among that ancient people; probably the heads of tribes, or rather of the great families of Iſrael, who, before the ſettlement of the Hebrew common-wealth, exerciſed government and authority over their families, and the people. Moſes, we read, aſſembled the elders of the people together, and acquainted them with what the Lord had commanded. (Exod. xii. 16. 21. iv. 29, &c.) Moſes and Aaron treat the elders of Iſrael as repreſentatives of the Jewiſh nation. The number of theſe elders was 70; but we may ſuppoſe, that as there were 12 tribes, there were 72 elders, 6 of each, and that 70 is ſet down inſtead of 72; or rather Moſes and Aaron made the 71ſt and 72d, and excluſively of them, there were but 4 elders of the tribe of Levi. This eſtabliſhment of 70 elders by Moſes ſeems to have continued, not only during his life, but under Joſhua likewiſe, and under the Judges.

Long afterwards, thoſe who held the firſt rank in the ſynagogues were uſually called זקנים, *zekenim*, *elders*, in imitation of the ſeventy elders, whom Moſes eſtabliſhed for the judges of the ſanhedrim. Numbers xi. 16, 17. 24, 25. Exod. xxiv. 1. 9. 14. See Sanhedrim.

The preſident, or chief, had, in a particular manner, the appellation of elder; being, as it were, the *decanus ſeniorum*, dean of the elders.

In the aſſemblies of the primitive Chriſtians, thoſe who held the firſt place or rank aſſumed the denomination of preſbyters, or elders; for the word *preſbyters*, which occurs ſo frequently in the Old Teſtament, and which includes alike both biſhops and prieſts, does properly ſignify elders. See M. Simon's obſervation thereon, in his Supplement aux Ceremonies des Juifs.

The preſident, or biſhop, as being the chief of the elders, did likewiſe aſſume the denomination of elder; whence it is, that in the New Teſtament the name biſhop is frequently confounded with that of preſbyter. See Bishop, and Presbyter.

For the like reaſon, the council of the firſt churches was called *preſbyterium*, or council of the elders, where the biſhop preſided in quality of firſt elder, being ſeated in the middle of the other elders. The prieſts, or elders, who ſat by him, had each his judge's chair; for which reaſon they are called, by the fathers, *aſſeſſores epiſcoporum*. Nothing of any importance was done till it had firſt been examined, and reſolved, in this aſſembly, where the biſhop only made one body with the other elders, or prieſts; the juriſdiction which we now call epiſcopal, not being then dependent on the biſhop alone, but on all the elders, over whom he was only the preſident.

Elders is alſo a denomination ſtill retained in the preſbyterian diſcipline.

The elders are officers, who, in conjunction with the paſtors, or miniſters, and deacons, compoſe the conſiſtories, or kirk-ſeſſions, meeting to conſider, inſpect, and regulate matters of religion and diſcipline. They are choſen from among the people, and are received publicly with ſome degree of ceremony. In Scotland, there is an indefinite number of elders in each pariſh; generally about twelve. See Kirk-*Seſſions*, and Presbytery.

EL DORADO, or Manoa, a fabulous region and city, ſuppoſed to exiſt in the Spaniſh dominions of America, abounding with gold, and diſtinguiſhed by a community of Amazons. The late diſcuſſions of Depons concerning this city are of little moment; as it is now known that Manoa only ſignifies a lake or a river; and the name originally belonged to a river, which runs into the Ucaial. See Manoa.

ELDPACH, in *Geography*, a town of Germany, in the archduchy of Auſtria; 6 miles S. of Ips.

ELEA, or Elææ, in *Ancient Geography*, a river of Italy, in Lucania, on this ſide of the Apennine, which gave name to the gulf, called by the ancients "Eleates Portus" and "Eleates Sinus." It is at preſent *Piſciota*.

ELEANOR of Guienne, in *Biography*, queen of France and England, was married in 1137, at the age of fifteen, to Louis VII. king of France, to whoſe dominions her eſtates, as heireſs of William, laſt duke of Guienne, made a very conſiderable addition. She had two daughters by Louis, whom ſhe accompanied to Paleſtine. Her own conduct and intrigues with the prince of Antioch, and with a young handſome Turk named Saladin, led to a divorce, which took place in 1152. In the following year ſhe married Henry duke of Normandy, who ſucceeded to the throne of England, in 1154, under the title of Henry II. Henry, by the poſſeſſions of his wife, became a formidable rival to the French king, who had reaſon ever afterwards to regret the ſeparation for which he had preſſed. From her own indiſcretions Eleanor had been divorced from her firſt huſband, yet ſhe could not overlook ſimilar failings in Henry, and by her jealouſy of fair Roſamond, cauſed much uneaſineſs to the king. (See Rosamond.) Her jealouſy has been called in by hiſtorians to account for the rebellion of her ſons againſt the king, whoſe unnatural conduct has been imputed wholly to her inſtigation. She was at length ſeized, and impriſoned juſt as ſhe was attempting to eſcape to France. In confinement ſhe remained ſeveral years, but on the acceſſion of Richard I. in 1189, ſhe was ſet at liberty, and was, when he went upon his cruſade, made regent of the kingdom. The zeal which ſhe manifeſted for this prince led her to conſiderable exertions on his behalf: ſhe went to Navarre to procure him, for a wife, Berengaria, daughter of the king of the country; and when Richard, on his return from Paleſtine, was impriſoned in Germany, ſhe proceeded thither with a ranſom accompanied by the chief juſticiary in 1194. After his death ſhe ſupported the ſucceſſion of John her ſon, in prejudice of her grandſon Arthur. She died in 1202; though, according to ſome writers, ſhe took the veil this year, at the abbey of Fontevrault, and there finiſhed her buſy and chequered life in the year 1204. Moreri. Hume's Hiſt. vol. i.

ELEATIC Philosophy, among the *Ancients*, a name given to that of the Eleatic ſect, ſo called becauſe three of its moſt celebrated preceptors, Parmenides, Zeno, and Leucippus were natives of 'Ελεα, in Latin Velia, a town in Magna Grecia, built by a colony of Phocæans in the time of Cyrus.

The founder of this philoſophy, or of the Eleatic ſect, is ſuppoſed to have been Xenophanes, who lived about the fifty-ſixth Olympiad, or between five and ſix hundred years before Chriſt. (See Xenophanes.) This ſect was divided into two parties, which may be denominated metaphyſical and phyſical; the one rejecting, and the other approving, the appeal to fact and experiment. Of the former kind were Xenophanes, Parmenides, Meliſſus, and Zeno, of Elea. To the latter claſs belonged Leucippus, Democritus, Protagoras, Diagoras, and Anaxarchus. For the peculiar and diſtinguiſhing tenets of each of theſe philoſophers, ſee their reſpective articles. Of the writings of the Eleatic ſchool, nothing remains except a few fragments collected by Henry Stephens; and therefore we chiefly depend for information concerning this ſect upon the authority of Plato and Ariſtotle. We may here obſerve in general that the philoſophers of the firſt claſs are ſuppoſed to have maintained principles not very unlike thoſe of Spinoza; they held the eternity and immutability of the world; that whatever exiſted was only one being; that there was neither any generation nor corruption; that this one being was immoveable and immutable, and was the true God; and whatever changes ſeemed to happen in the univerſe, they conſidered as mere appearances and illuſions of ſenſe. However, ſome learned men have ſuppoſed, that Xenophanes and his followers, ſpeaking metaphyſically, underſtood by the univerſe, or the one being, not the material world, but the originating principle of all things, or the true God, whom they expreſsly affirm to be incorporeal. Thus, Simplicius repreſents them as merely metaphyſical writers, who diſtinguiſhed between things natural and ſupernatural; and who made the former to be compounded of different principles. Accordingly, Xenophanes maintained, that the earth conſiſted of air and fire, that all things were produced out of the earth, and the ſun and ſtars out of clouds, and that there were four elements. Parmenides alſo diſtinguiſhed between the doctrine concerning metaphyſical objects, called truth, and that concerning phyſical or corporeal things, called opinion; with reſpect to the former, there was one immoveable principle, but in the latter two that were moveable, *viz.* fire and earth, or heat and cold; in which particulars Zeno agreed with him. The other branch of the Eleatic ſect were the Atomic philoſophers, who formed their ſyſtem from their attention to the phenomena of nature. See ATOMIC *philoſophy*, EPICUREANS, and STOICS. See a farther account of the opinions of theſe ancient philoſophers in Cudworth's Intellectual Syſtem, and Brucker's Hiſt. of Philoſ. by Enfield, vol. i.

ELECAMPANE, in *Botany*. See INULA.

The root of the *inula*, or elecampane, has been long famous in all diſorders of the breaſt and lungs. It is alſo recommended as a ſudorific and alexipharmic, and, as ſuch, has a place in moſt of the compoſitions of that intention. Taken freely, it is ſaid to gently looſen the belly, and increaſe the urinary diſcharge. The doſe of the dry root in ſubſtance is from a ſcruple to a dram, or two. An ointment made of the freſh roots and leaves with lard, is alſo much recommended in the itch, and other cutaneous foulneſſes. The roots yield in diſtillation an eſſential oil, which concretes into white flakes, reſembling camphor in many of its properties, and ſoluble in ſpirit of wine. An extract may alſo be obtained from the dry root, both by water and ſpirit; an ounce yielding by water 6½ drams, and by ſpirit 2½.

ELECAMPANE, *Baſtard*. See HELENIA.

ELECAMPANE *Wine*. See WINE.

ELECT, from *eligo*, I chuſe, choſen, in the *Scripture*, is applied to the primitive Chriſtians. In which ſenſe, the elect are thoſe choſen and admitted to the favour and bleſſing of Chriſtianity.

ELECT, in ſome ſyſtems of *Theology*, is a term appropriated to the ſaints, or the predeſtinated. In which ſenſe the elect are thoſe perſons who are ſaid to be predeſtinated to glory as the end, and to ſanctification as the means.

Dr. Taylor, in his excellent Paraphraſe, &c. on the Epiſtle to the Romans (p. 96.) obſerves, that ſome of the expreſſions, whereby the *antecedent* bleſſings are ſignified, (that is, thoſe benefits, which were granted to mankind by the mere grace of God, antecedently to their obedience, and without reſpect to it, but ſo that they were intended to be motives to obedience), ſuch as *elect*, *juſtify*, *ſanctify*, &c. may be uſed in a double ſenſe; namely, either as they are applied to all Chriſtians in general, in relation to their being tranſlated into the kingdom of God, and made his peculiar people, enjoying the privileges of the goſpel, or as they ſignify the *effects* of thoſe privileges, *viz.* either that excellent diſpoſition and character, which they are intended to produce, or that final ſtate of happineſs, which is the reward of it. Wherever any bleſſing is aſſigned to all Chriſtians, without exception; wherever it is ſaid, not to be of works; wherever Chriſtians are exhorted to make a due improvement of it, and threatened with the loſs of God's bleſſing, and of eternal life, if they do not, in this caſe the expreſſions, which ſignify that bleſſing, are to be underſtood in a general ſenſe, as denoting a goſpel privilege, profeſſion, or obligation. And in this general ſenſe, *ſaved*, *elect*, *choſen*, *juſtified*, *ſanctified*, are ſometimes uſed, and *calling*, *called*, *election* are, as this writer conceives, always uſed, in the New Teſtament. But when any bleſſing connotes real holineſs, as actually exiſting in the ſubject, then it may be underſtood in the ſpecial and eminent ſenſe, and always muſt be underſtood in this ſenſe, when it implies the actual poſſeſſion of eternal life: and in this ſenſe *ſaved*, *elect*, *choſen*, *juſtify*, *ſanctify*, *born of God*, are ſometimes uſed. (Matt. xx. 16. xxiv. 31. xii. 36, 37. 1 Theſſ. v. 24. 1 John, ii. 29. iv. 7.) See ELECTION and PREDESTINATION, ARMINIANS, CALVINISTS, &c.

ELECT is likewiſe applied to archbiſhops, biſhops, and other officers, who are choſen, but not yet conſecrated, or actually inveſted with their office, or juriſdiction.

The emperor is ſaid to be elect, before he is inaugurated and crowned; a lord mayor is elect before his predeceſſor's mayoralty is expired, or the ſword is put in his hands.

ELECTARY, in *Pharmacy*. See ELECTUARY.

ELECTI, in *Church Hiſtory*, a ſect of heretics, who neither uſed fleſh nor married. See AUDITORS.

ELECTION, a choice made of any thing, or perſon, whereby it is preferred to ſome other.

There ſeems this difference, however, between *choice* and *election*, that election has uſually regard to a company or community, which makes the choice; whereas choice is ſeldom uſed, but when a ſingle perſon makes it.

We ſay, the election of a biſhop, a member of parliament, &c. See BISHOP, BURGESS, PARLIAMENT, *Scots* PEERS, SHERIFF, &c.

The moſt ſolemn election is that of a pope; which is performed by the cardinals in four different ways. The firſt by the Holy Spirit, as they call it: when the firſt cardinal who ſpeaks, having given his vote for any perſon, proceeds to the adoration, and proclaims him pope, as by a ſudden inſpiration of the Holy Ghoſt. In which caſe he is deemed duly elected, if all, or at leaſt two-thirds of the aſſembly, be conſenting thereto.

The ſecond, by compromiſe, when the whole college pitches on three cardinals, to whom they give a power of nominating the pope; which power expires upon the burning out of a candle lighted on that occaſion.

The third by way of poll or ſcrutiny, which laſt is the moſt uſual; the cardinals throwing ſealed tickets, on which their votes are written, into a chalice, or cup, placed on the altar. Two-thirds of the votes are required to determine an election by ſcrutiny.

The fourth is by way of acceſſion; when the votes being too much divided to elect any body, ſome of the cardinals deſiſt from their firſt ſuffrage, and accede, that is, give their voices to him, who has already the majority by ſcrutiny.

The way of acceſſion, however, is always added to the ſcrutiny; it being the conſtant practice for all the cardinals to give their voices, after the laſt ſcrutiny, to him whom they find to have the plurality already. So that all elections of popes are with the unanimous conſent of all the cardinals. See CARDINALS, CONCLAVE, and POPE.

ELECTION *of numbers*, or *quantities*, in *Arithmetic* and *Algebra*, denotes the different methods of taking any numbers or quantities given, either ſeparately, or in pairs, &c. or it is the ſum of all the combinations that can be made with a different number of quantities, in each ſet of combinations, out of any number of quantities propoſed. Thus, the election of three quantities a, b, c, is 7; a, b, c, ab, ac, bc, abc; of four quantities 15; and if N repreſent the number of quantities given, $2^N - 1$ is equal to the number of elections required; but as the ſingle quantities are equal in number to the given quantities, the number of proper elections will be $2^N - N - 1$. See Combination.

Election *of a clerk of ſtatutes merchant*, in *Law*, a writ that lies for the choice of a clerk aſſigned to take bonds called ſtatutes merchant. It is granted out of chancery, on ſuggeſtion that the clerk, formerly aſſigned, is gone to dwell at ſome other place, or is under an impediment to attend the duty of his office, or that he has not land ſufficient to anſwer his tranſgreſſions, if he ſhould act amiſs. Fitz-Herb. Nat. Brev. 164.

Election *of eccleſiaſtical perſons*. Elections for the dignities of the church ought to be free, according to the ſtat. 9 Ed. II. cap. 14. If any perſons, that have a voice in elections, take any reward for an election in any church, college, ſchool, &c. the election ſhall be void. And if any perſons of ſuch ſocieties reſign their places to others for reward, they incur a forfeiture of double the ſum; and both the parties are rendered incapable of the place. Stat. 31 Eliz. cap. 6.

Election *of a verderor of the foreſt (electione viridariorum foreſtæ)*, a writ that lies for the choice of a verderor, where any of the verderors of the foreſt are dead, or removed from their offices. This writ is directed to the ſheriff, and the verderor is to be elected by the freeholders of the county, in the ſame manner as coroners. New Nat. Brev. 366.

Election, in *Metaphyſics*, is alſo the ſtate of a perſon who is left to his own free will, to take or do either one thing or another, which he pleaſes. See Liberty.

Election, in *Theology*, ſignifies the choice which God, of his good pleaſure, makes of angels or men, for the objects of mercy and grace.

The election of the Jews was the choice God made of that people to be more immediately attached to his worſhip and ſervice, and for the Meſſiah to be born of them.

This grand and gracious deſign of Providence commenced with the ſelection of one family of the earth, to be a repoſitory of true knowledge, and the pattern of obedience and reward among the nations. To this family God particularly revealed himſelf, viſited them with ſeveral public and ſignal diſpenſations of providence, and at laſt formed them into a nation, under his ſpecial protection, governed them by laws delivered from himſelf, and placed them in the open view of the world; firſt in Egypt, and afterwards in the land of Canaan. The head or root of this family was Abraham, who, though he had been an idolater, was ſelected for this important and beneficial purpoſe. Accordingly God eſtabliſhed a covenant with Abraham, and his ſeed, or poſterity after him, and appointed circumciſion as a token of the certainty and perpetuity of this covenant. For about 215 years, from the time when God ordered Abraham to leave his native country, he and his ſon Iſaac, and grandſon Jacob, ſojourned in the land of Canaan, under the ſpecial protection of heaven, till infinite wiſdom thought fit to ſend the family into Egypt, which was then, as it were, the head-quarters of idolatry, that they might there increaſe and become a great nation. At length God delivered them from the ſervitude of Egypt by dreadful diſplays of his almighty power, by which he demonſtrated himſelf to be the one true God, in a ſignal and complete triumph over idols, even in their metropolis, and in a country celebrated among all ſurrounding nations. Thus freed from the moſt humiliating and oppreſſive bondage, he formed them into a kingdom, of which he himſelf was the ſovereign; gave them a revelation of his nature and will, inſtituted ſundry ordinances of worſhip, taught them the way of truth and of life, and ſet before them various motives to duty; promiſing ſingular bleſſings to their obedience and fidelity, and threatening apoſtacy and diſobedience, or revolt from his government, with very awful judgments. Having ſettled their conſtitution, he led them through the wilderneſs, where he diſciplined them for 40 years, cauſed them to triumph over every kind of oppoſition, and at laſt brought them to the promiſed land. It is here to be obſerved, that God did not chooſe the Iſraelites from any partial regard to that nation, nor becauſe they were better than other people, (Deut. ix. 4, 5) and would always obſerve his laws. Indeed, he knew the contrary (Deut. xxxi. 29. xxxii. 5, 6. 15.) It was, indeed, with great propriety, that, among other advantages, he gave them alſo that of being deſcended from progenitors illuſtrious for piety and virtue; and that he grounded the extraordinary favours they enjoyed upon Abraham's faith and obedience (Gen. xxii. 16, 17, 18.) But it was not on account of the moral character of the Jewiſh nation that God made choice of theſe people; any other nation would have ſerved as well in this reſpect; but as he thought fit to ſelect one nation of the world, to anſwer the purpoſes of his all-wiſe and benevolent providence in the moral adminiſtration of the world, he ſelected the Iſraelites, from reſpect to the virtue and piety of their anceſtors. (Exod. iii. 15. vi. 3, 4, 5. Deut. iv. 37.) It ſhould alſo be obſerved, that God ſelected the Iſraelitiſh nation, and manifeſted himſelf to them by various diſplays of his power and goodneſs, not principally for their own ſakes, to make them a happy and flouriſhing people; but to be ſubſervient to his own great and kind deſigns with regard to all mankind. The ſelection of this nation, and the divine diſpenſations reſpecting it, would ſerve as a public voucher of the being and providence of God, and of the truth of the revelation delivered to them in all ages, and in all parts of the world. Accordingly the divine ſcheme, in relation to the Jewiſh polity, had reference to other people, and even to us at this day, as well as to the Jews themſelves. In proof of which we may add, that the ſituation of this nation, lying upon the borders of Aſia, Europe, and Africa, was very convenient for ſuch a general purpoſe. This ſcheme was alſo wiſely calculated to anſwer great ends under all events. If this nation continued *obedient*, their viſible proſperity, under the guardianſhip of an extraordinary providence, would afford very extenſive and uſeful inſtruction to the nations of the earth. If theſe people were *diſobedient*, their calamities and diſperſions would anſwer a ſimilar purpoſe, by ſpreading the knowledge of the true God, and of revelation, in the countries where before they were not known. So wiſely was this ſcheme laid at firſt, with regard to the laws of the nation, both civil and religious, and ſo carefully has it all along been conducted by the divine Providence, that at this day, more than 3600 years from the time when it firſt took place, it is of great importance and of public uſe, for confirming the truth of revelation: not only becauſe the Chriſtian profeſſion, diffuſed over a great part of the world, has grown out of this ſcheme, but as the Jews themſelves, in virtue of it, after a diſperſion of about 1800 years, over the whole face of the earth, every where in a ſtate of ignominy and contempt, have, notwithſtanding, ſubſiſted in great numbers, diſtinct and ſeparate from all other nations. This ſmall nation, generally deſpiſed and hated, haraſſed and perſecuted, has ſubſiſted in a body, diſtinct and ſeparate from all other people, even in a ſtate of diſperſion and of general contempt and oppreſſion, for nearly 1800 years, agreeably to the prediction. (Iſ. xlvi. 28.) Hence we derive a demonſtration, that the wiſdom, which ſo formed them into a peculiar body, and the providence, which has ſo preſerved them, that they have, almoſt ever ſince the deluge, ſubſiſted in a ſtate divided from the reſt of mankind, and are ſtill likely ſo to remain for a longer period, is not human, but divine. For no human wiſdom or power, could form, or, however, could execute, ſuch a vaſt, extenſive deſign.

As God, in his infinite wiſdom and goodneſs, was pleaſed to prefer the Iſraelites before any other people, and to ſingle them out for the purpoſes of revelation, and for preſerving the knowledge, worſhip, and obedience of the true God, he is ſaid to *chooſe* them, and they are repreſented as his *choſen*, or *elect* people. (Deut. iv. 37. vii. 6. x. 15. 1 Kings, iii. 8. 1 Chron. xvi. 13. Pſ. xxxiii. 12. cv. 6. 43. cvi. 5. cxxxv 4. Iſ. xli. 8, 9. xliii. 20. xliv. 1, 2. xlv. 4. Ezek. xx. 5. Iſ. xiv. 1. Zech. i. 17. ii. 12) The firſt ſtep that was taken by the almighty ſovereign, in execution of his purpoſe of election, was to reſcue them from their ſtate of bondage and idolatry in Egypt, with a view to which they are ſaid to be *delivered, ſaved, bought*, or *purchaſed*, and *redeemed*. Moreover, as they were not only reſcued from Egypt, but invited by the Almighty to the honour and happineſs of his people, and by many expreſs declarations and acts of mercy engaged to adhere to him as their God, he is ſaid to *call* them, and they were his *called;* and many other expreſſions occur, which deſcribe not only their deliverance from an oppreſſed condition, but their eſtabliſhment in a more happy, and their inveſtiture with many privileges and honours. All the bleſſings, to which we have already referred, and others of a ſimilar kind which might have been enumerated, were conferred on the Iſraelites, as the elect people of God by his mere grace or free-favour; they were *antecedent* to their obedience, and had no reſpect to it; nevertheleſs, they were intended to be motives to obedience. If they produced this effect, their election and redemption were confirmed; and they were entitled to all the bleſſings promiſed in the covenant ſubſiſting between God and them; which bleſſings, contraſted againſt the former, or conſidered in reference to them, may be called *conſequent:* becauſe they were given only in conſequence of their obedience.

All the honours and privileges pertaining to the Jews as a people elected by God, and aſſigned to the whole body of them, do not import an abſolute, final ſtate of happineſs and favour of *any* kind; but they are to be conſidered as diſplays and inſtances of God's love and goodneſs to them, which were to operate as means of holineſs and motives to obedience. We may further obſerve, that this ſelection of the Jewiſh nation, and their introduction into a peculiar relation to God, was a ſcheme for promoting true religion and virtue in all its principles and branches, upon motives adapted to the rational nature of mankind, which principles and branches of true religion are particularly ſpecified in their law. Nor was this conſtitution in favour of the Jews in any reſpect prejudicial to the reſt of mankind; ſo far otherwiſe, it was erected and maintained for the good of the whole world, and the Jews themſelves were inſtructed and commanded to exerciſe kindneſs and hoſpitality towards thoſe who might be conſidered, with regard to them, as aliens and ſtrangers. However, though the Jews were directed and required to exerciſe benevolence towards perſons of other nations, yet about the time when the goſpel was promulged they were unduly elevated on account of their diſtinguiſhing privileges, looked upon themſelves as the peculiar favourites of heaven, and regarded the reſt of mankind with a ſovereign contempt. Their conſtitution, they were ready to imagine, was permanent and immutable; and thoſe who did not ſubmit to their law, were in their eſtimation unworthy of a place in the church, and unfit for the kingdom of heaven. But the Jewiſh diſpenſation, as they ought to have conſidered, which laſted, if we reckon from the call of Abraham, 430 years before the law was given on mount Sinai, to the coming of Chriſt, about 1921 years, was introductory to another more perfect and more permanent, to be introduced and eſtabliſhed by the promiſed Meſſiah. Accordingly, Abraham, the head, or root, of the Jewiſh nation, is repreſented as the "father of us all," (Rom. iv. 16, 17) Gentiles as well as Jews; and the believing Gentiles are ſaid to partake of all the ſpiritual privileges which the Jews enjoyed, and from which the unbelieving Jews fell; and to be taken into that kingdom and church of God out of which they were caſt. Hence, the ſtate, privileges, and honours, &c. of profeſſed Chriſtians, particularly of the believing Gentiles, are expreſſed by the ſame phraſes with thoſe of the ancient Jewiſh church. Thus, as God *choſe* or *elected* his ancient people the Jews, and they were his *choſen* and *elect;* ſo now the whole body of Chriſtians, Gentiles as well as Jews, are admitted to the ſame honour; as they are ſelected from the reſt of the world, and taken into the kingdom of God, for the knowledge, worſhip, and obedience of God, in hopes of eternal life. (Rom. viii. 33. Eph. i. 4. Col. iii. 12. 2 Theſſ. ii. 13. Tit. i. 1. 2 Tim. ii. 10. 1 Pet. i. 1, 2. ii. 9. v. 13) The ſame and ſimilar expreſſions are applied to Chriſtians under the diſpenſation of the goſpel, which were applied to the Jews under their diſpenſation, and which deſcribed the outward privileges and benefits with which they were inveſted; and in the ſame manner particular nations are *elected* to the participation of the outward bleſſings of Chriſtianity. The advocates of this opinion maintain, that the election, which the apoſtle Paul ſtates and defends in the 9th chapter of the Epiſtle to the Romans, and in ſome other places, is not an election by the abſolute decree and purpoſe of God, to eternal life, but only election to the preſent privileges and external advantages of the kingdom of God in this world; and that reprobation, or rejection, is not that by an abſolute decree to eternal miſery, but that it ſignifies the not being favoured with the forementioned privileges and advantages. To the ſame purpoſe we ſhall here ſubjoin the following paſſage from Mr. Pyle's preface to the Epiſtle to the Romans, cited by Dr. Tomline, the preſent biſhop of Lincoln, in his "Elements of Chriſtian Theology," (vol. ii. p. 304.)

"The errors and vain diſputes," ſays Mr. Pyle, "that have ariſen in the latter ages of Chriſtianity concerning faith and works, juſtification and ſanctification, election and reprobation, that have diſtracted the minds of many Chriſtians, have proceeded from applying particular phraſes or paſſages in the Epiſtles to particular perſons, which originally referred to the ſtate and condition not of particular perſons, but of whole churches in their collective capacity. Thus the body of heathens, while in their heathen ſtate, are called aliens, ſtrangers, enemies to God, &c. but ſuch of them as were converted (the churches to whom the apoſtles wrote) are ſtyled no longer ſtrangers, but of the houſehold of God, a choſen or elected generation, a royal prieſthood, juſtified, ſanctified, ſaints, &c. So the major part of the Jewiſh nation, who obſtinately rejected the goſpel of Chriſt, inſtead of being any longer the holy nation, the people of God, are called the veſſels of wrath, fitted (by their own obſtinacy) for deſtruction, reprobate; while the believing Jews becames veſſels of mercy, fore-ordained, predeſtinated, to be called into the kingdom or covenant of the goſpel, choſen to eternal life; which expreſſions mean no more than their having been offered the means and opportunities of attaining to the future happineſs of heaven, by their knowledge and practice of Chriſt's religion. Their actual enjoyment of future happineſs depended entirely on their virtuous obedience to the goſpel; on their diligence to make their calling and election ſure, that is, effectual to their ſalvation. No private perſons are ever mentioned in theſe writings as elected to eternal life by any abſolute decree of God. Paul was a choſen veſſel; but he was choſen as a proper miniſter of Chriſt's goſpel, to bear his name to the Gentiles; his being choſen to the crown of life hereafter, was the fruit of his earneſt endeavours to keep the faith, (his fidelity) to finiſh his courſe, and of his labouring abundantly. To take theſe expreſſions otherwiſe, is to pervert the deſign of theſe writings. It is this miſtake that has diverted the minds of many good men from attending to the more excellent parts of theſe writings, the moral and weighty exhortations given to Chriſtians; and by puzzling them about former controverſies that do very little, if at all, concern us now, have turned off their thoughts from the great matters of the Chriſtian law, which are moſt eaſy to be underſtood, and requiſite to be put in practice." For a farther illuſtration of theſe obſervations, in their peculiar reference to the ſtate of Chriſtians, the reader may conſult Dr. Taylor's Key to the Epiſtle to the Romans, *paſſim*. Locke on the Epiſtles. See the next article.

ELECTION alſo, in the language of ſome divines, ſignifies a predeſtination to grace and glory, and ſometimes to glory only. And it has been enjoined as an article of faith, that predeſtination to grace is gratuitous, merely and ſimply ſo; *gratia, quia gratis data*. But the divines are much divided as to the point, whether election to glory be gratuitous, or whether it ſuppoſes obedience and good works, *i. e.* whether it be before, or after, the previſion of our obedience. For an account of the different opinions that have been maintained on this ſubject, ſee GRACE, PREDESTINATION, and REPROBATION.

ELECTION is alſo uſed for a part of *Pharmacy*, being that which teaches how to chuſe the medicinal ſimples, drugs, &c. and to diſtinguiſh the good from the bad.

Some diſtinguiſh a general election, which gives the rules and marks for all medicines in general; and a particular one for each medicine in particular. Pomet, in his Hiſtory of Drugs, gives very good rules for this election.

ELECTIVE, ſomething that is done, or paſſes, by election. See ELECTOR.

ELECTIVE *Attraction*, in *Chemiſtry*. See AFFINITY.

ELECTOR, formed of the Latin *eligere*, to chooſe, any perſon who has a right to chooſe or elect another to an office of honour or truſt. But the term elector uſed to be applied more particularly, and by way of eminence, to thoſe few princes of the German empire, in whom was veſted the right of electing or chooſing the head of the empire. They were all ſovereign princes, and the principal members of the Germanic body. The German name is *Churfürſt*, *Kurfürſt*, or *Wahlfürſt*.

The origin of the electoral dignity, and of the right inherent in the ſame, is not exactly aſcertained. Some place it in the year 996, and attribute the inſtitution to an edict of Otho III. confirmed by pope Gregory V. But this opinion is contradicted by hiſtory. It appears, that from the earlieſt period in the hiſtory of Germany, the perſon who was to reign over all was elected by the ſuffrage of all. Thus, Conrad I. was elected either by all the princes and chief men, or by the whole nation. In 1204, poſterior to the ſuppoſed regulations of Otho III., Conrad II. was elected by all the chief men, and his election was approved of and confirmed by the people; and at the election of Lotharius II., in 1225, 60,000 perſons of all ranks were preſent, and he was named by the chief men, whoſe nomination was approved by the people.

Others refer the origin of the electoral dignity and excluſive function to Frederick II. who died in 1250: and the firſt author who mentions the ſeven electors is Martinus Polonus, who flouriſhed in this reign. It appears, after all, that this reſtrictive privilege was obtained by degrees. The princes of greater authority were firſt allowed to name the perſon whom they wiſhed to be choſen emperor, and the nation retained the right of approving or diſapproving the nomination. When they had thus ſecured the right of voting firſt, it became needleſs for the inferior eccleſiaſtics or barons to attend merely to confirm their choice, more eſpecially as their attendance would be troubleſome and expenſive. And as the electors were ſovereign princes, poſſeſſed of moſt extenſive territories, they were ſtrongly ſupported by their numerous attendants and allies, and conſidered as the repreſentatives of all the higher claſſes of German nobility. See Robertſon's Charles V., vol. i. chap. 5.

The inſtitution of electors has alſo been aſcribed to Rudolph of Habſburgh, the founder of the houſe of Auſtria, in 1280. Their number, however, was unſettled till the fourteenth century; it was Charles IV. who, by his golden bull of the year 1356, limited the ſame to ſeven, three eccleſiaſtical, *viz.* the archbiſhops of Mayence or Mentz, Treves, and Cologne; and four ſecular, *viz.* the king of Bohemia, the count Palatine, the duke of Saxony, and the margrave of Brandenburg. In 1648, the duke of Bavaria was put in the place of the count Palatine, who was outlawed by the emperor for having accepted the crown of Bohemia: but as he was at length reſtored to his rank, and a new electoral dignity was created for the duke of Bavaria, which increaſed the number of electors to eight. In 1692 a ninth electorate was added by the emperor Leopold, in favour of the duke of Hanover, of the houſe of Brunſwick Luneburg. From that period to the year 1777, the electoral college conſiſted of the three eccleſiaſtical electors, Mentz, Treves, and Cologne, and the ſix ſecular, Bohemia, the palatinate of the Rhine, Saxony, Brandenburg, Bavaria, and Hanover.

The dominions of the laſt elector palatine of the Rhine, having devolved, in December 1777, to the elector of Bavaria, the electoral college was again reduced to eight members, until the peace of Luneville; when the three eccleſiaſtical electorates were ſecularized, the archbiſhop of Ratiſbon introduced as a new elector arch-chancellor, and the duke of Wirtemberg, the landgrave of Heſſe Caſſel, the margrave of Baden, and the grand duke of Toſcany, as duke of Saltzburg, raiſed to the electoral dignity. This increaſed the number of electors to ten, *viz.* the elector arch-chancellor, Bohemia, Bavaria, Saxony, Brandenburg, Hanover, Wirtemberg, Heſſe Caſſel, Baden, and Saltzburg.

But this arrangement was not of long duration. In the year 1806 the German empire was diſſolved. Bavaria and Wirtemberg, on joining the Confederation of the Rhine, under the protection of the French empire, aſſumed the royal dignity; Hanover was in poſſeſſion of the French; Baden and Saltzburg took the titles of grand dukes; the elector arch-chancellor that of the prince primate of the Confederacy of the Rhine; and the year following Saxony likewiſe aſſumed the royal dignity; Heſſe Caſſel was annexed to the new kingdom of Weſtphalia; Bohemia as part of the dominions of Auſtria, and Brandenburg as part of thoſe of Pruſſia, reverted to theſe two houſes as independent monarchical ſtates. Thus the electoral college was not only diſſolved with the diſſolution of the German empire: but the title of elector, a title which for ſo long a ſeries of years conferred a rank equal to that of the old kings of Europe, became altogether extinct.

Beſides the power of electing an emperor, the electors had a right to capitulate with the new head of the empire, to dictate the conditions on which he was to reign, and to depoſe him if he broke thoſe conditions. They actually depoſed Adolphus of Naſſau in 1298, and Wenceſlaus in 1401. They were ſovereign and independent princes in their reſpective dominions, had the "privilegium de non appellando illimitatum," that of making war, coining, and exerciſing every act of ſovereingty. They formed a ſeparate college in the diet of the empire, and had among themſelves a particular covenant, or league, called the "Kur verein." They had precedence of all the other princes of the empire, even of cardinals, and ranked with kings. There was, however, a difference between the ſecular and eccleſiaſtical electors; none of the latter could be choſen emperor, and they were to be thirty years of age before they could attain the electoral dignity, whilſt the majority of the ſecular electors was fixed at eighteen years of age, and any of them might be placed at the head of the empire; indeed they might even vote in their own favour.

The ſeveral functions of the electors were exerciſed by deputies. The elector of Mentz was arch-chancellor in Germany; Treves, in Gaul and the kingdom of Arles; Cologne, in Italy; Bohemia was arch-cupbearer; Bavaria, arch-ſewer, or officer who ſerves out the feaſts; Saxony, arch-marſhal; Brandenburg, arch-chamberlain; Hanover, arch-treaſurer. During the vacancy of the imperial throne, the elector of Saxony uſed to be vicar of the empire in the north, and the elector of Bavaria ruled as vicar over the ſouthern circles.

The laſt electors of the German empire were; 1. Charles Theodore, baron Dahlberg, elector of Ratiſbon and arch-chancellor, now prince primate. 2. Frederick William III. king of Pruſſia, elector of Brandenburg. 3. George III. king of Great Britain, elector of Hanover. 4. Ferdinand Joſeph, elector of Saltzburg, now duke of Saltzburg. 5. Frederick II. elector, now king of Wirtemberg. 6. Charles Frederick, elector, now grand duke of Baden. 7. William IX. elector of Heſſe Caſſel, driven from his dominions by the French. 8. Maximilian Joſeph, elector, at preſent king of Bavaria. 9. Frederick Auguſtus IV. elector, at preſent king of Saxony; and, 10. Francis II. elector of Bohemia, at preſent emperor of Auſtria.

Elector *of Bavaria, the late,* ſon of the emperor Charles VII., was not only a very fine performer on the viol da gamba, but a good compoſer. And it is but juſtice to the memory of that prince to ſay, that upon an examination of the ſcore of an entire maſs for four voices, with inſtrumental accompaniments, which is now before us, we find the deſign and compoſition much ſuperior to the generality of dilettanti productions.

ELECTORAL Crown, or *Coronet.* See Crown.

ELECTORATE, a term uſed formerly to denote the dignity of an elector of the German empire, *die Churfürſtliche Würde*, or the territories belonging to an elector of Germany, *ein Churfürſtenthum.* See Elector.

ELECTRA, in *Ancient Geography*, a ſmall town of the Peloponneſus, in Meſſenia, upon the route from Andania to Cypariſſiæ, according to Pauſanias. It was watered by two rivers, one of the ſame name, and another called *Coeus*.

ELECTRAS, a river placed by Ptolemy in the ſouthern part of the iſle of Crete.

ELECTRESS Dowager *of Saxony, the late,* daughter of the emperor Charles VII. and ſiſter of the late elector of Bavaria, was not only an illuſtrious dilettanti in muſic, but a princeſs of great knowledge and talents in the art. After the deceaſe of her conſort, when her time was no longer occupied by cares of ſtate, applying herſelf wholly to the ſtudy of the fine arts, and travelling into Italy, ſhe not only wrote two ſerious dramas in the Italian language, "Taleſtri," and "Il Trionfo della Fedeltà," but ſet them to muſic, and performed the principal part: both were printed in ſcore at Leipſig, and much admired all over Germany, where they have frequently been performed. This princeſs had learned to ſing at an early period of her life of Porpora, and been taught the principles of compoſition by Haſſe, and both ſung and wrote in ſuch a manner as did honour to thoſe great maſters, as well as her own genius and application.

This princeſs was celebrated all over Europe for her talents, and the progreſs ſhe had made in the arts, of which ſhe was a conſtant protectreſs. Her electoral highneſs was a poeteſs, a paintreſs, and ſo able a muſician, that ſhe played, ſung, and compoſed, in a manner at which dilettanti ſeldom arrive.

ELECTRIA, in *Ancient Geography*, one of the ancient names of the iſle of Samos.

ELECTRIC, or Electrical, *adj.* (from the Latin *electrum*, amber, or from ηλεκτρον, the Greek name of the ſame natural ſubſtance,) belonging to that branch of natural philoſophy which has been denominated *electricity*. Thus we hear of the electric fluid, electric attraction and repulſion, electrical machine, electrical apparatus, &c.

Electric, *ſubſt.* denotes a body capable of being excited (either by means of friction or otherwiſe) ſo as to exhibit the phenomena of electricity; and which body is at the ſame time impervious to that power. Some of the phenomena of electricity are ſaid to have been firſt obſerved in amber, hence the word electric was derived from the Latin or Greek name of that ſubſtance.

All the bodies which come under our notice are more or leſs capable of being excited ſo as to exhibit electrical phenomena; and are more or leſs pervious to that power. And it is to be remarked, that thoſe bodies, which are leſs pervious, are more capable of being excited: whilſt, on the other hand, thoſe which are more pervious, are leſs capable of being excited. Thoſe bodies, in which the capability of being excited is more conſpicuous than their permeability, are called *electrics*, or *non-conductors*, and thoſe in which the capability of being pervaded is more conſpicuous than that of being excited, are called *conductors*, or *non-electrics*.

Both theſe claſſes of bodies contain a vaſt gradation from the moſt perfect to the moſt imperfect of each kind; the moſt perfect conductors, or non-electrics, being thoſe through which the paſſage of the electric power meets with the leaſt reſiſtance; and the moſt perfect electrics, or non-conductors, being thoſe which oppoſe the greateſt reſiſtance to the paſſage of that power. Theſe may alſo be more powerfully excited. But it muſt be obſerved, 1ſt, that, ſtrictly ſpeaking, there is no ſubſtance known, which may be conſidered as a perfect electric, or a perfect conductor; for the electric power finds ſome reſiſtance in going through the beſt conductors, and it will, in ſome meaſure, paſs through, or, at leaſt, over the ſurface of, the beſt electrics; and, 2dly, that the limits of the above-mentioned two claſſes of bodies come ſo near to each other, that ſeveral bodies may, by the leaſt alteration of temperature, or of ſome other circumſtance, be rendered either more of the nature of an electric, or more of the nature of a conductor. See CONDUCTORS *of electricity*. We ſhall now arrange the electrics, or (as they are ſometimes called) the *electrics per ſe*, in the following liſt, and in the order of their perfection, commencing with the beſt; as far as ſuch arrangement is practicable; we ſhall then add ſeveral neceſſary remarks reſpecting ſome of theſe bodies.

Electrics.

Glaſs, and all vitrifications, even thoſe of metallic ſubſtances.

All precious ſtones, the moſt tranſparent of which are generally the beſt; ſuch as diamonds, rubies, emeralds, topazes, ſapphires, garnets, &c.

Amber,
Sulphur,
Shell-lac, and all reſins, or reſinous compounds,
All bituminous ſubſtances,
Silk,
Wax,
Cotton,
All dry animal ſubſtances, as feathers, wool, hair, &c.
Paper,
White ſugar, and ſugar-candy,
Air, and gaſſes,
The vapour of quickſilver, according to Dr. Prieſtley,
A perfect Torricellian vacuum,
Ice of diſtilled water at the temperature of 13° below 0 of Fahrenheit's thermometer.
Oils,
Metallic oxyds,
The aſhes of animal and vegetable ſubſtances,
All dry vegetable ſubſtances,
All hard ſtones, the hardeſt of which are the beſt.

It has been ſaid above, that, in general, the electrics are ſuch as will not conduct the electric power, and are at the ſame time capable of being excited. This laſt property, however, muſt not be conſidered as belonging to them all, or rather, that they may all be ſubjected to the trial, for ſeveral of them, though impervious to the electric power, are not capable of being excited on account of their peculiar confirmation, and ſuch are air, oils, the Torricellian vacuum, &c.

Moſt of the above-mentioned ſubſtances, and probably all thoſe which are capable of being ſubject to experiments, when rendered very hot, loſe their electric property, and become quite, though not equally, good conductors. The degree of heat at which this change of property takes place is various in various bodies. Thus, red-hot glaſs, melted reſin, baked wood made very hot, ice in a temperature above 0 of Fahrenheit's thermometer, and water, &c. are conductors of the electric power. It is rather ſupriſing that the focus of a burning glaſs is not a conductor. It has been obſerved, that glaſs, eſpecially the hardeſt and beſt vitrified, often is a very imperfect electric, or even a pretty good conductor. The abbé Nollet and others have endeavoured to inveſtigate the cauſe of this occurrence in glaſs, by means of experiments; but they have not been able to aſcertain it. Glaſs veſſels, made for electrical purpoſes, are often rendered very good electrics by uſe and time, though they were bad electrics when new. And, on the other hand, ſome glaſs veſſels, which had been long uſed for excitation, have ſometimes loſt nearly all their power.

With reſpect to the non conducting property of a vacuum, the following obſervations deſerve the attention of the ſcientific reader. It is well known that the vacuum produced by means of an air-pump, even of the moſt perfect conſtruction, is a conductor of the electric power: or that the more the air is rarefied within a given veſſel, the more eaſily will the electric power paſs through that veſſel. But Mr. Walſh, aſſiſted by Mr. De Luc, boiled the quickſilver in a double barometer, *viz.* in an arched glaſs tube, the legs of which formed two barometers, connected at top by the curved part, in which the vacuum or abſence of air was as perfect as could be effected; and they found that the electric power would not paſs through this vacuum (Prieſtley's Obſervations on Air, &c. vol. i.) Mr. Morgan, ſome time after, made ſeveral experiments of the like ſort, which confirmed the above-mentioned diſcovery; (Phil. Tranſ. vol. 73.) ſo that the fact ſeems to be fully aſcertained, though one cannot comprehend why it ſhould be ſo; for if the electric power can paſs eaſier and eaſier through a given ſpace, in proportion as the air in it is more and more rarefied, why does it not paſs in the eaſieſt manner poſſible when the air has been entirely removed? And this fact appears ſtill more ſurpriſing, if it be admitted that the electric phenomena are produced by a fluid highly elaſtic.

The various tranſitions of water from the ſtate of a conductor to that of a non-conductor, or an electric, are alſo deſerving of notice. Ice, as we have already mentioned, is an electric below a certain temperature, and ſo much ſo, that Mr. Achard, who diſcovered this property of it in the year 1776, whirled a ſpheroid of ice in a proper machine with a rubber, &c. like the glaſs cylinders of a common electrical machine, and by this means he electrified the prime conductor, ſo as to attract, repel, give ſparks, &c. Above that degree of temperature, the ice begins to conduct, and this conducting property increaſes as the temperature is raiſed, ſo that the water, when pretty hot or near boiling, is a moſt excellent conductor; but as ſoon as it is converted into vapour, the conducting property diminiſhes, and when the vapour is mixed with the air, ſo as to become inviſible, its conducting power ceaſes altogether; as is indicated by the high electric ſtate of the atmoſphere in dry weather, when it is known that a great deal of aqueous vapour is mixed with the air.

After the preceding diſcrimination of ſubſtances, with reſpect to their electric, or their non-conducting property, the reader may naturally aſk, how is it to be aſcertained whether a body is or is not an electric? The anſwer is, that there are various methods of determining theſe properties in bodies, and which can not all be applied indiſcriminately in all caſes. For common purpoſes, when an electrical machine, (furniſhed with a prime conductor, to which an electrometer is affixed,) is in action, in which caſe, the electrometer is diverging, if you touch the prime conductor with any given ſubſtance, you will eaſily perceive whether that ſubſtance is an electric, or a conductor; for, in the firſt caſe, the electrometer will continue in a ſtate of divergency; whereas in the latter it will collapſe. For this purpoſe, the ſubſtance in queſtion muſt have a certain extenſion; and whilſt one extremity is preſented to the prime conductor, the other extremity of it muſt communicate with the ground, either through the body of the perſon that holds it, or otherwiſe; for, if it be too ſhort, though an electric, the electricity from the prime conductor will paſs over its ſurface to the hand that holds it, and the electrometer will of courſe collapſe. The experiment may be performed nearly as well without an electrometer; *viz.* by drawing ſparks from the prime conductor with one hand, or with a knobbed wire, and preſenting the ſubſtance in queſtion with the other hand; for if that ſubſtance is a conductor, the ſparks will ceaſe; and if an electric, the ſparks will continue. Thus, the electric nature of any ſubſtance may be determined in a groſs manner; but when an accurate determination is required, then recourſe muſt be had to other means, which muſt be diverſified according to the ſubſtance in queſtion. Thus, if it be an elaſtic fluid, a glaſs veſſel may be filled with it, and an electrified electrometer may be admitted to it. If it be a liquid, a glaſs tube may be filled with it; putting a cork at each end, and paſſing a pin through each cork, ſo as to touch the liquid; with this tube, then, you muſt repeatedly touch the electrified prime conductor of an electrical machine, and mark the effects produced upon the electrometer; you muſt alſo try how it will convey the ſhock of a charged jar, *viz.* whether ſilently, or with a report, &c. The beſt way of determining the electric property of ſolids is, by rubbing them againſt the hand, or a piece of ſilk, or woollen cloth, and the like. But in conducting theſe experiments, the operator may be eaſily deceived by the moiſture which ſeveral ſubſtances abſorb with great readineſs; and in conſequence of which, theſe bodies will appear as pretty good conductors. Thus, white paper, and eſpecially the thick brown paper, in its common ſtate, will be found to be a conductor, and, of courſe, incapable of being excited; but when well dried before a fire, and whilſt it remains in a hot ſtate, it is quite a non-conductor, and it may be powerfully excited by friction. Even baked wood, if not well varniſhed, (which ought to be done immediately after its being taken out of the oven,) will eaſily abſorb moiſture, and in conſequence of which it will loſe its non-conducting property. The various methods of exciting electrics are deſcribed under the article EXCITATION.

A natural tranſition from the effect to the cauſe will induce the human mind to inquire why are certain bodies electrics, whilſt others are conductors of the electric power? But though innumerable experiments have been inſtituted expreſsly for that purpoſe, and various conjectures have been offered, yet, it muſt be acknowledged, that no ſatisfactory information has been obtained; for no peculiar property has been diſcovered to belong excluſively to either of the above-mentioned claſſes of bodies. When the catalogue of electrics and conductors was very ſhort and imperfect, it was ſuppoſed that the two conducting principles were metals and water; ſo that whatever contained a certain quantity of either of theſe ſubſtances, or of both, was a conductor; otherwiſe it was an electric. But in a more advanced ſtate of the ſubject, the fallacy of the above-mentioned ſuppoſition was readily manifeſted; nor, in truth, has any thing elſe been ſubſtituted which might furniſh a ſatisfactory explanation of the queſtion.

The word *electric* is often uſed to denote that part of the electrical machine which furniſhes the electric power, when rubbed, &c. *viz.* an electric body of a particular configuration, which, being moved againſt a rubber by the mechaniſm which is annexed to it, is thereby excited, and communicates the electric power to the prime conductor. (See ELECTRICAL *Machine.*) For this purpoſe, various ſubſtances and various forms have been tried and often uſed; ſuch as glaſs, ſulphur, roſin, ſealing-wax, varniſhed paſteboard, varniſhed ſilk, and baked wood: and theſe have been formed into globes, ſpheroids, cylinders, plates, &c. When the two electricities were firſt diſcovered, and it was found that glaſs, or vitrifications in general, produced one kind of electricity, which was thereby called the *vitreous electricity;* whilſt ſulphur and reſinous bodies produced the other kind, called the *reſinous electricity;* then electrical machines were mounted with electrics of one of theſe materials, or of the other, according as one or the other of thoſe kinds of electricities was required. But when it was found that a machine, mounted with a ſingle electric of any kind, would produce both electricities at the ſame time; for if the prime conductor acquires the vitreous electricity, the inſulated rubber would acquire the reſinous, and *vice verſâ;* then the neceſſity of uſing two different electrics was removed, and the only thing which was attended to was the choice of an electric that might be very durable, and at the ſame time capable of a powerful excitation. After an innumerable variety of experiments made with the above-mentioned, and various other ſubſtances, glaſs has been found to be the material fitteſt for the purpoſe, and altogether preferable to all others. Its ſhape has alſo been often varied; but the forms which are at preſent principally uſed, as having been found more advantageous, are cylinders, globes, and flat circular plates, eſpecially the firſt and the laſt; for now one hardly ever finds a machine mounted with a globe. Amongſt the various kinds of glaſs which have been tried for this purpoſe, the preference has been given to the beſt flint glaſs; and, accordingly, of this material the cylinders, or the plates, for electrical machines, are at preſent moſtly made. The abbé Nollet obſerves, that the hardeſt, moſt compact, and beſt vitrified kind of French glaſs, is the moſt difficult to be excited. But Dr. Prieſtley ſays, "I have ſome reaſon to think that common bottle metal is fitteſt for the purpoſe of excitation; at leaſt, the beſt globe I have yet ſeen is one that I have of that metal. Its virtue is certainly exceeding great, and I attribute it in part to the great hardneſs of the metal, and in part to its exquiſite poliſh."

Though a glaſs veſſel exhauſted of air does not ſhew any ſigns of electricity on its external ſurface, yet it has been found, that the electric power of a glaſs globe, or cylinder, is ſtrongeſt, when the air within it is a little rarefied.

It has long been queſtioned, whether a coating of ſome electric ſubſtance, as roſin, turpentine, &c. on the inſide ſurface of the glaſs, had any effect towards increaſing its electric power; and, after a great many trials, it ſeems, that if it does not increaſe the power of a good glaſs globe, or cylinder, it does at leaſt improve a bad one. The moſt approved compoſition for this purpoſe conſiſts of four parts of Venice turpentine, one part of roſin, and one part of bees' wax. This compoſition muſt be boiled gently over a fire, ſtirring it continually for about an hour; afterwards it is left to cool, and reſerved for uſe. When a globe, or a cylinder, is to be lined with it, ſome ſmall pieces of it are introduced into the glaſs; then, by holding the glaſs near the fire, the mixture is melted, and is equally ſpread over its internal ſurface to about the thickneſs of a ſix-pence. In this operation, care muſt be taken that the glaſs be heated gradually, and be continually turned, ſo as to heat it pretty equally in all its parts, otherwiſe it is apt to break.

At preſent, however, this reſinous lining is hardly ever applied; for, with a pretty good cylinder, or globe, and the zinc amalgam upon the rubber, the modern electrical machines furniſh as much electricity as can reaſonably be expected.

ELECTRIC *Charge.* See CHARGE and LEYDEN PHIAL.

ELECTRICAL-AIR-*Thermometer*, is an inſtrument contrived by Mr. Kinnerſley of Philadelphia, for the purpoſe of obſerving the effects of electrization upon air, and with this inſtrument Mr. K. made ſeveral experiments, which he deſcribes in a letter to Dr. Franklin, dated March the 12th, 1761. *Fig.* 26. of *Plate* IV. *Electricity*, repreſents this inſtrument; the body of which conſiſts of a glaſs tube A B, about eleven or twelve inches long, and about two inches in diameter. It is cloſed air-tight at top and bottom by two braſs caps, the lower one of which is faſtened to the wooden ſtand D. Through a hole in the upper cap, a ſmall glaſs tube H O, open at both ends, is introduced, and its lower aperture is immerſed in a ſmall quantity of water at the bottom of the large tube. Two wires F G, I E, proceed through the braſs caps within the tube A B, and their extremities G, I, are furniſhed with braſs balls, which may be ſituated nearer or farther from each other, by ſliding F G up or down through the hole in the upper braſs cap. The external part of the wire F G is alſo furniſhed with a ball F, that of the wire I E terminates in a hook. The holes through which the tube H O, and the wires F G, I E, paſs, muſt be ſecured, ſo as to prevent the paſſage of any air. It will be eaſily comprehended, that when the air within the tube A B is rarefied, it will preſs upon the water at the bottom B of the tube, and will force it to riſe in the cavity of the ſmall tube H O; then, according as the water riſes more or leſs in the ſmall tube, ſo it ſhews the greater or leſs rarefaction of the air within the tube A B.

If the water, when this inſtrument is to be uſed, is all at the bottom of the large tube, and none of it has riſen within the ſmall tube, it will be proper to blow into the ſmall tube, by applying the mouth at H; after which, on removing the mouth, the water will be found to riſe a little within the ſmall tube; and a mark may be fixed on the outſide againſt the ſurface of the water that has thus riſen within the ſmall tube. The experiments which Mr. Kinnerſley made with this inſtrument are as follows:

He ſituated this thermometer on an electric ſtand, and connected the wire F with the prime conductor of an electrical machine in action. Thus he kept it well electrified for a conſiderable time, but it produced no remarkable effect; from whence he inferred that the electric virtue, when in a ſtate of reſt, had no more heat than the air, and other matter wherein it reſides.

When the two wires within the tube A B were in contact, a large charge of electricity, from above thirty ſquare feet of coated glaſs, produced no rarefaction in the air; which ſhewed, that the wires were not heated by the electric power paſſing through them.

When the wires were about two inches aſunder, the charge of a three pint bottle, darting from one to the other, rarefied the air very evidently; which ſhewed, that the electric fire produced heat in itſelf, as Mr. Kinnerſley ſays, as well as in the air, by its rapid motion.

The charge of a jar, which contained about five gallons and a half, darting from wire to wire, would cauſe a prodigious expanſion of the air; and the charge of his battery of thirty ſquare feet of coated glaſs would raiſe the water in the ſmall tube quite to the top. Upon the coaleſcing of the air, the column of water, by its gravity, inſtantly ſubſided, till it was in equilibrio with the rarefied air. It then gradually deſcended, as the air cooled, and ſettled where it ſtood before. By carefully obſerving at what height the deſcending water firſt ſtopped, the degree of rarefaction, he ſays, might be diſcovered, which, in great exploſions, was very conſiderable. Mr. Kinnerſley obviouſly remarks, that the firſt ſudden riſe of the water, upon an exploſion being made in the veſſel A B, is not to be aſcribed to the rarefaction of the air by heat, but to the quantity of air actually diſplaced by the electrical flaſh. It is only when that firſt ſudden riſe has ſubſided, that the degree of its rarefaction by the heat can be eſtimated, *viz.* by the height at which the water then ſtands above the common level.

If the experiments be performed in a room, wherein the temperature is variable, then an allowance muſt be made for this circumſtance in eſtimating the effect of the electrization; for the electrical air-thermometer is affected by heat or cold in general, as well as by that which is occaſioned by an electrical exploſion.

Since this inſtrument was firſt made known to the ſcientific world, the philoſophical inſtrument makers have often varied its form; but this variation of ſhape has not been accompanied with any real improvement.

Electrical *Apparatus,* is an aſſortment of all the electrical inſtruments that have been invented for the purpoſe of performing any experiments that belong to the ſcience of electricity; comprehending even the materials neceſſary for conſtructing theſe and other inſtruments that may be occaſionally ſuggeſted in the courſe of any experimental inquiry. For the ſake of diſtinction, the articles of an electrical apparatus may be arranged under the following diviſions.

1. Inſtruments and materials neceſſary for producing electricity.
2. Inſtruments neceſſary for aſcertaining its quality, and for meaſuring its quantity.
3. Inſtruments neceſſary for the accumulation, retention, and employment of electricity.
4. Inſtruments neceſſary for the experimental demonſtration of the laws that have been aſcertained in the ſcience of electricity.
5. Inſtruments uſeful in the performance of entertaining experiments.
6. Inſtruments neceſſary for atmoſpherical electricity.
7. Inſtruments belonging to that branch which has been denominated *Galvanic electricity*, or *Galvaniſm.*
8. Inſtruments peculiarly uſeful in medical electricity.
9. Materials and tools principally uſeful to a practical electrician.

As moſt of theſe inſtruments have obtained, and are known by particular names, their deſcriptions will be found under thoſe names; therefore, the preſent article needs not contain more than an enumeration of them, accompanied with general remarks, and ſome explanation of ſuch inſtruments, materials, &c. which are not commonly known under any particular appellations.

1. The principal inſtrument for the production of electricity is the electrical machine, *viz.* a machine containing an electric, and a mechaniſm, by means of which that electric may be whirled or moved againſt a rubber, ſo as to excite and to communicate the electricity, which is thereby produced, to an inſulated conductor, called the *prime conductor.* The ſize and form of theſe machines have been continually varied, according as experience, and new diſcoveries, have pointed out any old defects, or ſome new advantages; and likewiſe according to the fancy, the wants, and the opulence of the proprietor. The deſcription of the principal electrical machines, together with the inſtructions neceſſary for the proper uſe and management of the ſame, will be found under the article Electrical *Machine.*

Next to the electrical machine, properly ſo called, comes the electrophorus, which, when its ſize is upwards of ſix inches in diameter, and it is properly managed, will furniſh electricity ſufficient for a variety of experiments, for it will give pretty long ſparks, it will charge a Leyden phial, &c. See the article Electrophorus.

But a great variety of experiments, eſpecially of the theoretical kind, (*viz.* ſuch as tend to explain the principles of the ſcience,) may be performed with inſtruments much ſimpler than the electrical machine or the electrophorus; and theſe are a few glaſs tubes, and a ſtick of ſealing wax. In order to obtain a great deal of electricity, theſe tubes ſhould be made as long as a perſon can well draw through his hand at one ſtroke, (which is about three feet,) and about two inches in diameter. The thickneſs of the metal is not material, but if it be equal to that of common window glaſs, it may be reckoned ſufficient both for ſtrength and for excitation. Theſe tubes ſhould be cloſed at one end; and it will be uſeful to have a braſs cap with a ſtop-cock fitted to the other extremity of at leaſt one of theſe tubes; for in this caſe, the air within the tube may be rarefied or condenſed by means of an air-pump, or a condenſing ſyringe; and experiments may then be tried with it in thoſe different ſtates. One or two other tubes ought to have the poliſh taken off from their external ſurface, (which may be accompliſhed by means of emery, or a grinding-ſtone,) for the purpoſe of producing negative electricity. This, however, may alſo be obtained by rubbing a ſtick of ſealing wax, or even a ſtick of baked wood, as long as this is preſerved free from moiſture.

The glaſs tubes for excitation muſt be kept perfectly clean, and dry both within and without. They act beſt when they are a little warmer than the ambient air. If the operator hold one of theſe tubes with one hand by one extremity, and draw his other hand (provided this be clean and dry) gently over the tube from one extremity to the other, a few times repeatedly; the tube will ſoon ſhew ſigns of excitation, by attracting light bodies, giving ſparks, affecting an electrometer, &c. The application of a proper rubber is better than the human hand, and will occaſion a more powerful excitation. The beſt rubber for a ſmooth glaſs tube is the rough ſide of black oiled ſilk, eſpecially when a little amalgam of mercury and tin, or rather of mercury and zinc, is ſpread upon it. The beſt rubber for a rough glaſs tube, for a ſtick of ſealing-wax, or of ſulphur, or of baked wood, is ſoft new flannel, or rather ſkins, ſuch as hare ſkins, cat ſkins, &c. tanned with the hair on.

2. The inſtruments neceſſary for aſcertaining the quality, and the quantity of electricity, are called *Electrometers*, which ſee.

3. The inſtruments proper for accumulating, retaining, and employing the electric power, are very numerous, but they may be comprehended under the following general appellations, *viz.* inſulated conductors, and inſulating ſtands; coated electrics, or the Leyden phial in its various ſhapes; diſcharging rods, and the univerſal diſcharger. See INSULATION, LEYDEN PHIAL, ELECTRICAL BATTERY, and DISCHARGER of *Electricity*.

4. Under the appellation of inſtruments neceſſary for the illuſtration of the laws of electricity, in a general ſenſe, one ſhould comprehend all thoſe which are enumerated in the other ſections of the preſent article; ſince the experiments that are made with them do all tend to illuſtrate the laws of electricity; excepting, however, a few, which are mere variations of others.

5. The inſtruments uſeful for the performance of entertaining experiments are likewiſe very numerous; but they will be found deſcribed under the article ELECTRICAL *Experiments*.

6. The inſtruments neceſſary for exploring the electricity of the atmoſphere are deſcribed under the article ELECTRICITY, *Atmoſpherical*.

7. The apparatus peculiar to that branch of electricity, which has been called *Galvaniſm*, will be found deſcribed under that name.

8. The application of electricity to medical purpoſes requires very few particular inſtruments, beſides thoſe which are commonly in uſe for other experiments. They conſiſt of a few directors, a diſcharging electrometer, a few wooden points, and ſome other trifling appendages, for which ſee *Medical* ELECTRICITY.

9. The extenſive and fertile ſcience of electricity perhaps furniſhes more opportunities for ſignalizing the genius of the operator, than any other branch of natural philoſophy. There is hardly an electrician whoſe mind does not ſuggeſt ſome alteration, or ſome contrivance, entirely new, in the courſe of his experiments. His ideas may ſometimes be ill founded, and may at other times be proper and uſeful. In either caſe a prompt and ready conſtruction is deſirable;—the aid of regular workmen is dilatory and expenſive; and, though in an imperfect ſtate, the workmanſhip of the electrician himſelf may, in moſt caſes, expeditiouſly put his ideas to the teſt of actual trial. Therefore, for the accompliſhment of this object, he ought to furniſh himſelf with ſeveral articles or materials ready to be worked upon, and ſome tools to work with. The articles moſt uſeful are, glaſs tubes, and glaſs ſticks of various ſizes, glaſs plates, and ſlips of flat glaſs, and glaſs phials of different ſizes; (ſome of thoſe uſed by apothecaries will frequently be found very uſeful;) ſealing wax, roſin, ſulphur, ſhell-lac, and Venice turpentine; tin-foil; braſs and iron wire, ſome braſs balls of different diameters. Each of theſe balls ought to have a hole, in order to fix it, or ſcrew it upon a wire. Alſo ſome electrical cement, and ſome electrical varniſh, the firſt of which is deſcribed under the article CAEMENT, and the ſecond under the article COATING *of Electrics*. To theſe there may be alſo added ſilk threads, ſmall pith-balls, and cork-balls, gold and ſilver leaf, gilt paper, &c. But, beſides all theſe, a variety of other materials may be ſuggeſted by new diſcoveries, or new ideas, which cannot be foreſeen. With reſpect to tools, it is not poſſible to ſtate the preciſe number and kind that may be wanted; but for moſt purpoſes, thoſe which are uſually put in the middle ſized tool cheſts, that are ſold by ironmongers, will be found fully ſufficient.

ELECTRICAL *Atmoſphere*. See ATMOSPHERE, in *Electricity*.

ELECTRICAL *Attraction and Repulſion*. This kind of attraction takes place between bodies that are electrified, and all other kinds of bodies, in certain circumſtances; or, more properly ſpeaking, it takes place between bodies poſſeſſed of different electricities; that is, between bodies poſſeſſed of the poſitive or vitreous electricity, and bodies poſſeſſed of the negative or reſinous electricity. The repulſion takes place only between bodies poſſeſſed of the ſame kind of electricity. The various peculiar phenomena, which attend both this attraction and this repulſion, are highly deſerving of attentive conſideration, for upon them the ſubject of electricity principally depends. But though their effects are evident and ſtriking, though they have been exhibited under an endleſs variety of forms and combinations, though innumerable experiments have been made, and many hypotheſes have been offered for their explanation; yet the true cauſe upon which they depend is by no means underſtood. In order to proceed with that regularity, which ſeems more likely to be attended with perſpicuity, we ſhall, in the firſt place, briefly endeavour to point out the difference between this and all other kinds of attraction and repulſion; we ſhall, in the next place, deſcribe the phenomena of this kind of attraction and repulſion, to which we ſhall annex the explanation according to the moſt approved hypotheſis, *viz.* that of a ſingle electric fluid, which goes under the name of the Franklinian hypotheſis; and we ſhall, laſtly, examine ſome of the other hypotheſes that have been advanced in explanation of thoſe phenomena.

Five kinds of attraction have been obſerved amongſt natural bodies; *viz.* 1ſt, the attraction of gravitation, which forces all bodies, when not hindered, to fall towards the centre of the earth. This attraction is mutual between all bodies; but unleſs one body be vaſtly larger than the other, this attraction between them cannot be diſcerned; 2dly, the attraction of coheſion, by which the particles of bodies adhere to each other, and form the different forms of bodies, or lumps of matter. This kind of attraction vaniſhes at a diſtance vaſtly ſmall; ſo that though a body be very hard, yet if once broken, and the parts be adapted to each other, the coheſion cannot thereby be reſtored; 3dly, the chemical attraction, or affinity, which takes place between certain heterogeneous ſubſtances when they come in contact with each other; 4thly, the magnetic attraction, which takes place principally between the oppoſite poles of magnets, or between a magnet and iron, including ſuch compound bodies as contain iron. We have ſaid *principally* between thoſe ſubſtances, becauſe a few other bodies, which are ſaid not to contain any iron, are ſlightly attracted by the magnet. The magnetic repulſion takes place between the homologous poles of magnets only; 5thly, the electric attraction, which takes place between bodies of every kind, provided they are poſſeſſed of different electricities; for though in common experiments an electrified body attracts another body which appears to be in a natural, or unelectrified, ſtate; yet, on a cloſer examination, it will be found, that the latter body does actually acquire the electricity contrary to that of the former, before any attraction takes place, as will be ſhewn in the ſequel. From the above-mentioned properties peculiar to each kind of attraction, that of electricity may be eaſily diſtinguiſhed from the reſt. We ſhall now proceed to deſcribe the phenomena.

If light bodies of any kind, ſuch as pieces of paper, of ſtraw, of thread, of metallic leaves, feathers, &c. be ſtrewed upon a table, and an excited glaſs tube be held horizontally over them at the diſtance of four or five inches, as in *fig.* 27, the ſmall bodies will inſtantly fly towards the tube, and after having touched the ſurface of it, ſeveral of them will be inſtantly repelled by it; whilſt others will adhere to it a conſiderable time before they are repelled; and ſome of them will continue to adhere to it without their being ever repelled. Thoſe bodies which have been repelled, as ſoon as they come in contact with the table, or with ſome other conducting body, at no great diſtance from the excited tube, will ſoon after be attracted again by the tube, then they will be repelled a ſecond time, and ſo on repeatedly for a conſiderable number of times, or until the electric power of the tube is in great meaſure exhauſted. The ſame thing takes place, if, inſtead of the excited glaſs tube, an electrified and inſulated conductor, ſuch as the prime conductor of an electrical machine, be preſented to the light bodies; or if an excited electric of any other kind be uſed.

The general explanation of theſe apparently ſtrange and contradictory phenomena, upon the Franklinian theory of a ſingle electric fluid, is as follows. The poſitive, or *plus*, electricity of the excited glaſs tube, forces the light bodies, which come within its ſphere of action, to depoſit their natural ſhare of electric fluid upon the table, in conſequence of which they become electrified negatively, or *minus*, and in that ſtate they are attracted by the tube; which explains the aſſertion, that electric attraction takes place only between bodies poſſeſſed of different electricities. When the bodies, on being attracted, come in contact with the tube, they acquire the electricity of the tube, *viz.* become poſitive, and in that ſtate they are repelled, which explains the other aſſertion, namely, that repulſion takes place between bodies poſſeſſed of the ſame kind of electricity. If the bodies thus repelled come in contact with the table, or with any conductor, they depoſit their poſitive electricity upon it, become electrified negatively for the reaſon already alleged, and in that ſtate are again attracted by the tube. The reaſon why ſome bodies adhere to the tube longer than others, is, that their being bad conductors prevents their acquiring the electricity of the tube ſo ſoon as other bodies that are better conductors. A few bodies remain adhering to the tube without any tendency to fly off, when, in conſequence of their having ſome ſharp corners or projection a little removed from the ſurface of the tube, they throw out the electric fluid into the ambient air as faſt as they receive it from the excited tube; hence they cannot actually become poſſeſſed of the ſame kind of electricity as the tube, and, of courſe, cannot be repelled. If, inſtead of the excited glaſs tube, which, in the uſual way of rubbing it, is poſſeſſed of the poſitive electricity, you uſe an excited ſtick of ſealing wax, which is negatively electrified, the light bodies will be attracted and repelled exactly in the ſame manner, and the explanation is the ſame, excepting that the acquiſition and depoſition of the electric fluid muſt be reverſed; *viz.* the ſtick of ſealing wax being negative will oblige the ſmall bodies to acquire ſome electric fluid from the table, which renders them poſitively electrified, and, of courſe, capable of being attracted by the ſealing wax; then on their touching the ſealing wax, they depoſit their electric fluid upon it, become negative, and are repelled, and ſo forth. This experiment exhibits all the phenomena of electric attraction and repulſion; but in order to prove the various aſſertions that have been made with reſpect to the acquiſition and depoſition of electricity, &c. every one of the various phenomena muſt be ſhewn apart, by a particular experiment: and theſe experiments now follow.

Experiment 1.—Faſten a ſmall body, as, for inſtance, a ſmall piece of cork, to a ſilk thread of about eight or ten inches in length; and holding the thread by its extremity, let the ſmall body hang at the diſtance of about ſeven or eight inches from the prime conductor, when this is moderately electrified. This ſmall body will not, in this caſe, be attracted, becauſe, being inſulated, it cannot, by depoſiting its fluid upon, or by receiving it from, ſome other body (when the prime conductor is electrified negatively,) become poſſeſſed of the contrary electricity. But if a finger or any conducting ſubſtance be preſented to that ſide of the ſmall body which is fartheſt from the prime conductor, then the ſmall body will be immediately attracted; for it has now depoſited its own fluid upon, or has acquired ſome (if the prime conductor be negative) from the body that has been preſented to it. And when this ſuſpended body has touched the prime conductor, it will inſtantly fly from it, on account of the repulſion which takes place between bodies poſſeſſed of the ſame kind of electricity. It muſt, however, be obſerved, that if the inſulated ſmall body be brought too near to the prime conductor, or the latter be too powerfully electrified, then the ſmall inſulated body will be attracted, though no conducting body has been preſented to it. But in this caſe its natural quantity of electric fluid will be either propelled into the contiguous air, or will be crowded on that part of the body which is fartheſt from the conductor, when the prime conductor is electrified *poſitively*; but if it be electrified *negatively*, then the additional quantity of fluid, which is required to render the ſmall body poſitive, will be acquired from the air; or the natural quantity of fluid belonging to that body will be all crowded on that ſide of it, which is neareſt to the prime conductor. If, inſtead of the ſilk thread, this ſmall body be ſuſpended by a linen thread, then the attraction will take place at a much greater diſtance, as in this caſe the electric fluid will be eaſily conducted by the linen thread, &c.

Experiment 2.—Put a ſmall light body upon a pane of glaſs, and, holding the glaſs by one corner, place it under an electrified conductor, or an excited electric, at a moderate diſtance from it; which muſt be proportionate to the intenſity of the electricity. The ſmall body thus ſituated will not be attracted; but if in this ſtate you apply a finger to the lower ſurface of the glaſs plate, juſt againſt the place where the body ſtands, then the attraction will take place immediately; becauſe the lower ſurface of the glaſs will give its electric fluid to the finger, in conſequence of which its upper ſurface is enabled to receive the electric fluid from the ſmall body, and then that body is attracted by the conductor, or by the excited electric. In fact, if the pane of glaſs be examined by means of an electrometer, that part of its ſurface, which has been contiguous to the ſmall body, will be found electrified poſitively, and its oppoſite ſurface will be found negative. In this diſpoſition of the apparatus, the ſmall body, though acted upon by the electricity of the conductor, could not diveſt itſelf of its own electric fluid, becauſe the glaſs being an electric could not receive that fluid on one ſurface, unleſs its oppoſite ſurface could depoſit its own fluid upon ſome other conductor. (See Leyden Phial.) It muſt be obſerved, however, that when the electricity of the conductor, or of the excited electric, is too powerful, and is brought too near, the ſmall body will be attracted though the finger be not applied to the lower ſurface of the pane of glaſs. But in this caſe the electric fluid of the lower part of the glaſs will be forced into the air.

Experiment 3.—A B and B C, (*fig.* 28.) are two pieces of thick iron or braſs wire, inſulated upon two ſticks of ſealing wax, which are ſtuck faſt upon two pieces of wood, ſo as to form two inſulating ſtands. Each of the wires has a cork-ball electrometer affixed to one end. Place theſe two wires in contact with each other at B, and in one direction, as ſhewn in the figure, with the electrometers at their farther extremities A, C. Bring an excited glaſs tube D within ſeven or eight inches of the electrometer C, and it will be found that both the electrometers at A and C will diverge; with this difference, that the electrometer at C diverges with negative, and the electrometer at A with poſitive electricity, which may be proved by preſenting an excited ſtick of ſealing wax to each electrometer, as will be ſhewn in experiment 6. Theſe electricities ariſe from the action of the excited tube D, which, being poſitive, drives the electric fluid from the electrometer C, and the wire B C, to the electrometer A, and wire A B; thence the former becomes undercharged or negative, and the latter overcharged or poſitive. If the tube D be removed, both the electrometers will collapſe; for the electric fluid will return from A B to B C, and both the wires, &c. will remain in the ſame ſtate as they were before. But if whilſt the tube D remains near the end C, as in the figure, and the electrometers are diverging, the two wires with their ſtands be ſeparated, then, on withdrawing the glaſs tube, the electrometers will continue to diverge C with negative, and A with poſitive electricity; becauſe now the contact of the wires at B being interrupted, the electric fluid cannot return from the wire A B to the wire B C; and this plainly ſhews the effect which an electrified body produces upon other bodies that are brought within its ſphere of action. If in the above deſcribed experiment an excited ſtick of ſealing-wax be uſed inſtead of the glaſs tube, the ſame appearances will take place; excepting that the electrometer C will be poſitive, and A negative.

Experiment 4.—This experiment ſhews, that a body, once repelled by an electrified body, will not be again attracted by it, unleſs it firſt depoſits its electricity upon ſome other body.

Take a glaſs tube (whether ſmooth or rough is not material), and after having excited it by rubbing, let a ſmall light feather be let out of your fingers at the diſtance of about eight or ten inches from it. This feather will be immediately attracted by the tube, and will ſtick very cloſe to its ſurface, for a few ſeconds, and ſometimes longer; after which time it will be repelled, and if the tube be kept under it, the feather will continue to float in the air at a conſiderable diſtance from the tube, without ever coming near it, excepting when it comes in contact with ſome conducting body, upon which it may depoſit its electricity; for after that it will be readily attracted again. If the excited tube be managed dextrouſly, the feather may be driven at pleaſure through the air of a room from one part of it to another. The reaſon why, when the feather is firſt attracted by the glaſs tube, it remains adhering to it for a conſiderable time, and ſometimes will not fly from it without ſhaking the tube, is, that being an electric, it will not eaſily acquire the electricity from the tube.

This experiment is attended with a remarkable circumſtance, which is, that when the feather is kept floating in the air at a diſtance from the excited tube, by the force of electric repulſion, it always preſents the ſame part towards the tube; ſomewhat like the moon, which always preſents the ſame part of its ſurface towards the earth. You may move the excited tube ſwiftly about the feather, and yet the ſame ſide of the feather will be conſtantly turned towards it. The reaſon of this phenomenon is, that the equilibrium of the electric fluid in the various parts of the feather, being once diſturbed, cannot be eaſily reſtored, becauſe the feather is an electric, or, at leaſt, a very imperfect conductor. When the feather has acquired a certain quantity of electricity from the tube, it is plain that the action of the excited tube will drive that ſuper-induced electricity to that ſide of the feather which happens to be fartheſt; hence, that part will always be repelled the fartheſt.

Experiment 5.—Hold a common linen thread by one end, and preſent it to an excited electric, or to an electrified conductor, ſuch as the prime conductor of an electrical machine, the thread will be attracted by it, and will remain adhering to it as long as the electric or the conductor continues electrified. The reaſon why in this experiment the thread, after having been attracted, is not repelled by the electrified body, is, that it cannot become poſſeſſed of the ſame kind of electricity with the electrified body, on account of its being held by the hand of the operator; for whatever kind of electricity is communicated to it, will be conveyed to the hand of the operator, and from it to the ground, &c. In this experiment care muſt be had that the thread be not very dry; for, in that caſe, the paſſage of the electricity through it, being partially interrupted, the lower extremity of the thread may, for a ſhort time, acquire the ſame electricity as the electrified body poſſeſſes, and may of courſe be repelled.

Experiment 6.—Place an electrometer, conſiſting of two cork balls ſuſpended by threads, upon an inſulating ſtand, as in *fig.* 29, and the threads of the electrometer will hang down parallel to each other. If then you bring an electrified body near it, the cork balls will be inſtantly attracted, and having acquired ſome electricity from it, will ſoon after be repelled, and will afterwards, when the electrified body has been removed, continue diverging, which is the ſtate exhibited in the figure. If now you bring any electrified body near them, they will either fly from it, as in *fig.* 30; when that body is poſſeſſed of the ſame kind of electricity, or they will fly to it, as in *fig.* 31, when that body is poſſeſſed of the other kind of electricity. And this is the method by which it may be determined, whether an electrified body is poſitive or negative. It muſt, however, be obſerved, that if the body in queſtion be powerfully electrified, and be brought too near to the cork-balls, the latter will at laſt be attracted by it; for in this caſe, the action of the electricity in that body is ſufficient to drive the natural fluid of the electrometer, together with that which occaſioned its divergency, to the remoteſt part of it; or is capable of attracting the fluid when negatively electrified, &c.

That the repulſion amongſt bodies poſſeſſed of the ſame kind of electricity is more conſpicuous when the electricity is ſtronger, and *vice verſâ*, nobody will doubt; but it may be enquired, whether the angle of divergency of an electrometer bears any aſſignable proportion to the intenſity of the electricity which actuates it. The determination of this queſtion was attempted by the ingenious Fr. Beccaria, of Turin, and his experiments were performed in the following manner.

Experiment 7.—In the middle of a large room he inſulated a cylinder of tin, which meaſured about four feet in length, and about three inches in diameter; and to it he affixed a very delicate electrometer: another tin cylinder, exactly equal and ſimilar to the former, and having a long inſulating handle, was held by an aſſiſtant. Things being thus prepared, this philoſopher communicated ſome electricity to the former cylinder, in conſequence of which the electrometer, which had been affixed to it, diverged; in this ſtate, by means of ſights placed upon a ruler at a diſtance, he meaſured the angle of divergency, and noted it. He then deſired the aſſiſtant to touch the firſt cylinder, which was electrified, with the ſecond, which was not; and immediately to withdraw. By this means it is evident, that the electricity of the firſt cylinder muſt have been divided into two equal parts, and that this cylinder muſt now retain only the half of what it contained before. In this ſtate Fr. Beccaria meaſured the angle of divergency of the electrometer in the ſame manner as he had done before, and alſo noted it. The whole of this experiment he repeated ſeveral times both in the ſame, and in different days, and from the concurrence of the reſults, he found that the chord of half the angle of divergency was proportionate to the quantity of electricity in the cylinder; *viz.* the chord of half the large angle was double the chord of half the ſmall angle; anſwering to the quantities of electricity in the cylinder. See Beccaria's Elettriciſmo Artificiale, chap. vi. p. 1. art. 1.

M. De Sauſſure attempted the determination of the ſame queſtion in the following manner. He took two electrometers as equal and ſimilar as could be made; and electrified one of them, ſo that the balls were ſeparated by about ſix lines. He then touched the top of the electrified electrometer with the top of that which was not electrified; by which means the electricity was equally divided between the two electrometers; and in this ſtate each pair of balls diverged four lines; conſequently a diminution of half the denſity of electricity had leſſened the ſeparation of the balls by one-third. One of theſe electrometers was then deprived of its electricity, and was afterwards brought in contact with the other as before, in conſequence of which the electricity was divided, and the divergency of the balls was diminiſhed likewiſe by one-third, &c. This experiment being repeated ſeveral times, either with poſitive or negative electricity, was conſtantly attended with the ſame reſults.

Upon the Franklinian hypotheſis of a ſingle electric fluid, the attraction of bodies differently electrified is eaſily explained, for, according to that hypotheſis, the electric fluid is elaſtic, *viz.* repulſive of its own particles; but attractive of all other kinds of matter; therefore it is eaſy to conceive that the electric fluid, ſuper-induced upon a body electrified poſitively, attracts the undercharged matter of a body electrified negatively. The attraction between a body poſitively, and another negatively electrified, is ſo obvious as to require no farther illuſtration.

The repulſion of bodies electrified poſitively is alſo eaſily explained; but the repulſion of bodies electrified negatively requires much more attentive conſideration. The firſt explanation which occurred to thoſe who adopted the above-mentioned hypotheſis is, that when bodies are electrified poſitively, that exceſs of electric fluid which reſides upon their ſurfaces forms two atmoſpheres repulſive of each other, and the bodies remaining in the centres of their reſpective atmoſpheres muſt neceſſarily recede from each other. If the bodies are electrified negatively (*viz.* are in part exhauſted of their natural ſhare of electric fluid,) then they are attracted by the denſer fluid exiſting either in the atmoſphere contiguous to them, or to other neighbouring bodies, which occaſions them ſtill to recede from one another. Other patrons of the ſame hypotheſis obſerved, that as the denſer electric fluid ſurrounding two bodies negatively electrified, acts equally on all ſides of thoſe bodies, it cannot occaſion their repulſion. Is not the repulſion, they ſay, owing rather to an accumulation of electric fluid on the ſurfaces of the two bodies; which accumulation is produced by the attraction of the bodies, and the difficulty the fluid finds in entering them. This difficulty in entering was ſuppoſed to be owing chiefly to the air on the ſurface of bodies, which is probably a little condenſed there.

Lord Mahon, in his Principles of Electricity, explains the electrical attraction and repulſion in a very ingenious manner. He placed an electrified electrometer under the receiver of an air-pump; then began to exhauſt the receiver, in conſequence of which the divergency of the electrometer decreaſed. He then let the air return into the receiver, and this circumſtance alone cauſed the electrometer to increaſe its angle of divergency. "From theſe experiments, he ſays, it appears, that when bodies are charged with electricity, it is the *particles of circumambient air being electrified*, that conſtitutes the electrical atmoſphere which exiſts around thoſe bodies.

"Now ſince an electrical atmoſphere, (whether negative or poſitive,) conſiſts of electrified air; it evidently follows that the denſity of the electricity of that air muſt be in ſome inverſe ratio of the diſtance from the charged body, which cauſes that electrical atmoſphere.

"From theſe ſimple conſiderations, it is eaſy to reduce all the different phenomena of electrical attraction and repulſion to one plain and convenient principle, derived from the very nature of a diſturbed electrical equilibrium; namely, to the elaſtic tendency of the electrical fluid, to impel every body, charged either *in plus* or *in minus*, towards that part of its electrical atmoſphere where its natural electrical equilibrium would be the moſt eaſily reſtored.

"From this ſimple principle, it is evident, that bodies, which are charged with contrary electricities, muſt tend to approach each other, whenever the ſkirts of their oppoſitely electrified atmoſpheres interfere.

"From the ſame ſimple principle, it is alſo eaſy to underſtand, why bodies, that are charged with the ſame kind of electricity, tend to diverge from each other. Every body that is electrified, (whether *in plus* or *in minus*,) has a conſtant tendency to return to its natural ſtate; and this cauſes it to electrify, in a certain degree, other bodies in contact with it, and the air in its vicinity, in a manner ſimilar to that explained above.

" If two bodies (for example) be both poſitive; neither body will be able to depoſit its ſuperabundant electricity upon the other body, which is alſo ſimilarly electrified *in plus.* It is, therefore, evident, from the ſimple principle mentioned above, that if theſe bodies be brought near each other, each body will be impelled towards the particles of air on its other ſide, which are electrified *in plus* only in a ſmall degree. That is to ſay, that each body will tend to diverge from the other.

" If the bodies, on the contrary, be both negative; neither body will be able to have its deficient electricity ſupplied from the other body, which is alſo ſimilarly electrified *in minus.* It is therefore evident, from the ſimple principle mentioned above, that if theſe bodies be brought near each other, each body will be impelled towards the particles of air on its other ſide, which are electrified *in minus* only in a ſmall degree. That is to ſay, that each body will tend to diverge from the other. So that bodies, which are charged with the ſame kind of electricity, (whether poſitive or negative,) muſt neceſſarily tend to diverge from each other."

Mr. Cavalio explains the repulſion of bodies negatively electrified in the following manner. (Treatiſe on Electr. vol. iii. p. 193. of the 4th edit.)

" PROPOSITION I.—*No electricity can appear on the ſurface of a body, or no body can be electrified either poſitively or negatively, unleſs the contrary electricity can take place on other bodies contiguous to it.*

" This propoſition may be proved by a great many experiments and obſervations, ſuch as may be ſeen in vols. i. and ii. of this my work.

" PROP. II.—*There is ſomething on the ſurface of bodies which prevents the ſudden incorporation of the two electricities;* viz. *of that poſſeſſed by the electrified body, with the contrary electricity poſſeſſed by the contiguous air, or other ſurrounding bodies.*

" Without examining the nature, the extent, and the laws of this property in bodies, it will be ſufficient, for the preſent purpoſe, to obſerve, that the fact is certainly ſo; for otherwiſe a body could not poſſibly be electrified, or it would not remain electrified for a ſingle moment.

" PROP. III.—*Suppoſing that every particle of a fluid has an attraction towards every particle of a ſolid; if the ſolid be left at liberty in a certain quantity of that fluid, it will be attracted towards the common centre of attraction of all the particles of the fluid.*

" Let the body be extremely ſmall, and it is evident that it muſt be drawn towards the common centre of attraction; for if it be placed on one ſide of the ſaid centre, the attractive particles on the oppoſite ſide, being more numerous, will naturally draw it that way. If the body be large, the ſame reaſoning ſhews that the effect muſt be the ſame; for the attractive force of all its particles being concentered in a point or centre, will draw that centre towards the centre of attraction of all the particles of the fluid. Thus, if the fluid be of a ſpherical form, and the ſolid body be likewiſe ſpherical, the centre of the latter will coincide with that of the former.

" *Corollary* 1.—The ſame thing muſt happen, when the quantity of fluid is ſmaller than the bulk of the body; in which caſe the former muſt be within the latter.

" *Cor.* 2.—If the attraction of the particles of the fluid be exerted only towards the ſurface of the ſolid, and not towards its internal parts; the effect will be the ſame; when the body is of a regular ſhape, as ſpherical, cubical, &c. but with very irregular ſhapes, the difference will be very trifling, and not deſerving of notice in this place.

" The application of the foregoing propoſitions in explanation of the repulſion which takes place between bodies poſſeſſed of the ſame kind of electricity is very eaſy, and, in my opinion, concluſive. According to the Franklinian hypotheſis, the electric fluid is elaſtic, or repulſive of its own particles, and attractive of the particles of other matter. Let then A and B. (*fig.* 32.) be two ſpheres of metal ſuſpended in the open air, contiguous to each other, and capable of being eaſily moved. Let ſome electricity be communicated to them, and by Prop. I. it will appear, that whilſt the bodies touch each other, as ſhewn in *fig.* 32, the electricity which is communicated cannot be diſperſed equally all over their ſurfaces, but it muſt be thicker, or more condenſed, on the parts that are remote from the mutual point of contact, becauſe there the air is at liberty to acquire a contrary electricity; whereas, near the point of contact the electricity cannot be manifeſted, becauſe in that place there is no air or other body that can acquire the contrary electricity. Therefore the atmoſpheres of contrary electricity cannot be concentric with the ſpheres A and B; but muſt be ſituated as in *fig.* 32. It follows, therefore, by Prop. III., that the ſpherical bodies, being attracted towards the centre of theſe atmoſpheres, appear to repel each other, as ſhewn in *fig.* 33; ſo that when the bodies are electrified poſitively, in which caſe, according to the hypotheſis, they have acquired an additional quantity of electric fluid, negative atmoſpheres will be formed round them, and the additional or ſuperfluous electric fluid of the bodies will attract, and be attracted by, thoſe negative atmoſpheres. And when the bodies are electrified negatively, in which caſe, according to the hypotheſis, they have loſt part of their uſual quantity of electric fluid, poſitive atmoſpheres will be formed round them, which will attract the under charged bodies."

Experiment 8.—This experiment ſhews the attraction and repulſion by means of the electric light.

Fix a pointed wire upon the prime conductor of an electrical machine, having the point outward, and fix another pointed wire in the like manner upon the inſulated rubber of the ſame machine; then let the machine be put in action, and the points of both wires will appear illumined; *viz.* the former with a pencil, and the latter with a ſtar. In this ſituation, bring an excited glaſs tube ſideway of the point which proceeds from the prime conductor, and it will be found that the luminous pencil iſſuing from that point is turned ſideway; *viz.* is repelled by the atmoſphere of the tube. If the excited tube be held juſt oppoſite to the point, the luminous pencil will vaniſh entirely, becauſe both the tube and the point are electrified poſitively. If the excited tube be brought near the point of the wire which proceeds from the rubber, the ſtar upon it will turn itſelf towards the tube; for this wire is electrified negatively, and the tube poſitively. If inſtead of the tube, a ſtick of ſealing wax, or any other electric poſſeſſed of the negative electricity, be uſed; then the pencil of light will be attracted by it, and the ſtar will be repelled, or it may be entirely ſuppreſſed if the ſtick of ſealing wax be placed directly before it.

Hitherto we have treated of experiments performed in the ambient air; but it is now neceſſary to add a brief account of the manner in which electric attraction and repulſion are affected in rarefied air.

Towards the end of the 17th century, Mr. Boyle obſerved, that excited electrics would attract in the vacuum of his air-pump; whence he concluded, that the preſence, or abſence of air, did not interfere with electric attraction. Not long after, Mr. Grey repeated Boyle's experiments with the air-pump, and obtained a ſimilar effect; but at that time the air-pumps were very imperfect; their exhauſtion was very moderate; and, of courſe, the concluſions from the experiments that were made within their receivers could not furniſh much uſeful inſtruction. It ſeems that F. Beccaria was the firſt perſon who aſſerted, that in a perfect vacuum there would be no electric attraction. Lord Mahon ſuſpended a cork-ball electrometer within the receiver of an air-pump, and electrified it. "I then (he ſays) began to exhauſt the receiver; upon doing which, the balls ſoon began to divaricate gradually *leſs and leſs*. And as ſoon as the ſhort barometer gauge was got down to about one quarter of an inch (the barometer being that day at the height of 29¼ inches), the divarication of the balls from each other became reduced to leſs than one quarter of an inch.

"So that by $\frac{116}{117}$ parts of the natural quantity of air contained in the receiver being exhauſted, the divarication of the electrometrical balls was diminiſhed to leſs than one-tenth part. For the chord of the angle of divarication was decreaſed from above 2½ inches to leſs than one quarter of an inch. That is to ſay, that the verſed ſine of the angle of divarication was decreaſed conſiderably more than an hundred times; becauſe the verſed ſines are always as the ſquares of the chords.

"I ſhould be inclined to imagine, if this experiment were made with great accuracy, and with a proper electrometer, that the verſed ſine of the angle of divarication would always be in the ſame ratio as the denſity of the air in the receiver, provided that proper means were taken to keep the apparatus ſufficiently free from moiſture during the experiments." Principles of Electricity, p. 10.

Mr. Cavallo deſcribes a ſeries of experiments which he made with an excellent air-pump, (Phil. Tranſ. vol. lxxiii.) from which he deduced the following concluſion. "It ſeems (he ſays) deducible from thoſe experiments, that electric attraction and repulſion take place in every degree of rarefaction, from the loweſt to about one thouſand, but that the effect diminiſhes in proportion as the air is more rarefied; and by following this law, we may, perhaps, conclude with Beccaria, that there is no electric attraction, nor repulſion in a perfect vacuum; though this will, perhaps, be impoſſible to be verified experimentally, becauſe, when in an exhauſted receiver, no attraction, or repulſion, is obſerved between bodies to which electricity is communicated, it will be only ſuſpected that thoſe bodies are not ſufficiently ſmall and light. But, from reaſoning, it ſeems likely that electric attraction and repulſion cannot take place in a perfect vacuum, by which I only mean a perfect abſence of air. For either this vacuum is a conductor, or a non-conductor of electricity. If a conductor, and as much nearer to perfection as it becomes more free from air, it muſt be a perfect conductor at the ſame time that it becomes a perfect vacuum; in which caſe, electric attraction, or repulſion, cannot take place amongſt bodies incloſed in it; for, according to every notion we have of electricity, thoſe motions indicate, or are the conſequence of the intervening ſpace, in ſome meaſure, obſtructing the free paſſage of the electric fluid. And if the perfect vacuum be a perfect non-conductor, then neither electric attraction nor repulſion can take place in it."

Such are the facts which have been obſerved reſpecting electric attraction and repulſion, either in the ambient, or in rarefied air. The only thing which now remains to be added, is a ſhort account of the various explanations of theſe phenomena, which have been advanced, beſides the explanation upon the Franklinian hypotheſis, which has been already annexed to them.

When the knowledge of electricity was in its infancy, electricians ſuppoſed that certain *unctuous effluvia* were emitted by excited electrics, and that theſe effluvia would adhere to all light bodies which happened to be in their way, and would carry them back to the electric. We need not loſe time in endeavouring to manifeſt the abſurdity of this hypotheſis.

When Mr. Du Fay diſcovered the two oppoſite electricities, which he called the *vitreous* and the *reſinous electricities*, the idea of two diſtinct electric fluids was naturally adopted. Each of theſe fluids was ſuppoſed to be elaſtic, *viz.* repulſive, with reſpect to its own particles, but attractive of the other fluid. Theſe two fluids were ſuppoſed to be equally attracted by all bodies, and while they continue in their union to exhibit no mark of their exiſtence. It was then imagined, that by the excitation of an electric, theſe two fluids were ſeparated from each other, and one body became ſurcharged with one, whilſt another body became ſurcharged with the other elaſtic fluid. The two electric fluids being thus ſeparated, would ſhew their reſpective powers, and their eagerneſs to ruſh into re-union with one another. When bodies are charged with either of theſe fluids, they are diſpoſed to repel each other in conſequence of the elaſtic nature of the fluid, be it the vitreous, or the reſinous. But they are attracted by all other bodies, *viz.* they are attracted by bodies which have a leſſer ſhare of that particular fluid with which they are charged, and they are much more powerfully attracted by thoſe bodies which are overcharged with the oppoſite fluid.

The theory of Æpinus is a modification of the Franklinian hypotheſis. For he admits a ſingle elaſtic electric fluid; but he thinks that all the particles of matter, when diveſted of their natural ſhare of that electric fluid, muſt repel one another; for that otherwiſe (ſince all ſubſtances have in them a certain quantity of the electric fluid, the particles of which repel one another, and are attracted by all other matter), it could happen that bodies, in their natural ſtate, with reſpect to electricity, ſhould neither retract nor repel one another. According to this author, then, the repulſion of bodies negatively electrified, is in conſequence of the repulſion exiſting between the particles of matter, which manifeſts itſelf when thoſe particles are deprived of their natural ſhare of electric fluid; for the mutual repulſive property of the particles of the electric fluid, and the mutual repulſive property of the particles of matter, ſeem to neutralize each other when combined, and to act when ſeparated. See Æpini Tentamen Theoriæ Electricitatis et Magnetiſmi.

Electrical *Balance*. See Electrometer.

Electrical *Balls*. See Electrometer.

Electrical *Battery*. See Battery.

Electrical *Beatification*. See Beatification.

Electrical *Bells*. See Bells.

Electrical *Bruſh*. See Brush.

Electrical *Cement*. See Caement.

Electrical *Circuit*. See Circuit.

Electrical *Coating*. See Coating.

Electrical *Conductors*. See Conductors *of Electricity*.

Electrical *Eel*. See Gymnotus.

Electrical *Excitation*. See Excitation.

Electrical *Experiments*. The hiſtory of the ſciences clearly ſhews that the human ſpecies has obtained a much greater ſhare of knowledge reſpecting the works of nature, within the laſt two hundred years, than during the twenty or more centuries preceding them. If it be inquired how came this great ſcientific advancement to be made in a period ſo very ſhort, it will be found that this is entirely owing to the happy ſubſtitution of experiments to opinions; or of matter of fact to the wanderings of the imagination. When the learner was accuſtomed implicitly to believe, and to repeat, the fanciful explanations of the teacher, errors and abſurdities were propagated without the poſſibility of correction or of improvement. But when the ſtudent of nature adopted the motto of "Nullius in verba," and liſtened only to the reſults of experiments, or to the unerring mathematical deductions from thoſe reſults, then the temple of ſcience was raiſed with rapidity and triumph, by the accumulation of facts upon facts, which were firmly cemented by the ſtricteſt reaſoning.

The ſcience of electricity is a ſtriking inſtance of the abovementioned obſervation; for whatever is known of it has been acquired by means of a laborious experimental inquiry: and it is to be remarked, that the reſults of experiments have generally turned out different from any pre-conceived hypotheſis. The general and comprehenſive deductions which have been pointed out by the concurrence of many experiments are called the Laws of Electricity, and in mentioning theſe laws under their various denominations, we ſhall deſcribe the experiments which are neceſſary for their demonſtration; but there are ſeveral other experiments, which, though not abſolutely neceſſary for the demonſtration of theſe laws, are, nevertheleſs, either entertaining or uſeful in ſome other point of view; and theſe will be deſcribed in the preſent article.

Experiments relating to Electrics and Conductors.

The principal method of diſcriminating theſe two kinds of bodies from each other is deſcribed under the article Electrical *Attraction* and *Repulſion;* but the following experiments will ſhew how to determine theſe and other analogous properties in particular caſes, where the above mentioned general method cannot be applied.

Experiment 1.—*Mr. Henley's method of ſhewing the ſlight conducting power of ſmoke, and of the vapour of water.*

Suſpend a cork ball electrometer from the ceiling of a room, ſo as to ſtand about four or five feet above the conductor of an electrical machine; then put the machine in action very gently, ſo that the balls of the electrometer may not be affected by it. Stick a ſhort piece of wax taper, juſt blown out, upon the prime conductor, and under the electrometer, ſo that the ſmoke may aſcend to the latter. In this ſituation, if the machine be put in action as gently as before, the electrometer will open with the ſame kind of electricity with which the prime conductor is charged, which ſhews that the ſmoke is a conductor in a ſmall degree. If, inſtead of the wax taper, a metallic veſſel full of hot water be placed upon the conductor, and the machine be put in action as before, the electrometer will alſo be cauſed to diverge, ſhewing that the vapour of the water is a partial conductor.

Experiment 2.—*To prove that certain electrics become conductors when they are made very hot.*

Take a glaſs tube of about one-twentieth of an inch in diameter, and above a foot in length; let it be hermetically cloſed at one end, and introduce a wire in it, ſo as to be extended through its whole length. Let two or three inches of this wire project above the open end of the tube, and there faſten it with a cork. Tie round the cloſed end of the tube another wire, which will be ſeparated from the wire within the tube by the thickneſs of the glaſs tube. In theſe circumſtances, if you endeavour to ſend a ſhock through the two wires, (*viz.* the wire within the glaſs tube, and that which is twiſted on the outſide of it,) by connecting one of them with the outſide, and the other with the knob of a charged Leyden phial, you will find that the diſcharge cannot be made unleſs the tube be broken, becauſe the circuit is interrupted by the thickneſs of the glaſs at the end of the tube, which is interpoſed between the two wires. But put that end of the tube to which the external wire is faſtened into the fire, heating it gradually until it becomes barely red hot; then endeavour to diſcharge the jar again through the wires, and you will find that the charge is eaſily tranſmitted from wire to wire, through the ſubſtance of the glaſs, which, by being made red-hot, is become a conductor.

When the conducting power of hot reſinous ſubſtances, oils, &c. is to be examined, bend a glaſs tube in the form of an arch C E F D, *fig.* 34, and faſten a ſilk ſtring G C D to it, which ſerves to hold it by when it is to be ſet near the fire. Fill the middle part of this tube with the ſubſtance in queſtion, be it roſin, ſealing-wax, &c.; then introduce two wires A E, B F, through the apertures, ſo that they may touch the roſin, &c. or penetrate a little way into it. This done, let a perſon hold the tube, by the ſilk ſtring G, over a clear fire, ſo as to melt the roſin, or other ſubſtance, in it; and at the ſame time, by connecting one of the wires, A or B, with the outſide of a charged Leyden phial, and touching the other wire with the knob of the phial, endeavour to make the diſcharge through the roſin, and it will be found, that while the roſin is cold no charge can be tranſmitted through it. As the roſin melts, the conducting power will begin to be manifeſted, and when the roſin is quite melted, the ſhocks will paſs freely through it.

Experiment 3.—*To try the conducting or non-conducting property of hot air.*

The conducting property of air has by no means been fully determined, but the reader may form what judgment he thinks proper upon the following facts.

Electrify an inſulated cork ball electrometer, or electrify the prime conductor of an electrical machine, when the quadrant electrometer is ſet upon it; then bring a red-hot iron within leſs than an inch diſtance from the electrometer, or prime conductor, and either of them will ſoon loſe its electricity, which is conducted by the hot air contiguous to the iron; for if the experiment be repeated with the ſame iron when cold, the electricity will not be conducted away. It has been obſerved, that a battery may be diſcharged by introducing a red-hot iron between two knobs communicating with the inſide and outſide coating of the battery, and ſtanding at ſome diſtance from each other. But if, inſtead of iron, there be introduced a piece of red-hot glaſs between the two knobs, (the diſtance between them remaining as at firſt,) then the battery cannot be diſcharged; whence we may infer, that either hot air is not ſo good a conductor as has been generally believed, or that air heated by iron (perhaps in conſequence of its containing ignited iron particles) is a better conductor than when heated by red-hot glaſs.

Mr. Read endeavours to prove that hot air is not a conductor, and his experiments we ſhall now ſubjoin in his own words.

"It has been alſo commonly ſaid that hot air conducts electricity. With a view to aſcertain this matter, the following experiments were made: To one end of a long piece of wood (which ſerved as a handle) was fixed a glaſs rod fifteen inches long; to the remote end of the glaſs was fixed a pith-ball electrometer. Having electrified the balls, I held them by the wooden handle, and projected them into a large oven, immediately after the fire was drawn out of it; the conſequence was, that when I performed the operation ſlowly, the balls loſt their electricity; but that when done quick, with as little delay as poſſible, their electric charge was not diminiſhed. The electricity, in the firſt caſe, was found to have eſcaped along the glaſs into the wooden handle, and ſo to the earth, owing to the great heat the glaſs rod had acquired, by which it became a conductor of the fluid, for until it had cooled a little, the balls could not be charged again.

“ I ſhall lay before the reader one circumſtance more, becauſe it may tend to throw light on what degree of heat the oven was in at the time the obſervations were made. The baker having pointed out to me the hotteſt part of the oven, with a quick motion in and out, I plunged the electrified balls into that part of it, by which one thread and ball was burned off, but the remaining ball ſhewed that it ſtill retained its electric charge, becauſe it was ſtrongly attracted on the approach of my finger.” Read's Summary View of Spontaneous Electricity, p. 8.

Experiment 4.—*To ſhew that metallic ſubſtances conduct the electric power through their ſubſtance.*

Take a wire of any kind of metal, and cover part of it with ſome electric ſubſtance, as roſin, ſealing-wax, &c.; then diſcharge a Leyden phial through it, and it will be found that the wire conducts as well with as without that electric coating.

Experiment 5.—*To ſhew that the fluids of the human body are better conductors of electricity than water.*

Take a glaſs tube, about one-fortieth of an inch in diameter, and about ſix inches long, or rather take two ſuch tubes, exactly equal in length and diameter, and holding one of them with one extremity in water, let it be filled with that fluid. The water will ſoon fill the tube, in virtue of the capillary attraction, eſpecially if the tube be held inclined to the ſurface of the water. After the ſame manner let the other tube be filled with blood, or ſome other fluid of the human body. Now let an electric jar be charged, and let the circuit through which the jar is to be diſcharged be formed by the interpoſition of one of thoſe tubes, (to the extremities of which ſlender wires may be fitted, ſo as juſt to touch the fluid contained in it,) and likewiſe by the interpoſition of a perſon who may be deſirous of trying the experiment. In this manner, if the diſcharge of the jar be made ſeveral times, alternately changing the glaſs tube, *viz.* uſing once that which is filled with water, then the other which is filled with blood, &c., it will be found that the ſhock is felt more ſenſibly when the glaſs tube filled with the animal fluid forms part of the circuit, than when the tube filled with water is uſed.

The perſon who tries this experiment needs not be afraid of the ſhocks, becauſe their force is much weakened by paſſing through that ſmall quantity of fluid which is contained in the glaſs tube. Beſides, the ſtrength of the ſhocks ſhould not be greater than may be juſt felt. It is only neceſſary to charge the Leyden phial always equally high, which is eaſily done by uſing Mr. Lane's diſcharging electrometer. See DISCHARGER *of electricity*.

After the ſame manner the degree of conducting power of various ſubſtances may be aſcertained. Thus it may be obſerved, that ſea-water conducts better than freſh water, and that common freſh water conducts better than diſtilled water. The conducting powers of certain powders may alſo be tried in this manner.

Experiment 6. *To determine the different conducting powers of metallic ſubſtances.*

Connect with the hook, which communicates with the outſide coating of a battery, containing at leaſt thirty ſquare feet of coated ſurface, a wire of about one-fiftieth part of an inch in diameter, and about two feet long. The other end of the wire muſt be faſtened to one end of the diſcharging rod; this done, charge the battery, and then, by bringing the diſcharging rod near its wires, ſend the exploſion through the ſmall wire, which by this means will be made red-hot, and melted, ſo as to fall upon the floor in different glowing pieces. When a wire is melted in this manner, ſparks are frequently ſeen at a conſiderable diſtance from it, which are red-hot particles of the metal, that by the violence of the exploſion are ſcattered in all directions. If the force of the battery be very great, the wire will be entirely diſperſed by the exploſion, ſo that none of it can afterwards be found.

By repeating this experiment with wires of different metals, and uſing the ſame force of exploſion, it will be found that ſome metals are fuſed more readily than others, whilſt ſome are not ſenſibly affected; which ſhews the difference of their conducting powers. But in conducting ſuch experiments, the power of the battery muſt be adjuſted to the ſize of the wires, which muſt be of equal diameters and lengths. It is alſo to be remarked, that when every thing is properly adjuſted, and the battery is charged always equally high; ſome wires are melted through their whole length, whilſt others are barely melted at their extremities, or are only rendered red-hot.

No perſon ſeems to have ſucceeded ſo well as Mr. Van Marum in the determination of the conducting powers of metallic ſubſtances; for which purpoſe he employed the famous electrical machine belonging to the muſeum of Teyler, and an electrical battery, which contained 225 ſquare feet of coated ſurface. Mr. Van Marum had wires of different metals drawn of the ſame diameter, which was equal to one-thirty ſecond part of an inch; and, by expoſing equal lengths of them ſucceſſively to the above-mentioned battery, which was charged equally high in every experiment; he found, that of the leaden wire 120 inches were melted, of tin wire the like quantity, of iron wire five inches were fuſed, of gold wire three inches and a half, and of ſilver wire, or braſs, or copper, a quarter of an inch only was melted, which ſhews a pretty good eſtimate of their fuſibility by the action of electricity, whence the conducting power may be inferred, by conſidering this to be in the inverſe ratio of their fuſibility.

In order to compare this electrical fuſibility of the metallic ſubſtances with their fuſibility by the common fire, we ſhall now add the latter; which, according to the academicians of Dijon, is as follows.

Tin melts at 170° of Reaumur's thermometer.
Lead - 230
Silver - 450
Gold - 563
Copper - 630
Iron - 696.
According to Mr. Wedgwood's experiments,
Braſs melts at 3807° of Fahrenheit's thermometer.
Swediſh copper 4587
Fine ſilver - 4717
Fine gold - 5237
Caſt iron - 17,977. Phil. Tranſ. vol. 72.

From the above-mentioned and other electrical experiments, made with the ſame electrical machine and battery, Mr. Van Marum deduces the following concluſions, *viz.* that lead is the worſt, and upon the whole, copper is the moſt eligible metal for the conſtruction of a conductor of lightning.—That he could not poſſibly determine the proportion between the lengths and diameters of metallic wires, that could be melted by the power of the Teylerian machine.—That iron, tin, and copper, were melted into globules; but this was not the caſe with the other metals.—That the metallic globules were ſometimes thrown to the diſtance of thirty feet and upwards.—That the globules of tin remained red-hot red-hot for about eight or ten ſeconds; and that when the wires were very long, the fuſion was but partial.

Mr. Van Marum had the curioſity of trying whether the metallic wires could be fuſed and calcined in water; *viz.* by ſending the charge of the battery through them whilſt ſtanding under water; and he ſucceeded whenever he uſed the eighth part of that length of wire, which would have been calcined if the experiment had been performed in air.

The facility with which iron and ſteel are fuſed by means of electricity, and the violence with which ſmall particles of them burn, renders them peculiarly uſeful in entertaining experiments. The filaments produced in turning articles of ſteel are ſo very readily ignited by an electric ſhock, that ſome of the fineſt of them may be burned by the diſcharge of a ſix-ounce coated phial, or even a ſmaller one. They may be alſo burned by a ſingle ſpark from a large prime-conductor.

Experiment 7. *To ſhew that the focus of a burning glaſs is not a conductor of electricity.*

Let a wire, that proceeds from the outſide of a charged Leyden phial, come within an inch of the knob of that phial, or, in ſhort, ſo as to be very little farther from it than the ſtriking diſtance. Let then the focus of the ſolar rays, that are collected by a lens or mirror, fall midway between the knob of the phial and the wire which proceeds from its outſide, and it will be found that the charge of the phial is by no means diſſipated; whereas if the flame of a candle, or any other conductor, be interpoſed between the knob and the wire, the diſcharge will take place immediately. This experiment ſeems to corroborate the ſuppoſition, that the rays of the ſun, or of light in general, have no heat in themſelves, but that they only extricate the caloric from ſuch bodies as they happen to fall upon, provided thoſe bodies obſtruct their courſe and are not tranſparent.

Experiments relating to electric Attraction and Repulſion.

The laws of electric attraction and repulſion are as follow. Bodies poſſeſſed of the ſame kind of electricity (whether poſitive or negative) repel each other; but bodies poſſeſſed of different kinds of electricity attract each other. See the article Electric *Attraction and Repulſion.*

Experiment 1. *The dancing images.*

Fig. 35. repreſents two flat circular plates, either of braſs or copper, about ſix inches in diameter. The plate A is ſuſpended horizontally from the prime conductor by means of a chain, or wire. The lower plate B, which is generally made a little larger in diameter, is ſituated parallel to the former at the diſtance of about three inches. This lower plate is fixed to the ſtand C, ſo that it may be raiſed higher or lower, which is accompliſhed by the following ſimple conſtruction. A ſmooth and ſtraight wire is rivetted in the centre of the plate B, and moves in a hole made through the axis of the ſtand C, which, by being ſlit along an inch or two from the top, is rendered ſpringy, ſo as to hold the above-mentioned wire pretty tight in any ſituation. The ſtand C reſts upon the table, &c.

Place any kind of light bodies upon the lower plate B, ſuch as bran, bits of paper, pieces of gold-leaf, &c. then work the electrical machine which ſtands contiguous to the other end of the prime conductor, and the light bodies will ſoon move between the two plates, leaping alternately from the one to the other with conſiderable velocity. If inſtead of bran, or irregular pieces of other matter, ſmall figures of men and other things cut in paper, and painted, be put upon the lower plate, theſe will generally move in an erect poſition, but will ſometimes leap one upon another, or will exhibit different poſtures, affording a pleaſing entertainment to an obſerving company. In this experiment both the attraction and the repulſion are obſerved at the ſame time; and the reaſon of theſe phenomena is explained in the article Electric *Attraction and Repulſion.*

Experiment 2. *The electric well.*—Place upon an inſulating ſtand a metal quart mug, or ſome other conducting body nearly of the ſame form and dimenſions. Faſten a ſhort cork-ball electrometer to the extremity of a ſilk thread that proceeds from the ceiling of the room, or from ſome convenient ſtand, ſo that the electrometer may be ſuſpended within the mug, and no part of it may be above the aperture thereof. This done, electrify the mug, by giving it a ſpark with an excited electric or otherwiſe; and you will find that the electrometer, whilſt it remains in that inſulated ſituation, even if it be made to touch the ſides of the mug, is not attracted by it, nor does it acquire any electricity; but if, whilſt it ſtands ſuſpended within the mug, a conductor, ſtanding out of the mug, be made to communicate with the electrometer, or is only preſented to it, then the electrometer acquires an electricity contrary to that of the mug, and is of courſe immediately attracted by it.

The reaſon why, in this experiment, the electrometer contracts no electricity, whilſt it remains ſuſpended entirely within the cavity of the mug, is that the electricity of the mug acts upon the electrometer on all ſides, hence the electrometer has no opportunity of parting with its electric fluid, when the mug is electrified poſitively; nor of receiving any, when the mug is electrified negatively. But as ſoon as any conductor communicates with it, the electrometer becomes immediately poſſeſſed of the electricity contrary to that of the mug, &c. If, by raiſing the ſilk thread a little way, part of the electrometer, *viz.* of its linen threads, be lifted juſt above the mouth of the mug, the balls will be immediately attracted; for in this caſe the action of the electricity of the mug will enable the electrometer to receive from, or to impart to, the contiguous air, ſome electric fluid; or elſe the electric fluid of the balls may be crowded upon that part of the linen threads which project above the aperture of the mug, &c. hence the balls will acquire an electricity contrary to that of the mug, and will of courſe be attracted by it.

The electricity which is communicated to the mug reſides entirely upon its external ſurface, for the air contiguous to it can eaſily acquire the contrary electricity; but no electricity can be manifeſted on the internal ſurface of the mug, becauſe the air within that cavity, being entirely ſurrounded by the electrified mug, cannot acquire the contrary electricity, excepting towards the aperture of the mug, where in fact a little electricity is to be obſerved.

Experiment 3. *The electrified capillary ſtream.*—Let a ſmall metallic bucket, nearly full of water, be ſuſpended to the prime conductor, and let the water proceed from it. drop after drop, either by means of a glaſs capillary ſyphon, as repreſented in *fig.* 36, or by means of a hole in the bottom, as repreſented in *fig.* 37. In this diſpoſition, if the electrical machine be put in action, the water, which, when not electrified, only dropt from the aperture, will now run in a full ſtream, which will even be ſubdivided into other ſmaller ſtreams; and, if the experiment be made in the dark, it will appear beautifully illumined. The abbé Nollet, who made a vaſt number of experiments reſpecting this electrified ſtream, as well as on the action of electricity in evaporations, obtained the following reſults.

The electrified ſtream, though it divides, and carries the liquid a great way, is neither ſenſibly accelerated nor retarded, when the pipe through which it iſſues is not leſs than a French line in diameter.

Under this diameter, if the tube is wide enough to let the liquid run in a continued ſtream, electricity accelerates it a little, but leſs than a perſon would imagine, if he judged by the number of jets which are formed, and by the diſtance to which they go.

If the tube be a capillary one, from which the water only drops naturally, the electrified jet not only becomes a continued ſtream, and even divided into ſeveral ſtreams, but is alſo conſiderably accelerated; and the ſmaller the capillary tube is, the greater, in proportion, is the acceleration.

So great is the effect of the electric virtue, that it drives the water in a conſtant ſtream out of a very ſmall capillary tube, out of which it had not before been able even to drop.

Electricity augments the natural evaporation of fluids, for, excepting mercury and oil, all the others that were tried ſuffered a diminution, which could not be aſcribed to any other cauſe than electricity.

If it be communicated to inſulated fruits, fluids, and, in general, to bodies of every kind, which are actually in a ſtate of evaporation; it increaſes that evaporation in a greater or leſſer degree, according as thoſe bodies are naturally more or leſs evaporable, according as the veſſels which contain them are conductors or electrics, and as they expoſe a greater or leſſer ſurface to the open air. But from ſome very accurate experiments made by M. De Sauſſure with his hair hygrometer, it appears that the electricity promotes the evaporation of thoſe bodies which are ſuperſaturated with water, but not of thoſe which do not contain a ſuperabundant quantity of it.

Experiment 4. *The electrified bells.*—A ſhort deſcription of this experiment is contained in the article Bell, but inadvertently, without referring to the figure; we ſhall therefore ſupply the defect in this place, and ſhall add ſome other varieties of this entertaining apparatus. *Fig.* 38. *Plate* V. repreſents the bell apparatus in its ſimple and original ſtate. A B is a piece of braſs to which the three braſs bells C, E, G, and the two braſs balls, or clappers, D, F, are faſtened; the two bells C and G being ſuſpended by braſs chains; and the middle bell with the two clappers being ſuſpended by ſilk threads. A chain likewiſe proceeds from the inſide of the middle bell E, and falls upon the table. This machinery is ſuſpended at the end of the prime conductor by paſſing the knobbed wire, which is uſually affixed thereto, through the hole H.

Fig. 39. is another mode of mounting the bells. The pillar A is of glaſs; the horizontal wires at the top of it are of braſs, and are faſtened to the braſs ball *a*. The four bells *o*, *o*, *o*, *o*, are ſuſpended to the extremities of the horizontal wires by means of wires or chains; the four clappers are ſuſpended by ſilk threads; and the middle bell *c* is fixed to the ſtand which is a conductor. When this apparatus is to be uſed, it muſt be placed upon a table with the knob *a* in contact with the prime conductor. In that ſituation, if the electrical machine be put in action, the four bells *o*, *o*, *o*, *o*, becoming electrified, attract the clappers; theſe become electrified and are repelled by thoſe four bells, and ſtrike againſt the middle bell *c*, upon which they depoſit their electricity, and are then again attracted by the four bells, &c. ſo that the ringing continues as long as the electrical machine is kept in action.

Fig. 40. repreſents another ſet of bells, in which the bells are differently tuned, and they are ſtruck ſucceſſively by the ſame clapper. Theſe bells are fixed all round the bottom board *h i k*, from the middle of which a glaſs pillar riſes, to the top of which a pointed wire is faſtened, and upon this wire the flyer *b c d* reſts, like the magnetic needle of a compaſs. (The nature of this flyer will be ſhewn in the ſequel of this article.) From one arm of the flyer a wire *g* proceeds, which nearly reaches the bottom board, and a clapper, ſuſpended by a ſilk ſtring, is faſtened to the ſame arm of the flyer between the wire *g* and the apex *d*. To uſe this apparatus, the prime conductor muſt be removed from the electrical machine, and the bell apparatus is placed ſo, that the flyer *b c d* may come very near the cylinder of the machine. In this ſituation, if the machine be worked, the electricity of the cylinder will cauſe the flyer to turn in a direction contrary to the pointed extremities of its arms, and at the ſame time the clapper will ſucceſſively ſtrike each of the bells and the vertical wire *g*, the reaſon of which may be eaſily derived from what has been ſaid above reſpecting the other bells.

Experiment 5. *The artificial ſpider ſeemingly animated by electricity.*—*Fig.* 41. repreſents a Leyden phial, to the outſide of which the braſs hoop and arm *a b c* is fixed. The ball *c* of this braſs arm riſes to the ſame level as the ball *d*, which communicates with the inſide coating of the phial; *e* is an artificial ſpider made of cork, with a few ſhort threads run through, to repreſent its legs. This ſpider is ſuſpended by a ſilk thread, which proceeds from the ceiling of the room, or from any other convenient ſupport, ſo that the ſpider may hang mid-way between the two balls *d* and *c*, when the Leyden phial is not charged. Let the place of the phial upon the table be marked; then charge this phial by putting its ball *d* in contact with the prime conductor, &c. and replace it in the above-mentioned ſituation. The ſpider will now begin to move from one ball to the other, and back again, and will continue this motion for a conſiderable time; ſometimes for ſeveral hours.

The inſide of the Leyden phial being charged poſitively, the ſpider is attracted by the ball *d*, which communicates to it a ſmall quantity of electricity; the ſpider then becoming poſſeſſed of the ſame kind of electricity as the ball *d*, is repelled by it and is attracted by the ball *c*, whereupon it depoſits its electricity, and is afterwards attracted again by *d*, and ſo on. In this manner the phial is gradually diſcharged.

Experiment 6. *To ſpin ſealing-wax by means of electricity.* Stick a ſmall piece of ſealing-wax on the extremity of a wire, and warm it ſo as to render it ready to drop; and at the ſame time let the electrical machine be worked; then ſtop the motion of the machine, and inſtantly bring the hot ſealing-wax within four or five inches of the prime conductor, moving it about in a winding direction, and you will find that the ſealing-wax throws ſeveral exceedingly fine threads to the prime conductor, which appear like red wool. This experiment anſwers beſt when the conductor is covered with varniſh.

Mr. Adams deſcribes this experiment in the following manner. "Stick," he ſays, "a piece of ſealing-wax on the conductor, in ſuch a manner as it may be eaſily ſet on fire by a taper. While it is flaming, turn the cylinder, the wax will become pointed and ſhoot out an almoſt inviſible thread into the air, to the length of a yard and more. If the filaments that are thrown out by the wax are received on a ſheet of paper, the paper will be covered with them in a very curious manner; and the particles of the wax will be ſo far ſub-divided as to reſemble fine cotton. To faſten the piece of wax conveniently to the conductor, ſtick it firſt on a ſmall piece of paper, then twiſt the end of the paper ſo as to fit one of the holes which are made in the prime conductor; when it is thus placed, it may be eaſily fired by a taper."

Experiment 7. *The dancing balls.*—Fix a pointed wire upon the prime conductor, with the point outwards; then take a glaſs tumbler, graſp it with your hands, and preſent its inſide ſurface to the point of the wire upon the prime conductor, while the electrical machine is in motion. By this means the glaſs tumbler will ſoon become charged; for its inſide ſurface acquires the electricity from the point, and its outſide loſes its natural quantity of electric fluid through the hands, which ſerve as a temporary coating. This done, put a few pith-balls upon the table, and cover them with the charged glaſs tumbler. The balls will immediately begin to leap up along the ſides of the glaſs, as repreſented in *fig.* 42; and will continue that motion for a conſiderable time.

In this experiment the pith-balls are attracted and repelled by the electrified inſide ſurface of the glaſs, the electricity of which they gradually conduct to the table, or other conducting body, upon which the glaſs is ſet; at the ſame time that the contrary electricity of the external ſurface of the glaſs is communicated to the ſurrounding air.

Experiment 8. *The electrified head of hair.*—If a perſon, having pretty long hair, not tied up, upon his head, be placed upon an inſulating ſtand, and, by means of a wire, or chain, or by touching it with his extended hand, be connected with the prime conductor, and the electrical machine be put in action, the hairs on his head, by repelling each other, will ſtretch out in a ſurpriſing manner. Inſtead of a human being, a ſmall wooden head, covered with hair, is placed upon the prime conductor, and, on working the machine, the hair will be all ſtretched out, like the rays diverging from a centre. The ſame thing will take place if a downy feather, or a bundle of threads, tied up at one end, like a taſſel, be fixed to the prime conductor.

Experiment 9. *The metallic leaf ſuſpended in the air.*—Cut a piece of gold, or ſilver, or braſs leaf, in the form of a ſquare, or of a lozenge, like A, *fig.* 43; place it upon a broad metallic plate B, and hold the plate under the ball of the wire, which is uſually fixed to the end of the prime conductor. On working the machine, the metallic leaf will riſe from the plate B, and will remain ſuſpended between that plate and the ball C, with one point, or angle, towards the one, and the oppoſite towards the other, without touching either. This effect is owing to the action of the points of the leaf; for the point enables the leaf to abſorb the electric fluid from the prime conductor, without actually touching it, and the oppoſite point diſcharges that fluid upon the plate B alſo without actual contact. If the plate B be moved round the ball C, as repreſented at D, the leaf will alſo move round without touching either ball or plate.

Experiments relating to electric Light.

The two electricities produce peculiar luminous appearances, which are particularly deſcribed under the article Electric Light; but it is neceſſary in this place barely to mention, that a pointed conductor, proceeding from a body poſitively electrified, is, in the dark, illuminated with a pencil of light; but, if the body be electrified negatively, the point will be illumined with a ſtar, or globule of light, provided the electrified body is electrified powerfully enough. If a pointed conductor be preſented to an electrified body, the above luminous appearances are reverſed; *viz.* a pencil of light will appear upon the point when the body is electrified negatively, and a ſtar when the body is electrified poſitively.

Experiment 1. *The ſpiral tube.*—*Fig.* 44. repreſents an inſtrument compoſed of two glaſs tubes C, D, one within the other, and cloſed with two knobbed braſs caſes A and B. The innermoſt of theſe tubes has a ſpiral row of ſmall round pieces of tin-foil, ſtuck upon its outſide ſurface, and lying at about one-thirtieth of an inch from each other. If this inſtrument be held by one of its extremities, and its other extremity be preſented to the prime conductor, every ſpark that it receives from the prime conductor will cauſe ſmall ſparks to appear between all the round pieces of tin-foil that are ſtuck upon the inner tube, which, in a dark room, affords a pleaſing ſpectacle; the inſtrument appearing encompaſſed by a ſpiral line of fire.

The ſmall pieces of tin-foil are alſo ſtuck upon a flat plate of glaſs, ſo as to repreſent curve lines, flowers, letters, &c. and they are illumined after the ſame manner as the ſpiral tube. But the beſt way of exhibiting a luminous word is to ſtick a long ſlip of tin-foil, in a zig-zag manner, upon a flat plate of glaſs, one end of this ſlip communicating with a braſs knob on one of the glaſs plates, and the other extremity communicating with a hook, or another braſs ball on the oppoſite ſide of the glaſs. The letters are formed by cutting ſmall interſtices in the parallel ſlips of tin-foil. A plate of this ſort is repreſented in *fig.* 45, where *h* is the hook to which a chain is ſuſpended, and G is the braſs ball which, being preſented to the prime conductor, receives the ſparks, &c.

If the ſurface of the glaſs plate, oppoſite to that upon which the tin foil is ſtruck, is pointed with different tranſparent colours, the ſparks will appear tinged of the colours through which they are ſeen.

Experiment 2. *The artificial Bolonian ſtone, and other phoſphoreſcent ſubſtances, illumined by the electric light.*

The penetrability of the electric light is ſhewn in a very ſtriking manner, either with the real, or with the artificial Bolonian ſtone, which was invented by Mr. Canton, and is prepared in the following manner. "Calcine ſome common oyſter-ſhells, (if they be old, and half calcined by time, as are commonly found upon the ſea-ſhore, they are much better for this purpoſe,) by keeping them in a good coal-fire for half an hour. Let the pureſt part of the calx be pulverized and ſifted; mix three parts of this powder with one part of flowers of ſulphur; let this mixture be rammed into a crucible of about an inch and a half in depth, till it be almoſt full; and let it be placed in the middle of the fire, where it muſt be kept red hot for one hour, at leaſt, and then ſet it by to cool: when cold, turn it out of the crucible, and cutting, or breaking it to pieces, ſcrape off, upon trial, the brighteſt parts, which, if good phoſphorus, will be a white powder, and may be preſerved by keeping it in a dry phial well ſtopped."

If this phoſphorus, whether in or out of the phial, be kept in the dark, it will not give any light; but if it be expoſed to the light either of the day, or of any luminous object, and be afterwards brought into a dark place, it will then appear lucid for a conſiderable time. When good, about a quarter of an ounce of this phoſphorus, in a two-ounce phial, will, after having been expoſed to the light, and then brought into a dark place, afford light ſufficient for reading the hour upon a watch. For farther particulars reſpecting this phoſphorus, ſee the 58th vol. of the Phil. Tranſ. See Bononian *Stone* and Phosphorus.

If the phial containing ſome of the above deſcribed phoſphorus be held near the prime conductor, when a few ſtrong ſparks are drawn from it, within three or four inches of the phial, in a dark room; the phoſphorus will be illumined by them, and will afterwards continue to ſhine for about three or four minutes, the light, however, gradually decreaſing. This is the ſimpleſt way of exhibiting this phoſphorus; but, with very little trouble, various curious preparations may be made with it, which we ſhall now proceed to deſcribe, obſerving, once for all, that though ſtrong ſparks will illuminate this phoſphorus ſufficiently well, when taken near it; yet the light which is afforded by the diſcharge of a Leyden phial will produce the effect in a ſuperior manner.

This phoſphoric powder may be ſtuck upon a board by means of the white of an egg, ſo as to repreſent figures of the planets, letters, or any thing elſe at pleaſure; and theſe repreſentations may be illumined in the above-mentioned manner.

A beautiful method of expreſſing geometrical figures with the above-mentioned phoſphorus is as follows. Bend ſmall glaſs tubes, of about the tenth part of an inch in diameter, in the ſhape of the intended figures, and then fill them with the phoſphoric powder. Theſe tubes, ſo filled, may be illumined in the manner already deſcribed, and they are not nearly ſo ſubject to be ſpoiled as the figures repreſented upon a board.

When this phoſphorus is ſtuck uniformly upon a card, place a ſmall key upon it, and diſcharge a Leyden jar very near it, in a dark room. This done, lay hold of the card by one corner, and throw off the key. The phoſphorus will appear illumined all over the card, excepting where the key ſtood, and the repreſentation of the key will be ſo exact, that a ſpectator will hardly believe that the key has been removed.

When oyſter-ſhells are thrown careleſsly into the fire, and are kept therein different lengths of time, they acquire different degrees of phoſphoric power, and ſome of them, when afterwards illumined by the electric light, will exhibit the priſmatic colours in a beautiful manner. But beſides the oyſter-ſhells, almoſt all calcareous ſubſtances, when dry and hot, and eſpecially when burned to lime, have the property of being illumined by the diſcharge of a Leyden phial paſſed over their ſurfaces; and of continuing to ſhine for about a few ſeconds, or a minute, or even longer. Paper, or a card, made very dry and hot, has the ſame property. When a jar is diſcharged through a piece of loaf-ſugar, the ſugar is generally broken, and every piece is beautifully illuminated.

Experiment 3. *The aurora borealis, and Leyden vacuum.*—Take a phial nearly of the ſhape and ſize of a Florence flaſk; fix a ſtop-cock to its neck, and exhauſt the air out of it by means of the air-pump. If this phial be rubbed in the common manner, ſuch as is uſed for exciting electrics, it will appear luminous within, being full of a flaſhing light, which much reſembles the aurora borealis, or northern lights. This phial may alſo be rendered luminous, by holding it by either end, and bringing the other end to the prime conductor, when the electrical machine is in action. In this caſe, all the cavity of the phial will inſtantly appear full of a flaſhing light, which remains in it for a conſiderable time after it has been removed from the prime conductor. And it is to be remarked, that if the phial, after it has been removed from the prime conductor, (and even ſeveral hours after its flaſhing light has ceaſed to appear,) be graſped with the hand, ſtrong flaſhes of light will immediately appear within it, which often reach from one of its extremities to the other.

There are two cauſes upon which this experiment depends. The firſt is the conducting nature of the vacuum, and the ſecond is the charging and diſcharging of the glaſs; for when the outſide of the glaſs phial is put in contact with the prime conductor, the electric fluid, which is communicated to the outſide of that part of the phial, cauſes the natural fluid belonging to the inſide ſurface to depart from its place, and to go to the oppoſite ſide of the phial; and this fluid, by paſſing through the partial vacuum, cauſes the light within the phial, which light is more or leſs ſubdivided, according as the vacuum is more or leſs perfect. Now, that part of the phial which has touched the prime conductor is actually charged; for its outſide ſurface has acquired an additional quantity of electric fluid, and the inſide ſurface has loſt part of its own; but ſince the outſide of the phial has no coating, therefore, when it is removed from the prime conductor, and is not graſped with the hand, or other conductor, the charged part of the glaſs can only be diſcharged gradually; that is, whilſt its outſide ſurface is communicating its ſuperfluous fluid to the contiguous air, the inſide ſurface acquires that fluid from the other end of the phial, and the paſſage of this fluid through the vacuum cauſes the flaſhing. When the phial is graſped with the hand then its diſcharge is accelerated.

When a phial of this ſort is coated with tin-foil on its outſide for about three or four inches, it is then called the Leyden vacuum, it being, in fact, an exhauſted Leyden phial. The *figs.* 46. and 47. repreſent this phial in its beſt conſtruction. A braſs ferrule, having a hole with a valve, is cemented to the neck of this phial, and a round braſs cap is ſcrewed over it. A wire, terminating in a point, though not a very ſharp one, proceeds from the ferrule a ſhort way within the phial. The inſide of this phial requires no coating, on account of the conducting nature of the vacuum.

This phial clearly exhibits the direction of the electric fluid, both in charging and diſcharging; for if it be held by its coated lower part, and its braſs knob be preſented to the prime conductor poſitively electrified, a pencil of light will be ſeen to proceed from the point of the wire, as in *fig.* 46; and when it is diſcharged, a ſtar or globule of light will appear in the place of the pencil, as in *fig.* 47. If the phial be held by its braſs cap, and its coated part be preſented to the prime conductor; then the point of the wire in its inſide will appear illumined with a ſtar when charging, and with a pencil when diſcharging. If it be preſented to a conductor negatively electrified, theſe appearances will be reverſed.

Experiment 4. *The luminous conductor.*—*Fig.* 48. repreſents a prime conductor invented by the late Mr. Henly, for the purpoſe of ſhewing the direction of the electric fluid by the appearances of its light. The middle part E F of this conductor conſiſts of a glaſs tube about eighteen inches long, and three or four inches in diameter. To both ends of this tube braſs pieces F D, B E, are cemented air-tight, one of which has a pointed wire C, which ſerves as a collector to receive the electric fluid from the machine, when the inſtrument is ſet near it, and the other has a knobbed wire G, from which a ſtrong ſpark may be drawn; and from each of the pieces F D, B E, a knobbed wire proceeds within the cavity of the glaſs tube. One of the braſs pieces, *viz.* either F D or B E, is compoſed of two parts; that is, a cap F, which is cemented to the glaſs tube, and has a hole with a valve by which the cavity of the glaſs tube may be exhauſted of air; and the ball D, which is ſcrewed upon the cap F. The ſupporters of this inſtrument are two glaſs pillars fixed into the bottom board H, and ſcrewed to the braſs caps, or having at their upper extremities two ſemicircular hollows, upon which the conductor is barely laid. When the glaſs tube of this conductor has been exhauſted by means of an air-pump, and the braſs ball is ſcrewed on, as repreſented in the figure, then it is fit for uſe, and may ſerve for a prime conductor to an electrical machine.

If the point C of this conductor is ſet before the excited glaſs cylinder of the machine, it will appear illuminated with a ſtar; at the ſame time the glaſs tube will appear throughout illumined with a weak light; but from the knobbed wire, that proceeds from the piece F D, within the glaſs tube, a brighter lucid pencil iſſues, and the oppoſite knob appears illumined with a ſtar or round body of light, which, as well as the pencil of rays, is very clear, and diſcernible amidſt the other light, which occupies almoſt the whole cavity of the glaſs tube. If the point C, inſtead of being preſented to the excited cylinder, be connected with the rubber of the machine, the appearances of the light within the tube E F will be reverſed; the knob which communicates with the braſs piece F D appearing illuminated with a ſtar, and the oppoſite one with a pencil of rays; becauſe in this caſe the direction of the electric fluid is juſt the contrary of what it was before, it then going from D to B, and now coming from B and going to D. If the wires within the tube E F, inſtead of being furniſhed with balls, (which, however, need not be large,) be pointed, the appearances of the light will be the ſame, but not quite ſo ſtrong in this as in the former caſe.

Experiment 5. *The viſible electric atmoſphere.*—The following curious experiment is deſcribed by the celebrated Beccaria; but it ſeems that few perſons have been able to repeat it with ſucceſs; probably owing to the great delicacy and caution with which it muſt be conducted.

G I, in *fig.* 49, repreſents the receiver with the braſs plate of an air-pump. In the middle of the plate F I a ſhort metallic rod is fixed, bearing a metallic ball B, nicely poliſhed, and about two inches in diameter. From the top of the receiver another rod A D proceeds, which is furniſhed with a like ball A, and is cemented air-tight into the neck C of the glaſs receiver. The diſtance between the two balls A and B is about four inches, or rather more. When the receiver is exhauſted of air, if the ball A be electrified poſitively, by touching the top D of the rod A D with the prime conductor, or with an excited glaſs tube, a lucid atmoſphere will appear about it, which, though it conſiſts of a feeble light, is, however, very conſpicuous, and very well defined; at the ſame time that the ball B has not the leaſt light about its ſurface. The atmoſphere does not exiſt all round the ball A; but it reaches from about the middle of the ball, to a ſmall diſtance beyond that ſide of its ſurface which faces the oppoſite ball. If the rod with the ball A be electrified negatively, then a lucid atmoſphere, like that which has been deſcribed above, will appear upon the ball B, reaching from its middle to a ſmall diſtance beyond that ſide of it which faces the ball A; and at the ſame time the ball A, which is electrified negatively, remains deſtitute of light.

In this experiment the operator muſt take care not to electrify the ball A too much, for in that caſe the electricity will paſs in the form of a ſpark from one ball to the other, and the experiment will not have the deſired effect.

Experiments to be performed with the Leyden Phial and the electrical Battery.

The properties of the Leyden phial are enumerated and explained under the article of that name, which ſee.

Experiment 1. *To pierce a card, and other ſubſtances by the diſcharge of a Leyden phial, or charged jar.*—Take a card, a quire of paper, or the cover of a book, hold it cloſe to the outſide coating of a charged jar; put one knob of the diſcharging rod upon the card, or quire of paper, &c. ſo that between the knob and the coating of the jar the thickneſs of that card, or quire of paper only, may be interpoſed; then by bringing the other knob of the diſcharging rod near the knob of the jar, make the diſcharge; and the electric matter ruſhing through the circuit, from the poſitive to the negative ſurface of the jar, will pierce a hole, and often more than one hole, quite through the card or quire of paper. This hole, or holes, are larger or ſmaller, according as the card, &c. is more damp or more dry. It is to be remarked, that if the noſtrils be preſented immediately to it, they will be affected with a ſmell ſomewhat like ſulphur or phoſphorus, and like that which is produced, though not ſo ſtrongly, by an excited electric. This hole has a bur raiſed on each ſide, excepting when the card has been preſſed too hard between the diſcharging rod and the jar, which ſhews, that the hole is made not in the direction of the electric fluid, but in every direction from the centre of the reſiſting body.

If this experiment be performed with two cards inſtead of one, which two cards, however, muſt be kept very little diſtant from each other, (which may be eaſily effected by bending a little one of the cards;) each of the cards, after the diſcharge, will be found pierced with one or more holes, and each hole will be found to have burs on both ſurfaces of each card.

If inſtead of paper, a very thin plate of glaſs, roſin, ſealing-wax, or the like, be interpoſed between the knob of the diſcharging rod, and the outſide coating of the jar; on making the diſcharge, this will be broken in pieces. Small inſects may be killed in this manner. They may be held between the outſide coating of the jar and the knob of the diſcharging rod, like the above-mentioned card; and a ſhock from a common Leyden phial, ſent through one of them, will inſtantly deprive it of life, if the inſect be very ſmall; but if larger, it will be ſtunned for a time, but it will afterwards revive. This, however, depends on the quantity of the charge and ſize of the jar, as well as the ſize of the inſect. In this experiment if the inſect, diſcharging rod, &c. be not managed properly, the charge of the jar will paſs not through, but over the inſect, in which caſe it will not produce the deſired effect.

Experiment 2. *To ſtain paper, or mark glaſs by the diſcharge of the Leyden phial.*—Lay a chain, that forms part of the circuit between the two coated ſides of a charged jar, upon a ſheet of white paper, and after having made the diſcharge, the paper will be found tinged with a blackiſh tinge at the places which correſponded to the junctures of the links. If the charge be very great, the paper, inſtead of being ſtained with ſpots, will be found burned quite through. If the chain be laid upon a pane of glaſs, this will, after the diſcharge, be found marked with indelible ſpots, but not ſo ſtrongly as the paper.

When this experiment is performed in the dark, a ſpark is ſeen at every juncture of the links of the chain, and each ſpark is attended with a kind of radiation, as if particles of the metal in an ignited ſtate were thrown off. When the links are ſmall, and the charge of the jar is pretty high, the chain, on making the diſcharge, appears like a continued luminous line; which evidently ſhews that the electric fluid meets with ſome reſiſtance, or obſtruction, in paſſing from one link of the chain to another.

Experiment 3. *To burſt ſmall glaſs tubes by means of a Leyden phial.*—Take a narrow glaſs tube, *viz.* leſs than a tenth of an inch in diameter, fill it with water, and inſert a wire at each opening of the tube, ſo that part of the wire may project out of the tube at each end, and the other extremities may come within a ſmall diſtance of each other within the tube. If this preparation be made part of the circuit between the inſide and outſide coating of the charged Leyden phial, on making the diſcharge, the glaſs tube will be broken with violence. But in this experiment the ſize of the phial, height of the charge, &c. muſt be proportioned to the ſize of the glaſs tube; otherwiſe the tube will not be broken. In ſhort, if the diſcharge forms a viſible ſpark in the water within the tube, the latter will be broken; but if the wires are too far apart, and no ſpark takes place, then the tube will not be broken. This experiment evidently ſhews that water is a very bad conductor of electricity.

Experiment 4. *To fire gunpowder.*—Make a ſmall cartridge of paper, and fill it with gunpowder, or elſe fill the tube of a quill with it; inſert two wires, one at each extremity, ſo that their ends within the quill, or cartridge, may be about one-fifth of an inch from one another. This done, ſend the charge of a phial through the wires, and the ſpark which takes place between the extremities of the wires within the cartridge or quill, will ſet fire to the powder. If the gunpowder be mixed with ſteel filings, it will take fire more readily, and by a very ſmall ſhock.

Experiment 5. *To light a candle by the diſcharge of a jar.*—Take a wire of the ſize of a common knitting needle, and, by means of a ſlender flexible wire or chain, let one end of it communicate with the outſide coating of a Leyden jar, that contains about ten inches of coated ſurface. Twiſt, but very looſely, ſome cotton round the other extremity of the above mentioned thick wire, and ſo as entirely to conceal that extremity of the wire. This head of cotton muſt be rolled in powder of *lycopodium*, or in powder of roſin, which, indeed, anſwers better than the lycopodium, though it is not ſo clean. By this means, a good deal of the powder will adhere to the cotton. This done, the jar is charged, and then the head of cotton is brought haſtily towards the knob of the jar, ſo as to cauſe the charge to paſs through the head of cotton; on doing which the cotton will inſtantly be ſet on fire, and will continue to burn long enough to light a candle with it. This experiment was contrived by Dr. Ingenhouz.

Experiment 6. *To ſtrike metals into glaſs.*—Take two ſlips of common window glaſs, about three inches in length, and half an inch broad; put a ſmall ſlip of gold, ſilver, or braſs leaf between them, and tie them together, or preſs them between the boards of the preſs which belongs to the univerſal diſcharger (ſee Discharger), leaving a little of the metallic leaf out at the two oppoſite ends of the glaſſes; then ſend a ſhock through the metallic leaf, and the force of the exploſion will drive part of the metal into ſo cloſe a contact with the glaſs, that it cannot be wiped off, or even be affected by the uſual menſtrua which would otherwiſe diſſolve it. In this experiment the glaſſes are generally ſhattered to pieces; but whether they are broken or not, the indelible metallic tinge will always be found in ſeveral places, and ſometimes all along the ſurface of the glaſſes.

Experiment 7. *To melt wires.*—We have, in a preceding part of this article, deſcribed the melting of wires by means of an electrical battery, for the purpoſe of determining their various conducting powers. We ſhall now, however, deſcribe ſome other peculiar phenomena with which the melting of wires is attended. In melting wires of a conſiderable length, it is often to be obſerved, that when the force of the battery is juſt ſufficient to render the wire red-hot, the redneſs begins at one end of it; namely, at that which communicates with the poſitive ſide of the battery, and from thence it gradually proceeds to the other end; which affords an ocular demonſtration of the theory of a ſingle electric fluid. Indeed the wire is not rendered red-hot in one place before the other, in conſequence of the electric fluid paſſing firſt through the former, and then through the latter; for that difference of time is by no means appreciable; but becauſe the electric fluid loſes ſome of its impetus, or of its velocity, in going through the wire, in conſequence of which, that part of the wire which the electric fluid enters ſuffers the greateſt effect of the ſhock, and therefore becomes red ſooner, and in a greater degree.

If a wire be ſtretched by appending weights to it, and ſuch a battery be then diſcharged through it, as will render it barely red hot, the wire will be found to be conſiderably lengthened by it. But if the wire be left looſe, then, after a ſimilar exploſion, it will be found ſhortened. (See Nairne's paper in the 70th vol. of the Phil. Tranſ.)

If a wire be thus melted upon a piece of glaſs, the glaſs, after the exploſion, will be found marked with all the priſmatic colours. But the moſt beautiful impreſſions are made upon paper. For this purpoſe, a battery muſt be uſed of ſuch a ſize as entirely to diſperſe the wire, which muſt be laid upon a piece of white paper. The exploſion will generally fix part of the metal in its metallic ſtate into the paper, and will mark the paper on both ſides of this metallic track with a ſmoky broad band of colour, which differs according to the metal that has been exploded; the gold, for inſtance, makes a purpliſh ſtain; the ſilver, a grey, or inclining to yellow, and ſo on.

Experiment 8. *To ſhew that the electric fluid prefers a ſhort paſſage through the air to a long one through the beſt conductors.*—Take a wire of about five feet in length, or more, and bend it in the form repreſented in *fig.* 50, *viz.* ſo that the parts A, B, may come within half an inch of each other; then connect the extremities of it with the hook of a battery, and with the diſcharging rod; that is, one with the former, and the other with the latter, ſo as to ſend the charge through the wire. On making the diſcharge, a ſpark will be ſeen between A and B, which ſhews that the electric fluid prefers a ſhort paſſage through the air between A and B, to a long one through the wire. The charge, however, does not paſs entirely through the air at A B; but part of it alſo goes through the wire A D B, which may be proved by interpoſing a ſhort and very fine wire between A and B; for, on making the diſcharge, this fine wire will hardly be made red hot; whereas, if the large wire A D B be cut at D, ſo as to interrupt the circuit A D B, the ſmall wire will be melted, and diſſipated by a diſcharge ſimilar to the former.

Experiment 9. *To produce globules of metal.*—Take a ſlender wire, and inſert it in a glaſs tube of about a quarter of an inch in diameter; then ſend the charge of a battery through it, and the wire will be melted and reduced into globules of different ſizes, which will be found adhering to the inſide ſurface of the glaſs tube, and may be eaſily ſeparated from it. Theſe globules, on examination with a microſcope, will be found to be moſtly hollow, and, in truth, they are little more than a mere ſcoria of the metal.

Experiment 10. *The Fairy circles.*—Fix upon each of the knobs of the univerſal diſcharger (ſee Discharger *of Electricity*), or upon the wires which ſupport thoſe knobs, a flattiſh and ſmooth piece of metal, (watch caſes are very proper for this purpoſe,) ſo that the ſurfaces of thoſe pieces of metal may be near to each other ſufficiently for the charge of a battery to paſs from one to the other; then connect one wire of the diſcharger with the outſide coating of the battery, and the other wire, by the help of the diſcharging-rod, with the inſide coating of it, ſo as to make the diſcharge. This diſcharge will mark a beautiful ſpot upon the ſurfaces of the metal. It conſiſts of one central ſpot and ſome concentric circles, which are more or leſs numerous, and more or leſs diſtinct, according as the metal upon which they are marked is more or leſs fuſible, and according likewiſe to the power of the battery. The central ſpot as well as the circles lie at a little diſtance from one another, and they conſiſt of dots and cavities, indicating a true fuſion.

The moſt beautiful of theſe rings are produced by a number of diſcharges repeatedly taken from a large battery, every part of the apparatus remaining exactly in the ſame ſituation. If the pieces of metal receive the exploſion in vacuo, the ſpots which are formed upon them are very irregular and confuſed. This is an experiment of Dr. Prieſtley.

Theſe ſpots have been called *Fairy circles,* on account of their bearing ſome reſemblance to the ſpots ſo called, which are often obſerved upon the graſs in the fields. Theſe, which may be called natural Fairy circles in the fields, have been attributed to the action of lightning, on account of their bearing ſome reſemblance to the above-mentioned effects of electricity; the ſuppoſition, however, is not well founded; for the Fairy circles in the fields have no central ſpot, no concentric circles, nor, in general, are they of a circular form. The preſent prevailing idea reſpecting the origin of thoſe ſpots in the fields is, that they are formed by beds of muſhrooms. See the article.

Experiment 11. *To mark coloured rings upon metals.*—Fix a plain piece of metal of any kind upon one of the wires of the univerſal diſcharger, (ſee DISCHARGER *of Electricity,*) and upon the other wire fix a ſharp-pointed needle, with the point juſt oppoſite to the ſurface of the metal; then connect one wire of the diſcharger with the outſide of a battery, and the other wire with the diſcharging rod, &c. In this manner, if the diſcharges be repeatedly ſent either from the point of the needle to the piece of metal, or from the latter to the former, theſe diſcharges will gradually mark the ſurface of the piece of metal oppoſite to the point, with circles conſiſting of all the priſmatic colours; which are evidently occaſioned by very thin laminæ of the metal, raiſed by the force of the exploſions. Theſe colours appear ſooner, and the rings are cloſer to each other, when the point is ſituated nearer to the ſurface of the metal. The number of rings is greater or leſs according as the point of the needle is more or leſs ſharp; and they are repreſented equally well upon any of the metals. The point of the needle is alſo coloured to a conſiderable diſtance; the colours upon it returning in circles, though not very diſtinctly. See Prieſtley's paper in the 58th vol. of the Phil. Tranſ.

Experiment 12. *To ſhew the effects of the diſcharge of the Leyden phial upon colours.*—If cards or pieces of wood be painted with different colours, and a Leyden phial be diſcharged ſucceſſively over each coloured ſurface, black marks, more or leſs denſe and more or leſs broad, will be found marked upon them. Theſe experiments are commodiouſly performed with the univerſal diſcharger. The painted card is laid horizontally upon its tablet, and the points of its two wires (for the knobs muſt be removed) are laid in contact with the painted ſurface of the card, and at about two inches diſtance from each other. The other extremities of the wires are connected with the Leyden phial, and thus the charge is paſſed over the painted ſurface of the card. A Leyden phial, containing about a foot and a half of coated ſurface, is ſufficient for theſe experiments.

Mr. Cavallo, who originally made theſe experiments in a great variety of ways, ſays, “Vermilion was marked with a ſtrong black track, about one-tenth of an inch broad. The track was generally ſingle, but ſometimes it was divided in two towards the middle, and at other times, eſpecially when the wires were ſet at a conſiderable diſtance from each other, the track was interrupted in the middle. It often happened, but not always, that the impreſſion was ſtronger at the extremity of that wire which was connected with the poſitive ſide of the phial; whereas, the ſpot contiguous to the other wire was neither ſo ſtrongly marked, nor did it ſurround the point of that wire ſo much as the former.

“Carmine received a faint and ſlender impreſſion of a purple colour. Verdigris was ſhaken off from the ſurface of the card, except when it had been mixed with ſtrong gum-water, in which caſe it received a very faint impreſſion. White lead was marked with a ſtrong black track, not ſo broad as that on vermilion. Red lead was marked with a faint track, much like carmine. The other colours I tried were orpiment, gambodge, ſap-green, red ink, ultramarine, Pruſſian blue, and a few others, which were compounds of the above; but they received no impreſſion.”

It has been often obſerved, that when the lightning has ſtruck the maſts of ſhips, it has paſſed over ſuch parts as were covered with lamp-black and tar, or lamp-black and oil, without the leaſt injury; at the ſame time that it has ſhivered the uncoated parts. (See the 48th and 67th vols. of the Phil. Tranſ.) In order to examine this property of black paint, Mr. Cavallo inſtituted a ſeries of experiments. “I procured,” he ſays, “ſome pieces of paper painted on both ſides with oil colours, and ſending the charge of two feet of coated glaſs over each of them, by making the interruption of the circuit upon their ſurfaces, I obſerved that the pieces of paper painted with lamp-black, Pruſſian blue, vermilion, and purple brown, were torn by the exploſion; but white lead, Naples yellow, Engliſh ochre, and verdigris, remained unhurt. The ſame ſhock, ſent over a piece of paper painted very thick with lamp-black and oil, left not the leaſt impreſſion. I alſo ſent the ſhock over a piece of paper unequally painted with purple brown, and the paper was torn where the paint lay very thin, but it remained unhurt where the paint was evidently thicker. Theſe experiments I repeated ſeveral times, and with ſome little variation, which naturally produced different effects; however, they all ſeem to point out the following propoſition.

“1. A coat of oil paint, over any ſubſtance, defends it from the effects of ſuch an electric ſhock, as would otherwiſe injure it; but does by no means defend it from any electric ſhock whatever. 2. No one colour ſeems preferable to the others, if they are equal in ſubſtance, and equally well mixed with oil; but a thick coating does certainly afford a better defence than a thinner one.

“By rubbing the above-mentioned pieces of paper, I found that the paper painted with lamp-black and oil was more eaſily excited, and acquired a ſtronger electricity, than the papers painted with the other colours; and perhaps on this account it may be, that lamp-black and oil might reſiſt the ſhock ſomewhat better than the other paints.

“It is remarkable, that vermilion receives the black impreſſion when painted with lin-ſeed oil, nearly as well as when painted with water. The paper painted with white-lead and oil receives a black mark; but its nature is very ſingular. The track, when firſt made, is almoſt as dark as that marked on white lead painted with water, but it gradually loſes its blackneſs, and in about one hour's time (or longer, if the paint is not freſh) it appears without any darkneſs; and when the painted paper is laid in a proper light, appears only marked with a colourleſs track, as if made by a finger nail. I alſo ſent the ſhock over a piece of board which had been painted with white lead and oil about four years before, and the exploſion marked the black track upon this alſo; this track, however, was not ſo ſtrong, nor vaniſhed ſo ſoon, as that marked upon the painted paper; but in about two days' time it alſo vaniſhed entirely.”

Experiment 13. *To magnetize ſteel by means of electricity.*—Take a common ſewing needle, which upon trial is found not to be magnetic, place it in the circuit between the inſide and outſide of a battery, containing about eight or ten feet of coated ſurface; and ſend the charge of it through the needle. The effects will be as follow: If the needle be ſtruck, lying eaſt and weſt, that end of it which is entered by the charge, *viz.* that end which communicates with the poſitive ſide of the battery, or jar, will afterwards point north; but if the needle be ſtruck, lying north and ſouth, that end of it which lay towards the north will in any caſe point north; and the needle will acquire a ſtronger virtue in this than in the former caſe. Laſtly, if the needle is ſet perpendicular to the horizon, and the electric ſhock is given to either point of it, afterwards the lower extremity of the needle will point north. Franklin's letters, &c. p. 90; and Beccaria's Artif. Electr. § 731. to 734.

Mr. Van Marum, uſing the very large battery of the Teylerian muſeum, which contained 130 ſquare feet of coated ſurface, tried to magnetize needles made out of watch-ſprings, which meaſured 3 and even 6 inches in length; and likewiſe ſteel bars of 9 inches in length, from a quarter to half an inch broad, and about a 12th of an inch thick. It was obſerved, that, 1ſt, when the bar or needle was placed horizontally in the magnetic meridian, whichever way the ſhock entered, the end of the bar that ſtood towards the north acquired the north polarity, or the power of turning towards the north, when freely ſuſpended, and the oppoſite end acquired the ſouth polarity. If the bar, before it received the ſhock, had ſome polarity, and was placed with its poles contrary to the uſual direction, then its natural polarity was always diminiſhed, and often reverſed, ſo that the extremity of it, which, in receiving the ſhock, looked towards the north, became the north pole, &c.

2. When the bar or needle was ſtruck ſtanding perpendicularly, its loweſt end became the north pole in any caſe, even when the bar was previouſly poſſeſſed of ſome magnetic virtue, and was placed with the ſouth pole downwards; all other circumſtances being alike, the bars ſeemed to acquire an equal degree of magnetic power, whether they were ſtruck whilſt ſtanding horizontally in the magnetic meridian, or perpendicular to the horizon.

3. When a bar or needle was placed in the magnetic equator, whichever way it entered, the ſhock never gave it any magnetiſm; but if the ſhock was paſſed through its width, then the needle acquired a conſiderable degree of magnetiſm, and that end of it which lay towards the weſt became the north pole, and the other end the ſouth pole.

4. If a needle or bar, already magnetic, or a real magnet, was ſtruck in any direction, its power was always diminiſhed: and this took place with bars of conſiderable ſize; one being 7.08 inches long, 0.26 broad, and 0.05 thick.

5. Laſtly, when the ſhock was ſo ſtrong in proportion to the ſize of the needle, as to render it hot, then the needle either acquired a very ſlight magnetic power, or none at all.

Experiment 14. *To oxydate and to deoxydate metallic ſubſtances by means of electricity.*—If the charge of a battery be paſſed through a metallic oxyd, a partial deoxydation generally enſues; and it has already been obſerved in various parts of this article, that a ſtrong ſhock calcines or oxydates a metallic ſubſtance. Mr. Van Marum, uſing the ſame powerful machine which has been mentioned in the preceding experiment, and the pureſt metallic oxyds, which were confined between glaſſes whilſt the ſhock was paſſed over them; obſerved, that the oxyds were rendered metallic ſo far as to exhibit ſeveral grains of the metal, large enough to be diſcerned by the naked eye, and to be eaſily ſeparated from the reſt. With reſpect to the oxydation, whenever a ſhock was employed much greater than that which was barely neceſſary to fuſe the metal, part of the latter was oxydated, and even diſperſed into ſmoke. It is to be remarked, that this oxydation or ſmoke generally produced ſeveral filaments of various lengths and thickneſs, which ſwam in the air. It was farther obſerved, that if a conductor was preſented to theſe flying filaments of metallic oxyd, they were ſoon attracted by it; but after the firſt contact they were inſtantly repelled, and were generally broke into fragments.

Experiments producing ſeveral curious configurations by means of electricity.

Some years ago, profeſſor Lichtenberg of Gottingen produced ſeveral curious configurations by ſifting or puffing certain powders upon an excited electrophorus; and ſince that time, ſeveral ways of producing ſimilar effects have been diſcovered by various perſons. The principal method of producing theſe impreſſions in general, is to electrify a perfect or an imperfect electric, and then to throw certain powders upon it, which will diſpoſe their particles into various remarkable forms. Theſe powders may be ſifted over the electrified body from a common ſieve; they may be tied up in linen rags, and ſhook out of them; they may be projected by means of a bruſh; (*viz.* by taking a little of the powder between a finger and thumb, and drawing it over the bruſh, or by rubbing a lump of chalk, whiting, &c. over the bruſh) alſo by means of a pair of bellows. But a more commodious method is as follows: Fix a tube of glaſs, or wood, or metal, to the neck of a ſmall bottle of elaſtic gum, commonly called India rubber; put the powders, which you want to project, into this bottle, and then tie a double piece of flannel over the aperture of the tube. If this bottle, ſo prepared, be held in the hand, and be ſqueezed, by alternately opening and ſhutting the hand, the powders will be projected in a fine diffuſed manner. As for the nature of the powders, almoſt every ſubſtance that can be pulverized ſufficiently fine will produce ſome configurations when projected upon an electrified ſubſtance. Thus chalk, ſulphur, cinnabar, reſin, dragon's blood, gum arabic, evaporated decoctions of colouring woods, and many others, may be employed for this purpoſe either ſingle or mixed.

Experiment 1.—Take a pane of glaſs, clean and dry, hold it ſuſpended by one corner, or lay it flat upon a table, and draw over the ſurface of it the knob of a Leyden phial, moderately charged with poſitive electricity in its inſide. Then lift up the glaſs, if laid upon a table, and, holding it ſuſpended, project upon it, by means of the elaſtic gum bottle, a mixed powder, conſiſting of dragon's blood and gum arabic in equal parts. The two powders will be ſeparated upon the glaſs; the red powder of dragon's blood falling on certain places, ſo as altogether to form an oblong radiated track, conſiſting of two colours intermixed in a thouſand odd ways. The reaſon of this ſeparation of the powders is, that in the act of projecting them, the powders become actually electrified, and as ſome of them thereby acquire the poſitive, whilſt others acquire the negative electricity; therefore the former are attracted by thoſe parts of the glaſs, or other electric, which are electrified negatively, and the latter are attracted by thoſe parts of the electric which are poſſeſſed of the poſitive electricity.

If, inſtead of drawing the knob of the jar over the ſurface of the glaſs, you only touch the ſurface of it here and there with the knob of the jar, and then project the mixed powders as before; ſeparate ſtar-like figures will be formed about thoſe points. The ſtars, however, are more defined when a ſingle powder is projected. Their rays or ramifications ſometimes are few and ſtrong; at other times they are numerous and ſlender; and frequently they do not go quite round the points which had been touched with the knob of the jar.

Experiment 2.—Repeat the preceding experiment with this variation only; *viz.* that now the Leyden phial be charged negatively in the inſide, and the appearance of the configurations will be much different from the above deſcribed, which was produced by poſitive electricity. In the preſent, very few rays or branches will be obſerved: the powders moſtly diſpoſing themſelves in roundiſh ſpots, and generally it will be found, that a central ſpot of one powder is ſurrounded by another powder of a different colour.

Inſtead of dragon's blood and gum arabic, powders of other colours may be projected upon the pane of glaſs, ſuch as powdered Pruſſian blue, ſulphur, vermilion, roſin, &c. and thus the colours of the configurations may be varied.

Theſe powders adhere to the glaſs rather ſlightly; *viz.* ſo as not to bear being touched; yet, if a piece of paper be gently laid on the painted ſide of the glaſs, without rubbing it, and the edge of the paper be paſted all round the edge of the glaſs, the figures may be preſerved without injury. But a better method is, to lay another pane of glaſs of the ſame ſize upon the former, and to faſten them by paſting a ſlip of paper all round their edges. If powders of ſuch colours as are uſed by enamellers be projected upon glaſs or porcelain, and theſe be afterwards expoſed to a proper degree of heat in an enameller's furnace, the configurations will thereby be rendered indelible.

Experiment 3.—Take a piece of common writing paper, hold it very near the fire, ſo as to render it quite dry and very hot; lay it flat upon a dry marble ſlab, or a very dry table, and in that ſituation draw over it the knob of a charged Leyden phial, then lift up the piece of paper by one corner, and holding it ſuſpended, project upon it the mixed powder of dragon's blood and gum arabic by means of the elaſtic gum bottle. The configurations in this caſe are very beautiful, and may be made in various ſhapes, ſuch as letters, ſtars, ſtripes, &c. by moving the knob of the Leyden phial in the deſired direction; but they are of one colour; *viz.* red; for the gum arabic being nearly of the colour of the paper, cannot be diſtinguiſhed upon it. If the paper thus painted be held very near to the fire during a few ſeconds, the powder of dragon's blood being a reſinous ſubſtance, will be melted, and will be faſtened on the paper; after which the powder of gum arabic may be wiped off with a handkerchief.

Powders of other colours may be projected upon the paper after the ſame manner; but unleſs they are of a reſinous nature, ſo as to be eaſily melted by heat, it is very difficult to faſten them to the paper. In theſe experiments the Leyden phial muſt not be charged too high nor too low; for, in the former caſe, the figure will be too confuſed and irregular, and in the latter it will be too faint. In order to form a neat and determinate figure, and to leave the reſt of the paper clean, the powders muſt not be projected perpendicularly to the paper, but the ſtream muſt be thrown in a direction parallel to the ſurface of the paper. It is alſo neceſſary to perform theſe experiments in as expeditious a manner as poſſible; for, if the paper be ſuffered to cool too much, or the electricity to diſſipate, the deſired effect cannot be obtained.

Experiment 4.—Inſtead of the paper, the impreſſions may be made upon marble, by drawing the knob of the charged phial over it; the marble being very dry and hot. After the ſame manner, theſe configurations may be made upon all ſorts of electric, or ſemi electric ſubſtances, and they may be preſerved by covering them with a glaſs plate, or elſe by partially melting the ſubſtance, &c. when this is of the proper nature. It is alſo practicable to tranſpoſe theſe impreſſions from the electric plate to a piece of white paper; but the method is rather tedious. See Bennet's method of performing it, in his work on electricity; or in Cavallo's Elect. 4th edit. vol. iii. p. 148.

Experiment 5.—A very regular figure may be formed on the ſurface of a reſinous plate in the following manner. Lay the reſinous plate upon a table, inſulate one or more pointed wires over the plate, with their points directed towards its ſurface, and diſtant about an inch and an half, or two inches. Then, by touching theſe wires alternately with a poſitive and a negative Leyden phial, throw the alternate ſparks upon the reſinous ſurface, and afterwards, by projecting powders of different colours, you will obtain very regular figures, conſiſting of concentric zones of different colours, which aſſume the forms of circles, of ellipſes, or of other curves, according as one or more pointed wires are uſed, and according as thoſe wires are ſituated nearer to, or further from, each other.

Experiment 6.—Cut a figure of any ſort out of the middle of a card, as, for inſtance, a profile, a flower, &c. Place a piece of white ſilk (white ſatin anſwers very well) upon a table; lay the card upon it, and a gold leaf over the card; in which caſe it is evident, that the gold leaf will touch the ſilk only within the limits of the figure that has been cut out of the card. This done, lay another card over the gold leaf, and put a book, or ſomething elſe, heavy upon it to keep it down. Care, however, muſt be had to leave two projections of the gold leaf out of the cards at oppoſite ends. Laſtly, if you ſend the charge of a battery through the gold leaf, by connecting one of its projections with the inſide, and the other with the outſide of the battery, the gold leaf will be melted, and will be forced into the ſubſtance of the ſilk, ſo as to ſtain it with a purple ſpot of the ſhape and ſize of the figure cut in the card. The battery for this experiment muſt have force ſufficient to melt the gold leaf completely. By uſing different metallic leaves, and different figures, various beautiful ornaments may be marked upon ſilk.

Experiment 7.—Hold a piece of writing paper near the fire to render it dry and warm, then lay it upon a table, and rub it with a dry hand, which operation will excite it. Now let a piece of ſealing-wax be lighted, and after having ſuffered it to burn for about five or ſix ſeconds, lift up the excited paper from the table, and hold it up by one corner; blow out the flame of the ſealing-wax, and preſent the melted end of it to the paper at the diſtance of about an inch, moving it quickly in various directions. In doing this, the electricity of the paper will attract the ſealing wax in the form of exceedingly fine filaments, which may afterwards be melted and faſtened to the paper, by holding the paper very near the fire for a ſhort time. A ſmall piece of ſealing-wax, ſtuck upon a wire or a pin, anſwers better than a common ſtick of ſealing-wax.

Some of the configurations deſcribed in the preceding experiments are exhibited in *Plate* VI.

Experiments relating to Knobs and Points.

Sharp or pointed bodies have the property of throwing off or of imbibing electricity incomparably better than flat or blunt bodies; and it is for this reaſon, that, in the conſtruction of electrical machines and electrical apparatus in general, points and ſharp corners, edges, &c. are avoided as much as poſſible, excepting where a point or points are particularly required; as, for the example, is the caſe at that end of the prime conductor which faces the excited electric, where the pointed wires of the collector are required for the purpoſe of imbibing the electricity. The principle upon which this property of points depends, is explained under the article Point.

Experiment 1. *To draw the electric fluid ſilently from the prime conductor.*—Let a perſon hold the knob of a braſs rod at ſuch a diſtance from the prime conductor that ſparks may eaſily fly from the latter to the former, when the machine is in action; while theſe ſparks are going off, let the ſharp point of a needle be preſented to the prime conductor, at about twice the diſtance from it that the knobbed rod is held, and you will find that no more ſparks will go to the rod; remove the needle, or cover its point with a needle, and the ſparks will be ſeen as before: preſent the needle, and the ſparks diſappear, which evidently ſhews, that the point of the needle draws off *ſilently* almoſt all the fluid that the cylinder of the machine throws upon the prime conductor. If, whilſt the pointed needle ſtands preſented to the prime conductor, you form the finger and thumb of your hand like a ring, and ſurround the point of the needle, the action of this point will be ſuppreſſed, as is manifeſted by the ſparks, that, in this caſe, will go to the rod; which ſhews, that a point will act as a point only whilſt it remains free and diſencumbered; but not when ſurrounded by other bodies.

If the needle be fixed upon the prime conductor with the point outward, then, on working the machine, no ſparks can be drawn from the prime conductor, or, perhaps, an exceedingly ſmall one when a knobbed conductor is brought nearly in contact with it; the pointed needle diſſipating the electricity in the ſurrounding air; and indeed this is an effectual method of electrifying the air of a room.

This experiment anſwers equally well with negative or with poſitive electricity. A pointed wire, fixed on the end of a ſpiral tube, ſuch as has been deſcribed in the preceding part of this article, will draw ſparks on account of the interruptions.

Experiment 2. *To diſcharge a Leyden phial ſilently.*—When a large jar is fully charged, which would give a violent ſhock, put one of your hands in contact with its outſide coating; with the other hand hold a ſharp pointed needle, and keeping the point directed towards the knob of the jar, proceed gradually towards it, until the point of the needle touches the knob. This operation diſcharges the jar completely, and the operator will either receive no ſhock at all, or ſo ſmall a one as can hardly be perceived. The point of the needle, therefore, has ſilently and gradually drawn all the charge from the inſide of the Leyden phial.

If this experiment be performed in the dark, the point of the needle will appear illumined in its way towards the knob of the phial, which is another proof of its drawing off the charge.

Experiment 3. *To obſerve the wind which proceeds from an electrified point.*—When a pointed wire (the ſharper the better) is fixed at the end of the prime conductor, or indeed in any part of it, with the point outward, let the electrical machine be put in action, and preſent the face, or the palm of the hand, to the above-mentioned point, at the diſtance of about three inches, and a wind will be perceived to proceed from it.

Faſten five or ſix pieces of paper to a cork, like the leaves of a water-wheel in hydraulics; paſs a needle, by way of an axis, through the cork, and ſuſpend it by applying the end of the needle to a magnet. Let a pointed wire be fixed at the end of the prime conductor, and preſent the paper vanes of the cork ſuſpended, &c. to the current of air which proceeds from that point, when the machine is in action; and the force of that wind will cauſe the cork to turn round.

This current of air always proceeds from the point, whether the point be electrified poſitively or negatively; therefore it is not the influx or the efflux of the electric fluid that occaſions the wind; but it is owing to the particles of air which, acquiring the ſame electricity as the pointed wire, are repelled from it in virtue of the repulſion which takes place between bodies poſſeſſed of the ſame kind of electricity, be it poſitive or negative. Other particles of air ſucceed thoſe which are repelled firſt, and theſe being electrified are alſo repelled, and ſo on.

When the wire, inſtead of a pointed termination, is furniſhed with a ball of about an inch and a quarter in diameter, a curious phenomenon may be obſerved, by preſenting the flame of a candle to it, *viz.* ſo that the middle of the flame may be even with the middle of the ball. The machine being put in action, it will be found that the flame is blown from the ball, when the latter is electrified poſitively, *viz.* when connected with the poſitive conductor; and it will be blown towards it when the ball is electrified negatively, *viz.* when it is connected with the rubber of the machine, or with a negative prime conductor; which ſeems to ſhew the real influx and efflux of the electric fluid, according to the Franklinian theory.

Experiment 4. *The electric fly, or flyer.*—*Fig.* 51. *Plate* VII. repreſents a pointed wire fixed upon the prime conductor, and ſupporting the braſs flyer, which conſiſts of ſlender braſs wires fixed to a braſs cap, which is hollow in its under ſide, and reſts in *equilibrio* upon the point of the wire W, like the magnetic needle of a compaſs. The outer terminations of the wires are pointed, and are bent all the ſame way. When the electrical machine is put in action, the fly will immediately begin to move round in an horizontal plane, and in the direction of the letters *a*, *b*, *c*, *d*, *viz.* contrary to the direction of the points of the wires. If the experiment be repeated with a prime conductor negatively electrified, the fly will turn the ſame way as before, *viz.* in the direction of the letters *a*, *b*, *c*, *d*. The reaſon of this effect depends upon the repulſion exiſting between bodies poſſeſſed of the ſame kind of electricity; for whether the fly is electrified poſitively or negatively, the air oppoſite to the points of the wires (on account of the points eaſily tranſmitting electricity) acquires a ſtrong electricity analogous to that of the points, and therefore the air and the points muſt repel each other. This explanation is confirmed, by obſerving that the above-mentioned fly not only does not move in *vacuo*, but even if placed under a cloſe receiver it will turn for a little while only, and will then ſtop; for the quantity of air within the receiver will ſoon acquire its maximum of electricity.

Fig. 52. repreſents an improved flyer, which was invented by Edward King, eſq. and is deſcribed by Mr. Ferguſon in his Select Mechanical Exerciſes. We ſhall tranſcribe Mr. Ferguſon's words.

“The ſun and earth go round the common centre of gravity between them in a ſolar year, and the earth and moon go round the common centre of gravity between them in a lunar month. Theſe motions are repreſented by an electrical experiment, as follows: The ball S repreſents the ſun, E the earth, and M the moon, connected by bended wires *a c*, and *b d*: *a* is the centre of gravity between the ſun and earth, and *b* is the centre of gravity between the earth and moon. Theſe three balls, and their connecting wires, are hung and ſupported on the ſharp point of a wire A, which is ſtuck upright in the prime conductor B of the electrical machine; the earth and moon hanging upon the ſharp point of the wire *c a e*, in which wire is a pointed ſhort pin, ſticking out horizontally at *c*, and there is juſt ſuch another pin at *d*, ſticking out in the ſame manner, in the wire that connects the earth and moon.

“ When the cylinder of the electrical machine is turned, the above-mentioned balls and wires are electrified; and the electrical fire flying off horizontally from the points *c* and *d*, cauſes S and E to move round their common centre of gravity *a*; and E and M to move round their common centre of gravity *b*. And as E and M are light when compared with S and E, there is much leſs friction on the point *b* than upon the point *a*; ſo that E and M will make many more revolutions about the point *b* than S and E make about the point *a*. I have adjuſted the weights of the balls ſo, that E and M go twelve times round *b* in the ſame time that S and E go only once round *a*. It makes a good amuſing experiment in electricity; but it is ſo far from proving that the motions of the planets in the heavens are owing to a like cauſe, that it plainly proves they are not. For the real ſun and planets are not connected by wires or bars of metal, &c.

Experiment 5. *The electrified cotton.*—Take a ſmall lock of cotton, extend it in every direction as much as may be practicable, and by means of a linen thread, about five or ſix inches long, or by a thread drawn out of the ſame cotton, tie it to the end of the prime conductor; then let the electrical machine be put in action, and the lock of cotton, on being electrified, will immediately ſwell out, by repelling its filaments from each other, and will ſtretch itſelf towards the neareſt conductor. In this ſituation, the machine continuing in action, preſent the end of a finger, or the knob of a wire, towards the lock of cotton, and this will then immediately move towards the finger, endeavouring to touch it. But take a ſharp pointed needle in the other hand, and preſent its point towards the cotton, a little above the end of the above-mentioned finger, and you will find that the cotton immediately ſhrinks upwards, and moves towards the prime conductor. Remove the needle, and the cotton will come again towards the finger. Preſent the needle, and the cotton will ſhrink again; which clearly ſhews that the needle, being ſharp pointed, draws off the electric fluid from the cotton, and puts it in a ſtate of being attracted by the prime conductor; which effect cannot be produced by a wire having a blunted end, or a round ball for its termination.

Promiſcuous Experiments.

Experiment 1. *To cryſtallize a ſolution of pot-aſh.*—Take a glaſs tube, about four inches long, and about one quarter of an inch in diameter, open at both ends. Moiſten the inſide of it with a ſtrong ſolution of pot-aſh; adapt two corks to the extremities of the tube, and introduce a wire through each cork. The extremities of thoſe wires within the tube ſhould be about three quarters of an inch diſtant from each other. This done, connect one of the wires with the outſide coating of a pretty large electric jar, and connect the other wire with the diſcharging electrometer (ſee Discharger *of Electricity*); then let the diſcharge be repeatedly paſſed through the tube, and after a certain number of diſcharges, the alkaline ſolution within the tube will give manifeſt tokens of cryſtallization.

This experiment, at an early period of the ſcience, was ſuppoſed to prove, that the electric fluid is an acid, which, combining with the alkali, neutralized it, and diſpoſed it to cryſtallize. The fact, however, is, that the exploſions, which take place within the tube, by acting on the common air, produce a certain quantity of carbonic acid, which combines with the alkali, and diſpoſes it to cryſtallize.

Experiment 2. *The inflammable-air piſtol.*—This experiment ſhews that a very ſmall electric ſpark is ſufficient to inflame hydrogen gas, or, as it was formerly called, inflammable air. The *figs.* 53. and 54. repreſent a piſtol for this purpoſe, which is made of braſs; but it is here repreſented as tranſparent, in order to ſhew its internal parts. It conſiſts of a cavity A B C, to the aperture, A, of which a cork is fitted. To the lower part of it a perforated braſs piece is ſcrewed, into which a glaſs tube D E is cemented, and within this tube a wire G F is likewiſe cemented. This wire is furniſhed with a ſmall ball at its external termination, and is bent at its other extremity, ſo as to come within about a tenth of an inch of the braſs piece. *Fig.* 54. ſhews this braſs piece with the glaſs tube, &c. ſeparate from the reſt, and it likewiſe ſhews the braſs cap I, which, when the piſtol is not uſed, is ſcrewed at H, as is ſhewn by the dotted line in *fig.* 53, and it ſerves to defend the glaſs tube E. It will be eaſily comprehended, that if a perſon holds this piſtol in one hand, and brings the ball F near the prime conductor of an electrical machine, in action, or preſents an excited glaſs tube or ſtick of ſealing-wax to it, ſo as to give a ſpark to the ſaid ball F, a ſimilar ſpark will take place between the end of the bent wire within the tube, and the braſs piece contiguous to it. When the piſtol is properly charged with the inflammable gas, and the cork is adapted to the aperture of it, if a perſon holding it by its middle, communicates a ſpark in the above deſcribed manner to the ball F; the ſpark which takes place within the piſtol will inflame the gas, which produces a loud report, and drives out the cork with great violence.

The inflammable gas for this purpoſe muſt be kept in a common bottle well corked, and when the piſtol is to be charged, the corks are removed both from the piſtol and from the bottle, the piſtol is inverted over the bottle, adapting the aperture of the one to that of the other, and after remaining in that ſituation during about 10 or 15 ſeconds, the piſtol is ſeparated from the bottle, and the corks are inſtantly replaced in both their apertures. By this operation the common air, which is in the piſtol, mixes with the inflammable gas, for this being much lighter will aſcend into the piſtol, whilſt part of the common air of the piſtol will deſcend into the bottle. The piſtol is then ready to be fired off. The form of theſe piſtols has been often diverſified. They have been rendered capable of being filled with certain determinate quantities of elaſtic fluids, and that for the purpoſe of producing the greateſt poſſible effect. They have, in fact, rendered them capable of driving a leaden bullet with conſiderable force. For the preparation of the inflammable gas, ſee the article Hydrogen Gas.

Experiment 3. *Mr. Volta's inflammable air lamp.*—*Fig.* 55. repreſents this inſtrument, which was invented by Mr. Volta. A is a glaſs globe to contain the hydrogen gas; B is a glaſs baſon or reſervoir to hold water; D is a ſtop-cock which is to form occaſionally a communication between the water in the reſervoir B and the cavity of the veſſel A. The water paſſes into the latter through the metal pipe *g g*, which is fixed to the upper part of the reſervoir A. At S is a ſmall cock, to cut off, or open, a communication with the air in the ball and the jet K. N is a ſmall pipe to hold a piece of wax-taper; L is a braſs pillar, on the top of which is a braſs ball; *a* is a pillar of glaſs furniſhed at top with a ſocket, through which a wire *b* ſlides, and a ball is ſcrewed to the end of this wire. F is a ſtop-cock, by which the ball A is filled with the inflammable gas, and which afterwards ſerves to confine the gas and the water that falls from the baſon B into the ball A.

To uſe this inſtrument, after having filled the reſervoir A with pure hydrogen gas, and the baſon B with water, turn the cocks D and S, and the water which falls from B will force ſome of the gas out of the jet K into the air. If then an electric ſpark is made to paſs from the braſs ball *m*, to the braſs ball *n*, the jet of gas out of the pipe K will be inflamed. And when it is required to put it out, the cock S firſt, and then the cock D muſt be ſtopped, *viz.* muſt be turned ſo as to cut off the communication.

To fill the veſſel A with inflammable gas; having previouſly filled A with water, place the foot R under water, on a board or ſtool in a large tub of water, then the gas is conveyed by a bent glaſs tube from the veſſel in which that gas is generated, to the aperture under the foot R; whence the gas aſcends into the veſſel A, and the water comes out of it at the ſame time. When A is full of the gas, the cock F is ſhut up, and the veſſel is taken out of the water, &c. (See PNEUMATIC *tub*, and HYDROGEN GAS.) This inſtrument is uſeful for lighting a candle, and of late it has been much improved, ſo that it is now ſold in London expreſsly for that purpoſe. Theſe improved inſtruments contain alſo an electrophorus, and the whole is diſpoſed ſo, that by turning a ſingle cock, the ſtream of gas is forced out of the pipe, and is lighted at the ſame time. A more particular deſcription of theſe improved inſtruments belongs to other ſubjects.

Experiment 4. *To inflame ſpirits of wine by means of electricity.*—The power of the electric ſpark is ſufficient to inflame inflammable ſpirits when it is paſſed through them, and eſpecially when the ſpirits are a little warm.

Suſpend to the prime conductor a ſhort rod, having a ſmall knob at its end; pour ſome ſpirit of wine, a little warmed, into a metal ſpoon. (The beſt way of warming the ſpirits is to hold the ſpoon over the flame of a candle during a minute at moſt.) Hold the ſpoon by the handle, and place it ſo that the above-mentioned ſmall knob may ſtand at about the diſtance of one inch above the ſurface of the ſpirit. In this diſpoſition, if the electrical machine be put in action, by turning the winch, a ſpark will come from the little knob to the ſpoon, which, by paſſing through the ſpirit of wine, will ſet in on fire. Care, however, muſt be had, that the ſpark does not fly from the knob to the edge of the ſpoon; for in this caſe the ſpirit will not be inflamed. On this account it is proper to uſe a large ſpoon.

This experiment ſucceeds equally well whether the conductor be electrified poſitively or negatively; it being not the direction, but the rapid motion of the electric fluid, that ſets the ſpirit on fire.

This experiment may be varied different ways, and may be rendered very amuſing to a company of ſpectators. A perſon, for inſtance, ſtanding upon an inſulating ſtool, and communicating with the prime conductor, may hold the ſpoon with the ſpirits in his hand, and another perſon, ſtanding upon the floor, may ſet the ſpirits on fire, by bringing his finger within a ſmall diſtance of its ſurface. Inſtead of uſing his finger, he may inflame the ſpirits by preſenting a piece of ice, which will render the effect more ſurpriſing. If the ſpoon is held by the perſon who ſtands upon the floor, and the inſulated perſon brings ſome conducting ſubſtance over the ſurface of the ſpirits, the experiment will ſucceed equally well.

Mr. Winkler ſays that oil, pitch, and ſealing-wax, might be lighted by electric ſparks, provided thoſe ſubſtances were firſt heated to a degree next to kindling. Prieſtley's Hiſt. of Elect. period vii.

Experiment 5. *To cauſe the mercury to riſe in a thermometer by means of electricity.*—Fix a wooden ball to the wire that proceeds from the extremity of the prime conductor, and place another like wooden ball on a wire, or other conductor, that communicates with the earth, at about half an inch diſtance from the other ball; in which ſituation it is clear, that when the machine is in action, a ſtream of electric fluid will paſs from one ball to the other. Now if you place the bulb of a mercurial thermometer in that ſtream, *viz.* between the two wooden balls, the mercury will be gradually raiſed in it by the action of the electric ſtream. By continuing to work the machine, the mercury may be raiſed ſeveral degrees above its former ſtation.

For this experiment the bulb of the thermometer muſt be quite detached from the ſcale, ſo that the ſcale may begin at leaſt three inches above the bulb. This experiment, upon the whole, ſeems to anſwer beſt when the balls are of ſoft wood. Mr. Adams ſays, "with a cylinder of about ſeven inches and a half in diameter, the fluid paſſing from a ball of lignum vitæ to a ball of beech, and thence to the ground, elevated the quickſilver in the thermometer from 68° to 110°, repeatedly to 105°. The thermometer was raiſed from 68° to 85°, by the fluid paſſing from a point of box to a point of lignum vitæ; from 67° to 100°, from a point of box to a ball of box; from 66° to 100°, from a ball of box to a braſs point; from 69° to 100°, from ball to ball; the bulb of the thermometer covered with flannel." Adams's Eſſ. on Elect. p. 58.

Experiment 6. *The atmoſphere of ſmoke.*—Take a braſs ball, or any piece of metal that is free from points or edges, of about three or four inches in diameter, and inſulate it upon a narrow inſulating ſtand; then give it a ſpark with the knob of a charged phial, and immediately after preſent it to a wax taper juſt blown out and ſmoking. The ſmoke, in this caſe, will be attracted by the electrified body, and, by encompaſſing that body, will form a kind of atmoſphere about it. This atmoſphere will remain for a few ſeconds, and afterwards, beginning from the bottom, will gradually vaniſh, until at laſt, entirely departing from the electrified body, it goes off in a ſlender column, that ſoon rarefies and diffuſes itſelf into a conſiderable ſpace.

This experiment will not ſucceed unleſs it be performed in very dry weather, and in a room where the air is not agitated. Care muſt alſo be taken, that in blowing out the taper, and in preſenting it to the electrified body, the air be diſturbed as little as poſſible.

The effect which is produced in this experiment is far from proving the exiſtence of any electrical atmoſphere, as ſome perſons have been induced to ſuppoſe. The ſmoke is attracted by the electrified body in the ſame manner, and for the ſame reaſon, that other bodies are attracted by it. The ſmoke remains ſuſpended about that body, and cannot all come into contact with its ſurface, on account of its elaſticity. It remains ſo long ſuſpended about the electrified body, and is not immediately repelled, becauſe it is a bad conductor, and acquires the electricity very ſlowly; but when it has acquired a ſufficient quantity of that power, it begins to quit the electrified body, and aſcending in the air, expands itſelf into a large ſpace, in conſequence of the repulſion which takes place amongſt its own electrified particles.

Experiment 7. *The electrified cup and chain.*—Inſulate a metallic cup, or any other concave piece of metal, and within it place a pretty long metallic chain, having a ſilk thread tied to one of its extremities. To the handle of the cup, or to a wire proceeding from it, ſuſpend a cork ball electrometer; then electrify the cup by giving it a ſpark with the knob of a charged phial, in conſequence of which the balls of the electrometer will immediately diverge. If in this ſituation one end of the chain, held by the ſilk thread, be gradually raiſed above the cup, the other end remaining in it, the balls of the electrometer will converge a little, and more or leſs in proportion to the elevation of the chain above the cup. Lower the chain again, and the divergency of the electrometer will be increaſed, and ſo on; which proves that the electricity of the cup and chain together is more denſe when theſe bodies are in a compact, than when they are in a more extended form; or that the denſity of the electric power is nearly, if not exactly, in the inverſe proportion of the ſurface; ſo that if equal quantities of electricity be communicated to two bodies differing in the extenſion of their ſurfaces, the electric virtue will be denſer upon the ſmall than upon the large ſurface. And two bodies of equal and ſimilar ſurfaces, but one of them hollow and the other ſolid, will acquire an equal ſhare of electricity if they are both, at the ſame time, brought in contact with the prime conductor, or with any other electrified body.

The ſame property was ſhewn by T. Ronayne, eſq. in the following different manner: He excited a long ſlip of white flannel, or a ſilk ribbon, by rubbing it with his fingers; then, by applying his hand to it, took off as many ſparks as the excited electric would give; but when the flannel, or ſilk, had loſt the power of giving ſparks in this manner, he doubled or rolled it up, in conſequence of which the contracted flannel, &c. appeared ſo ſtrongly electrical as to give ſparks even ſpontaneouſly.

Experiment 8. *To pierce holes through glaſs by means of electric ſparks.*—Take a common phial, or let a glaſs tube of any diameter, and about four or five inches long, be cloſed either hermetically, or by means of ſealing-wax, at one end, and fill about the half of it with olive oil; then ſtop the aperture with a cork, through which a wire muſt be paſſed. This wire muſt come ſo far within the tube, as to have its extremity below the ſurface of the oil, and muſt be bent ſo as to touch the ſurface of the glaſs. Things being thus prepared, bend the external part of the wire in the form of a ring, and ſuſpend it together with the phial, or tube, to the wire at the extremity of the prime conductor. Now put the electrical machine in action, and bring the knuckle of a finger, or the knob of a wire, near the outſide of the tube, juſt oppoſite to the extremity of the wire within; the conſequence will be, that a ſpark paſſes from the wire to the knuckle, which makes a hole, and ſometimes more than one hole through the glaſs. By turning the wire about, or by raiſing and lowering it, many holes may be ſucceſſively made in the ſame phial or tube, after the above-mentioned manner.

It is very remarkable, that ſo ſmall a force as a ſimple ſpark from an ordinary electrical machine ſhould perforate a ſubſtance ſo hard as glaſs. It has ſometimes made a hole through glaſs that was nearly a quarter of an inch thick. It ſeems that the oil, being an electric, prevents the electricity of the ſpark to ſpread beyond the very narrow place on the ſurface of the glaſs which touches the point of the wire, and that the ſpark becomes ſo powerful in conſequence of its being ſo confined or concentrated.

Experiment 9. *To ſhew the direction of the electric fluid in the diſcharge of a Leyden phial by the flame of a wax taper.*—Remove the circular tablet from the middle of the univerſal diſcharger. (See DISCHARGER.) Fix the two wires of that inſtrument in the ſame horizontal direction, and ſo that their knobs may be about two inches diſtant from each other. Fix a piece of wax-taper, lighted, ſo that its flame may ſtand midway between the two knobs. Having diſpoſed the apparatus in this manner, if you connect, by means of a chain or otherwiſe, the outſide of a charged jar with one of the horizontal wires of the univerſal diſcharger, and bring the knob of the jar to the other wire, you will obſerve, that on making the diſcharge, (which muſt paſs from one knob to the other, through the flame of the wax taper,) the flame is always driven in the direction of the electric fluid, that is, it will be blown upon the knob of that wire which communicates with the negative ſide of the jar.

In this experiment the jar muſt have an exceedingly ſmall charge, *viz.* juſt ſufficient to paſs from one knob to the other, which experience will preſently determine, otherwiſe the experiment will either not ſucceed, or it may be rendered equivocal. The reaſon why this experiment does not ſucceed with a high charge ſeems to be, that the high charge, in conſequence of its extended ſphere of action, diſturbs the flame of the wax taper before the actual diſcharge takes place.

Experiment 10. *To render the direction of the electric fluid conſpicuous, by the motion of a pith ball.*—Bend a card lengthways over a round ruler, ſo as to form a channel or ſemicircular groove; or cut a piece of baked wood in the ſhape of an oblong channel; for this piece of wood, being painted over with lamp-black and oil, will anſwer better than the card. Lay this channel upon the tablet of the univerſal diſcharger; place a pith-ball, of about half an inch in diameter, in the middle of the channel; then at equal diſtances, about half or three-quarters of an inch from the pith-ball, lay the braſs knobs of the wires of the univerſal diſcharger, *viz.* one on one ſide, and the other on the oppoſite ſide of the pith-ball. The card or piece of wood being dry and rather warm, if you connect, by means of a chain or otherwiſe, the outſide of a charged jar with one of the wires of the univerſal diſcharger, and bring the knob of the jar in contact with the other wire, you will obſerve that on making the diſcharge, which muſt paſs from one knob to the other, and through the pith-ball, the latter is always driven in the direction of the electric fluid, *viz.* it is puſhed towards that knob which communicates with the negative ſide of the jar.

This experiment demands great care and attention, and with reſpect to the charge of the jar the ſame precautions muſt be uſed in this as in the preceding experiment.

Experiment 11. *To render the direction of the electric fluid evident by the diſcharge of a Leyden phial over a card.*—Lay a wire upon a table, and place a card over the end of it. Alſo lay another ſimilar wire upon the card, ſo that the two wires may be in one direction, and their extremities at about one inch diſtance from each other. If one of thoſe wires be made to communicate with the outſide coating of a charged jar, and the other wire be made to communicate with the knob of the jar, the diſcharge muſt evidently paſs over the ſurface of the card from the extremity of one wire to that of the other; but ſince the extremities of the wires lie on oppoſite ſides of the card, it is alſo evident, that on making the diſcharge, a hole muſt be made by the electric charge in ſome part of the card. Now it will be found, that the electric fluid runs over that ſurface of the card which touches the wire that is connected with the poſitive ſide of the jar; and in order to paſs to the other wire, it breaks a hole exactly over the extremity of that wire which communicates with the negative ſide of the jar.

This curious experiment, which was invented by Mr. Lullin of Geneva, requires a jar of a moderate ſize, and moderately charged; for the diſcharge of a large Leyden phial is apt to pierce ſeveral holes, which renders the effect equivocal.

Experiment 12. *To ſhew the penetrability of the electric light.*—Let the extremities of two wires, one of which proceeds from the outſide of a charged jar, and the other is connected with one branch of the diſcharging rod, be laid upon a table at about one-tenth of an inch diſtance from each other; then place the thumb exactly over that interruption of the circuit, preſſing it flat down. Now bring the diſcharging rod in contact with the knob of the jar, and on making the diſcharge, the ſpark which neceſſarily takes place under the thumb will illuminate it in ſuch a manner as to ſhew the bone and the principal blood-veſſels. In this experiment the operator needs not be afraid of receiving a ſhock, for the diſcharge of the jar paſſes from wire to wire, and, at moſt, it only affects the thumb with a ſort of tremor, which is far from being painful.

Experiment 13. *To illuminate water.*—Let every thing be diſpoſed exactly as in the preceding experiment, excepting that inſtead of the thumb, a large clear glaſs decanter full of water be laid over the interruption of the circuit. On making the diſcharge, the water will appear illumined throughout.

After the ſame manner, *viz.* by paſſing the charge of a Leyden phial over the ſurface of a variety of bodies, or under them, or laſtly through; theſe bodies will moſtly appear illuminated at the time of the diſcharge, and ſometimes for a few ſeconds after it. Eggs are beautifully illumined by the paſſage of a charge through their ſubſtance. It needs hardly be obſerved that theſe experiments muſt be made in the dark.

Experiment 14. *To ſhew that the electric fluid drives ſmall conducting bodies in its way.*—Lay ſome braſs duſt, or braſs filings, upon a metallic plate that communicates with the inſide coating of a battery; connect the outſide of the battery with the diſcharging rod by means of a wire; charge the battery, then bring the knob of the diſcharging rod over the above-mentioned braſs duſt, and the diſcharge will be made at a much greater diſtance (more than double or treble,) than when no braſs duſt is uſed, which ſhews that the electric fluid drives the conducting duſt from the plate towards the knob of the diſcharging rod, and the particles of this duſt then ſerve as ſteps to facilitate the paſſage of the fluid. Beccaria was the firſt who advanced the propoſition, that "when the electric fluid is obliged to paſs through air, or through any other ſubſtance which obſtructs its free paſſage, it throws forward all light conducting ſubſtances which happen to be at hand, in order to facilitate its own paſſage." Dr. Prieſtley made a variety of experiments with a view of aſcertaining and of elucidating this property of the electric fluid. He formed the circuit between the two ſides of the Leyden phial by trains of braſs filings, leaving a ſmall interruption in them; he formed heaps of duſt at a diſtance from one another, &c.; but after the account of all thoſe trials he ſays, "All theſe experiments ſhew that light bodies, poſſeſſed of a conſiderable ſhare of electricity, diſperſe in all directions, carrying the electric matter to places not abounding with it; and that they ſometimes promote a ſudden diſcharge of great quantities of that matter from places where it was lodged, to places where there was a defect of it."

Experiment 15. *To take a long ſpark through an exhauſted tube.*—This experiment is extracted from a valuable paper of Mr. Morgan, who made numerous electrical experiments in vacuo. "It is," he ſays, "ſurpriſing to obſerve, how readily an exhauſted tube is charged with electricity. By placing it at ten or twelve inches from the conductor, the light may be ſeen pervading its inſide, and as ſtrong a charge may ſometimes be procured as if it were in contact with the conductor; nor does it ſignify how narrow the bore of the glaſs may be; for even a thermometer tube, having the minuteſt perforation poſſible, will charge with the utmoſt facility; and in this experiment the phenomena are peculiarly beautiful.

"Let one end of a thermometer tube be ſealed hermetically; let the other end be cemented into a braſs cap with a valve, or into a braſs cock, ſo that it may be fitted to the plate of an air pump. When it is exhauſted, let the ſealed end be applied to the conductor of an electrical machine, while the other end is either held in the hand or connected with the floor. Upon the ſlighteſt excitation, the electric fluid will accumulate at the ſealed end, and be diſcharged through the inſide in the form of a ſpark, and this accumulation and diſcharge may be inceſſantly repeated till the tube is broken. By this means I have had a ſpark 42 inches long, and had I been provided with a proper tube, I do not doubt but that I might have had a ſpark of four times that length. If inſtead of the ſealed end, a bulb be blown at that extremity of the tube, the electric light will fill the whole of that bulb, and then paſs through the tube in the form of a brilliant ſpark, as in the foregoing experiment; but in this caſe I have ſeldom been able to repeat the trials above three or four times before the charge has made a ſmall perforation in the bulb.

"If, again, a thermometer filled with mercury, be inverted into a ciſtern, and the air exhauſted ſo as to form a Torricellian vacuum, the electric light in the bulb, as well as the ſpark in the tube, will be of a vivid green; but the bulb will not bear a frequent repetition of charges before it is perforated in like manner as when it has been exhauſted by an air-pump. It can hardly be neceſſary to obſerve, that in theſe caſes the electric fluid aſſumes the appearance of a ſpark from the narrowneſs of the paſſage through which it forces its way. If a tube 40 inches long be fixed into a globe 8 or 9 inches in diameter, and the whole be exhauſted, the electric fluid, after paſſing in the form of a brilliant ſpark throughout the length of the tube, will, when it gets into the inſide of the globe, expand itſelf in all directions, entirely filling it with a violet and purple light, and exhibiting a ſtriking inſtance of the vaſt elaſticity of the electric fluid."

ELECTRICAL *Fiſhes*. All the phenomena of electricity which were known in the 15th century amounted only to the attraction of light bodies by the tourmalin when heated, and by amber, and a few other bodies, after friction. The light was diſcovered ſoon after, but the greateſt diſcoveries, which indeed excited the wonder and the aſtoniſhment of the human ſpecies, ſuch as the prodigious force of the Leyden phial, the identity of electricity, and the lightning, &c. belong entirely to the laſt century. Amongſt theſe wonders we muſt undoubtedly reckon the electricity of fiſhes, which has been diſcovered within the laſt 40 years; for though the power of benumbing, or of giving a ſhock, was long known in one of thoſe animals, namely, the torpedo, from which indeed it derived its name, yet that power was not known to be an effect of electricity before Mr. Walſh proved it within the above-mentioned period.

Four different inhabitants of the ſea have hitherto been found to poſſeſs the peculiar property of giving ſhocks ſtrong enough to ſtun, or actually to kill, ſmall animals, and the moſt probable conjecture is, that nature gave them that property for the purpoſe of procuring their food, and perhaps, too, for deterring larger animals from approaching and annoying them. Three of theſe fiſhes are called the *torpedo*, the *gymnotus electricus*, and the *ſilurus electricus*. Of the fourth fiſh, which has not yet obtained a name, we have only a ſhort and imperfect account, which we ſhall ſubjoin preſently.

Whenever a communication is made by means of ſubſtances that are conductors of electricity, between one part and another of the body of any of theſe fiſhes, and a man, or other animal, is interpoſed, *viz.* forms part of the circuit; the man or other animal feels a ſhock analogous to that which is occaſioned by the diſcharge of the Leyden phial.

If the circuit be formed of electrics, no ſhock will be felt; and if a man touch any of theſe animals with one hand only, without completing the circuit, he will, at moſt, only feel a ſlight tremor in the hand that touches the animal. The gymnotus alone affords a luminous ſpark, which becomes evident by making an exceedingly ſmall interruption in the circuit of communication. It muſt be obſerved, however, that once, and once only, the torpedo afforded a ſpark which was ſeen by a diſtinguiſhed Italian philoſopher and his attendant, and he even heard the crackling noiſe of it. (Joſephi Gardinii De Electrici Ignis natura Diſſertatio, p. 100.) Excepting the above-mentioned properties, it is not known that theſe fiſhes have any other property in common with artificial electricity.

Agreeably to the plan of our work, we ſhall particularly deſcribe the three principal electrical fiſhes, together with their anatomy, electrical properties, force, &c. under the articles Torpedo, Gymnotus Electricus, and Silurus Electricus. The ſhort account of the fourth electrical fiſh is as follows.

This animal was found on the coaſt of Johanna, one of the Comorro iſlands, in lat. 12° 13′ ſouth, by lieutenant Wm. Paterſon, and he thus ſpeaks of it in the Phil. Tranſ. vol. 76. "The fiſh is deſcribed to be ſeven inches long, two and a half inches broad, has a long projecting mouth, and ſeems of the genus tetrodon. The back of the fiſh is a dark brown colour, the belly-part of ſea-green, the ſides yellow, and the fins and tail of a ſandy green. The body is interſperſed with red, green, and white ſpots, the white ones particularly bright; the eyes large, the iris red, its outer edge tinged with yellow."

Whilſt the fiſh is living, ſtrong ſhocks, like electrical ſhocks, are felt by a perſon who attempts to hold it between his hands. Three perſons are mentioned in the account, as having experienced this property of one of thoſe fiſhes, but the want of opportunity prevented the trial of farther experiments.

We need hardly add, with reſpect to all theſe fiſhes, that every electrical property vaniſhes with the entire death of the animal.

Electrical *Fluid.* The phenomena of electricity, ſo ſingular, ſo various, ſo extenſive, and ſo powerful, as they are deſcribed in divers parts of this Cyclopædia; are the effects of an unknown cauſe, which philoſophers have called the *electric*, or the *electrical fluid.* That it is a fluid, and that it is elaſtic, there can hardly be a doubt; for if it be communicated from one body to another, it inſtantly expands itſelf all over the two bodies, and if again other bodies (always meaning ſuch bodies as are capable of receiving and tranſmitting it; *viz. conductors*) be placed in contact with the above, the electric fluid will expand itſelf over theſe alſo, and ſo on; nor do we know any limits to its expanſibility. But beſides this fluidity, and this elaſticity, whatever elſe has been advanced reſpecting the nature of this fluid, is mere hypotheſis or conjecture, and of the principal of theſe hypotheſes we ſhall now endeavour to give a ſuccinct account.

When the attraction and the repulſion were the only electrical phenomena known to philoſophers, they ſuppoſed that theſe were occaſioned by a kind of unctuous effluvia, proceeding immediately from the electrified body; but when the light, the burning quality, and the peculiar ſmell of electricity were diſcovered; then the idea of their being produced by ſome modification of fire was naturally ſuggeſted, and accordingly the electrical fluid was commonly called the *electrical fire,* which name even at preſent is uſed by ſeveral writers on the ſubject of electricity. But notwithſtanding the various effects, ſimilar to thoſe of common fire, which are produced by electricity, an attentive examination of the concurring circumſtances will eaſily ſhew that electricity, and fire, or caloric, are things quite diſtinct from each other. In the firſt place it ſhould be conſidered, that friction, or the ſudden attrition of bodies, produces not only heat in a moderate degree, but in a great many caſes, actual combuſtion, accompanied with light, &c. therefore it ſhould not be wondered that the electric fluid, which paſſes with aſtoniſhing rapidity through bodies, ſhould produce the above-mentioned effects; and it is to be remarked, that it is in its paſſage, or motion, alone, that the electric fluid produces effects analogous to thoſe of fire. Secondly, if heat or fire, and electricity, were the ſame thing, they would be always together; or, more properly ſpeaking, the effects of the one ought to be always accompanied with the effects of the other; but we find that a body ſimply electrified, or a Leyden phial containing a high charge, is not ſenſibly heated by it; nor does a body acquire any electricity by being heated; excepting that electricity which ſeems to be produced in conſequence of an enlargement or contraction of parts, and which is obſervable in a few bodies only.

Some writers of eminence have laid great ſtreſs upon an experiment of Mr. Wilſon, made ſome years ago at the Pantheon, where an immenſe apparatus was erected principally for the purpoſe of determining whether a point or a knob was the beſt termination for the conductors of lightning. The apparatus conſiſted of an electrical machine, which, though pretty large, was not, however, of any extraordinary ſize: but to this machine there was annexed an immenſe prime conductor, which conſiſted of a great number of military drums, covered with tinfoil, which formed a cylinder of above 155 feet in length, and more than 16 inches in diameter; and to this vaſt conductor were occaſionally added 4800 yards of wire. The electric fluid drawn from this conductor, after it had been fully electrified by the machine, fired gun-powder; when it was drawn off by a ſharp point. The particular conſtruction was as follows: Upon a ſtaff of baked wood a ſtem of braſs was fixed, which terminated in an iron point at the top. This point was put into the end of a ſmall tube of Indian paper, made ſomewhat like a cartridge, about an inch and a quarter long, and two tenths of an inch in diameter. When the cartridge was filled with common gun-powder, unbruiſed, a wire, communicating with the earth, was faſtened to the bottom of the braſs ſtem. Whilſt the charge in the great prime conductor was kept up by the continued action of the machine, the top of the cartridge was brought very near the cylinder of drums, ſo that it frequently even touched the tinfoil with which it was covered. In this ſituation a ſmall faint luminous ſtream was frequently obſerved between the top of the cartridge and the metal. Sometimes this ſtream would ſet fire to the gun-powder the moment it was applied; at other times it would require half a minute or more before it took effect. But this difference in time was ſuppoſed to be owing to ſome ſmall degree of moiſture in the powder or in the paper. Tinder was fired in the ſame manner, but much more readily. This experiment has, ſince that time, been imitated by Mr. Nairne with a Leyden phial.

Now the reſult of this experiment was ſuppoſed to corroborate the idea of the identity of electricity and fire; but there requires no great ingenuity to remark that the great quantity of electric fluid, which in this experiment muſt have paſſed through the metallic point, heated that point ſufficiently to fire the gun-powder. It has been alleged, that in this caſe the paſſage of the electricity could not have power to heat that point, becauſe, when that fluid is drawn off by a ſharp point, it has leſs force than in any other caſe;

but it ſhould be obſerved, that when ſurrounded by other bodies, as in the preſent caſe, a pointed body ceaſes to act as a point, and that more or leſs according to the nature of the bodies which ſurround it.

If we examine the propagation of heat and of electricity, their diſſimilarity becomes more apparent: for though heat paſſes through certain conductors of electricity (ſuch as the metals) eaſier than through other bodies; yet ſooner or later it penetrates every known ſubſtance, and an exceedingly ſmall quantity of it diffuſes itſelf alike throughout bodies of every kind; and that diffuſion is performed very ſlowly; but the electric fluid pervades conductors only, and its propagation through them is performed in an immeaſurable ſmall portion of time. Mr. Henly, an ingenious electrician, whoſe labours conſiderably promoted that ſcience, made the following obſervations. We conſtantly, he ſaid, obſerve, 1. That if two bodies containing the inflammable principle in equal quantities (which is the caſe with bodies of the ſame kind, as glaſs and glaſs, metal and metal, &c.) be rubbed together, they acquire either very little electricity, or none at all. 2. That as one of the bodies contains a greater quantity of the inflammable principle than the other, ſo they acquire a greater quantity of electricity, and ſuch is the caſe when glaſs is rubbed with a metal. 3. That a certain degree of friction produces electricity, and that a more violent friction produces fire, but no electricity; and, 4. That, in general, bodies which are poſſeſſed of a greater quantity of the inflammable principle, give the electric fluid to bodies that have leſs of it, when they are rubbed together.

From theſe obſervations Mr. Henly concluded, that the electric fluid and fire are produced by ſimilar operations, and are both extracted from bodies abounding with the inflammable principle; and therefore he was led to ſuppoſe that the inflammable principle, (at that time called *phlogiſton,*) the electric fluid and fire, are only different modifications of the very ſame element; the firſt being its quieſcent ſtate of exiſtence, the ſecond its firſt active ſtate, and the laſt its more violent ſtate of agitation.

But to ſay that the electric fluid is a modification of the inflammable principle, without pointing out what that modification conſiſts of, is the ſame thing as to ſay that one does not know what the electric fluid really is.

Certain philoſophers have ſuppoſed the electric fluid to be nothing more than the *ether* mentioned by ſir Iſaac Newton; but according to Newton's ſuppoſition, the ether is an exceedingly ſubtile and elaſtic fluid, which is diſperſed throughout the univerſe, and the particles of which repel the particles of all other matter. But upon this ſuppoſition, as Dr. Prieſtley juſtly obſerves, the electric fluid is quite different from the ether, becauſe it is not repulſive like the ether, but attractive, of all other matter.

Dr. Prieſtley, obſerving that the electric exploſion taken in different kinds of air acted like other phlogiſtic proceſſes, according to the language of that time, ſuppoſed that the electric matter either is, or contains, phlogiſton; (Obſervations on different kinds of Air, vol. ii. ſect. 13.) He might, however, have, with more probability, ſuppoſed, that in his experiments the phlogiſton was extricated from the bodies which were immediately acted upon by the electric force; but ſince modern philoſophers have utterly conſigned the ſuppoſed phlogiſton to oblivion, we need not ſay any thing more about it.

The electric fluid has alſo been ſuppoſed to be of an acid nature, and the facts which have given origin to this ſuppoſition are, that electricity occaſions the cryſtallization of an alkali in certain caſes (ſee the article ELECTRICAL *Experiments,*) and it ſlightly reddens certain blue vegetable colours. But it is more likely that the ſmall quantity of acid which is thus manifeſted, is produced by the violent action of the electric fluid upon the air, or other contiguous bodies; for it is only in caſes of its quick tranſition that theſe effects are produced.

An ingenious philoſopher has endeavoured to eſtabliſh a propoſition, which (as he thinks) is warranted by the principal phenomena of electricity; namely, that the electric fluid conſiſts of two principles; *viz.* of the pureſt and nimbleſt hydrogen, a little rarefied, and of the elementary heat. All the experiments, he ſays, tend to prove, "intimam ignis electrici naturam minime contineri in acido quodam, ut ex aliquibus experimentis male digeſtis putarunt aliqui cæteroquin ſapientes; ſed hanc exurgere, et componi a duobus principiis, nempe a phlogiſto, aut ut vocant Galli, hydrogene, puriori, mobiliori, et admodum rarefacto, atque ex igne elementari ſive calore latente, (calorico,) ubique per corpora univerſa diffuſo, atque pro ipſorum capacitate in illis hoſpitante." De electr. ignis nat. Diſſert. ab Joſepho Gardinio. Mantuæ, 1792.

According to the moſt rational hypotheſis, the electric fluid ſeems to be a fluid *ſui generis; viz.* a fluid quite diſtinct from all other known fluids. It is imponderable, and inviſible whilſt in a quieſcent ſtate; and even the light which we ſee in its tranſition from one body to another is not, in all probability, the electric fluid itſelf; but the light which is elicited from other bodies or from the air: for in a perfect Torricellian vacuum no electric light is to be ſeen.

So far we have related the different hypotheſes that have been advanced, with reſpect to the nature of the electric fluid, upon the ſuppoſition that the phenomena of electricity are produced by a ſingle fluid; but there are ſeveral philoſophers, who are of opinion that theſe phenomena are produced by two electric fluids, *viz.* the *vitreous* and the *reſinous.* The peculiar merits of theſe two hypotheſes, *viz.* of the hypotheſis of a ſingle electric fluid, and of that of two electric fluids, will be properly examined under the article *Theory of* ELECTRICITY.

The nature of theſe two ſuppoſed electric fluids has likewiſe been ſought after with great attention by various labourers in the ample field of ſcientific inquiry; but no preciſe diſcovery has as yet determined any thing about them. It has been ſuppoſed that theſe two electrical fluids are fluids diſtinct from all others; but they have alſo been thought to be of an acid, and of an alkaline nature, *viz.* that the vitreous is of an acid, and the reſinous of an alkaline nature. And indeed there are ſome experiments which ſeem to countenance this ſuppoſition; but we muſt refer the reader to the article GALVANISM for farther information concerning this particular; it being impracticable to convey a clear idea of the nature of the above-mentioned experiments, without a previous ſtatement of that new branch of electricity, which is at preſent ſucceſsfully cultivated under the name of *Galvaniſm.*

ELECTRICAL *Jar.* See LEYDEN PHIAL.

ELECTRICAL *Kite.* See KITE.

ELECTRICAL *Machine;* a mechaniſm in which an electric body, ſuch as glaſs, ſulphur, roſin, &c. is ſubjected to friction, in order to excite in it that power which is commonly known under the name of electricity.

When the attraction and the repulſion were the only phenomena of electricity known, and when thoſe phenomena had been obſerved in ſmall bodies only, ſuch as natural pieces of amber, a tourmalin, a diamond, and the like; a ſimple friction againſt the hand or the garment of the experimenter was ſufficient to excite the electric virtue; but when the ſame property was diſcovered in ſulphur, in reſin, and in other bodies, which might be formed into pretty large maſſes, ſo as to produce effects more ſtriking and deciſive; then ſimple friction in the manner already mentioned was found inadequate to the purpoſe, and philoſophers contrived to perform the excitation in a more commodious manner by mechanical means; and ſuch mechaniſms are what we now call electrical machines.

In the hiſtory of the original conſtruction, and of the ſubſequent improvements of thoſe machines, a contemplative mind is naturally led to admire the ingenuity of philoſophers, as well as the alternate advancements of the ſcience of electricity, and of the improvements of the machines; for if a new diſcovery pointed out a defect, or a uſeful improvement, in the machine; the improvement of the latter hardly ever failed to produce new diſcoveries, and ſo on.

The firſt mechaniſm which deſerves the name of electrical machine, was contrived by Otto Guericke, burgomaſter of Magdebourg, and the celebrated inventor of the air-pump; a contemporary of Boyle.

Fig. 1. *Plate* VII. repreſents this firſt ſmall and imperfect machine; but while we call it ſmall and imperfect, we muſt not forget to acknowledge, that to the uſe, which its inventor made of this machine, we are indebted for the diſcovery of the light, the ſmell, and the crackling noiſe of electricity.

Previous to the deſcription of this and the other electrical machines up to the preſent time, it will be neceſſary to premiſe a general idea of the parts of theſe machines, in order that the reader may be enabled to comprehend the objects for the attainment of which the different conſtructions were adopted, and may likewiſe be enabled to appreciate their peculiar advantages or defects.

An electrical machine being a mechaniſm capable of exciting an electric, ſo as to produce electrical phenomena, naturally conſiſts of the following principal parts; *viz.* of the electric, the moving engine, the rubber, and the prime conductor; that is, an inſulated conductor, which receives the electricity immediately from the excited electric body.

Formerly the electric was uſed of different ſubſtances, ſuch as glaſs, roſin, ſulphur, ſealing-wax, &c. which variety was adopted on two accounts, firſt, becauſe philoſophers had not quite determined to which of theſe bodies the preference might be given, and ſecondly, on account of producing a negative or poſitive electricity at the pleaſure of the electrician; for before the electricity of the inſulated rubber was diſcovered, ſulphur, rough glaſs, ſealing-wax, or other reſinous body, was uſed for producing the negative electricity; whilſt ſmooth glaſs ſerved for the production of the poſitive or vitreous power. At preſent ſmooth glaſs ſeems to be the only ſubſtance univerſally uſed, and that on account of its power, of its durability, of its cheapneſs, and of its being eaſily formed into any ſhape which may beſt anſwer the views of the electrician. And when the machine has an inſulated rubber, the operator may obtain either poſitive or negative electricity at pleaſure without changing the electric.

The form of the glaſs has been much varied, but thoſe which are at preſent generally uſed, and have been found preferable to all others, are cylinders, and circular plates. Globes are likewiſe uſed, but leſs frequently.

The cylinders are made with two necks; they are moſtly uſed without an axis; for this is only an obſtruction, and has no real uſe; and their more uſual ſize is from four inches in diameter, and eight in length, to twelve inches in diameter and two feet in length; but ſome very powerful electrical machines have been made in London with cylinders of two feet in diameter and upwards. The globes are always made with one neck, and the circular plates have been uſed from the ſmall ſize of ſix inches in diameter to the larger ſize poſſible to be made.

With reſpect to the engine, which is to give motion to the electric, multiplying wheels have been generally uſed for machines containing a globe or a cylinder, and theſe communicate to the electric a quick motion, while they are conveniently turned by a winch. The uſual method is to fix a wheel on one ſide of the frame of the machine, which is turned by a winch or handle, and has a groove on its circumference. Upon the braſs cap which is cemented to the neck of the glaſs globe, or to one of the necks of the cylinder, a pulley is fixed, the diameter of which is about the third or fourth part of the diameter of the wheel; then a ſtring, or ſtrap, is put over the wheel and the pulley; and by this means, when the winch is turned, the globe or cylinder makes three or four revolutions for each revolution of the wheel. There is an inconvenience generally attending this conſtruction, which is, that the ſtring becomes ſometimes ſo very ſlack, that the electric will not turn round when the winch is moved. To remedy this inconvenience, the wheel ſhould be made moveable with reſpect to the electric, ſo that it may be fixed at the proper diſtance; or elſe the pulley ſhould have ſeveral grooves of different diameters on its circumference; in which caſe the ſtring may be paſſed from a groove of ſmaller diameter to that of a larger, in proportion as it becomes ſlack, or extended. The motion of the electric, which has been found moſt productive of electricity, is about five revolutions in a ſecond, which cannot conveniently be performed by means of a ſimple winch applied immediately to the cap at the neck of the globe or cylinder, and therefore multiplying wheels have been uſed. Yet when the cylinders are not very large, and the mechaniſm is nicely conſtructed with the beſt rubber, rendered active by the zinc amalgam, a ſimple winch has been found fully ſufficient, and accordingly ſeveral machines have been conſtructed upon that ſimple plan, and are at preſent frequently uſed. In theſe machines the cylinder may be conveniently cauſed to make about three revolutions in a ſecond. The circular glaſs plate machines are always moved by a ſimple winch, which is fixed to the axis of the glaſs plate or plates; (for ſome of theſe machines contain two plates fixed on the ſame axis, parallel to each other.) The axis paſſes through a hole in the centre of the plate or plates, and is fixed thereto, in a ſituation perpendicular to the plate, by means of certain ſockets on either ſide of the plate.

In ſome of the machines furniſhed with a globe or a cylinder, a metal wheel and pinion, or a wheel and an endleſs ſcrew, have been uſed, inſtead of the above-mentioned pulley and ſtring. And when this conſtruction is new, and is properly executed, it anſwers very well; but it is apt to make a diſagreeable rattling noiſe, and unleſs it be frequently oiled ſoon wears away in conſequence of the great friction of its parts.

The rubber, as it is at preſent more commonly conſtructed, conſiſts of a leather cuſhion (the leather moſtly uſed is baſil ſkin, or flannel, ſtuffed with hair) and having a piece of ſilk (either varniſhed or unvarniſhed) thrown over, which being faſtened to the lower part of the cuſhion, paſſes between this and the glaſs, and projects a conſiderable way beyond the cuſhion, and over the glaſs. Another conſtruction, which was recommended by Dr. Nooth, is likewiſe not unfrequently uſed. It conſiſts of a ſilk cuſhion ſtuffed with hair, and having a piece of leather thrown over, ſo that the leather is what immediately touches the ſurface of the glaſs, and to the upper edge of this leather, a piece of ſilk is generally added, which reſts upon the glaſs, and covers about one-third part of its ſurface.

In theſe or ſimilar conſtructions, the amalgam is always to be uſed, and this ſhould be confined to that part of the rubber which the glaſs globe or cylinder enters as it revolves. In ſhort, that ſide of the rubber which the glaſs enters in whirling muſt be made as perfect a conductor as poſſible, in order to furniſh the glaſs with a plentiful ſupply of electricity; and the oppoſite part muſt be as much a non-conductor as poſſible, in order that little or none of the fluid which is accumulated upon the glaſs may return to the rubber. In the conſtruction of the rubber care muſt alſo be taken that it be free from points or ſharp edges; and it ſhould be ſupported by a ſpring, by which means it may adapt itſelf to the inequalities of the glaſs. It ſhould alſo be inſulated for the purpoſe of obtaining a negative electricity.

The prime conductor, or firſt conductor which is applied to the excited electric, is nothing more than an inſulated conducting ſubſtance furniſhed with one or more points at one end, for the purpoſe of collecting the electricity immediately from the excited electric. (See Collector *of Electricity*.) When the conductor is of a moderate ſize, it is uſual to make it of hollow braſs, or of tin plates; but when very large, it is more commonly made of wood, or tin plates, or paſte board, covered with tinfoil, or even with gilt paper. The conductor is generally made of a cylindrical ſhape; but be the form of it what it may, it ſhould always be made free from points, or ſharp edges, and if holes are to be made in it, which on many accounts are very uſeful, theſe ſhould be well rounded, and made perfectly ſmooth. If any part of the prime conductor is to be made larger than the reſt, this ought to be that which ſtands fartheſt from the excited electric; for at that end the electricity endeavours moſtly to eſcape.

It has been conſtantly obſerved, that the larger the prime conductor is, the denſer or ſtronger ſpark may be drawn from it; for the quantity of electricity diſcharged in the form of a ſpark is nearly proportional to the ſize of the conductor; and for this reaſon the prime conductors have been made much larger of late years than they were made formerly. Its ſize, however, may be rendered too large, ſo that the diſſipation of electricity from its ſurface may be little ſhort of the ſupply from the electric, in which caſe ſo large a conductor would only be an unwieldy and uſeleſs incumbrance. Beſide the above-mentioned parts, the machine muſt have a ſtrong frame to ſupport the electric, the rubber, and the wheel. The prime conductor ſhould be ſupported by pillars of glaſs, or of other ſolid non-conductors, and not by ſilk ſtrings, which admit of continual motion. In ſhort, the machine and the prime conductor ſhould be made to ſtand as ſteady as poſſible, otherwiſe the experiments cannot be conveniently and ſatisfactorily performed. We ſhall now proceed to deſcribe the particular electrical machines.

Fig. 1. *Plate* VII. repreſents Otto Guericke's original machine. It conſiſts of an horizontal frame, the peculiar conſtruction of which is not mentioned in his work "De Vacuo Spatio;" for it is in that book that the electrical machine is deſcribed: *a c* and *b d* are two uprights, which ſupport the axis of the globular electric, and ſuch are all the parts of this machine with reſpect to the formation of the electric, which is of ſulphur; he gives the following directions: Take, ſays he, a ſpherical glaſs phial of the ſize of the head of an infant; fill it with ſulphur, which has been previouſly powdered in a mortar, and thus filled, expoſe it to the fire to liquify the ſulphur, and when afterwards cooled, break the glaſs phial, in order to obtain the globe of ſulphur. So little did he imagine, as Dr. Prieſtley juſtly obſerves, that the glaſs globe itſelf with or without the ſulphur would have anſwered his purpoſe as well. This globe, he adds, may be perforated with a hole quite through, and an iron axis may be fixed to it, and thus the globe is ready for uſe.

To ſhew the virtue (which he calls *virtutem conſervativam*) of this globe, place the axis of it upon the two ſupports *a*, *b*, of the little machine *a b c d*, about a foot high from the baſe, and place ſmall bodies of any kind under it, ſuch as leaves of gold, ſilver, paper, &c. then graſp the globe or rub it with the hand ſufficiently dry, and the ſulphur will then attract the ſmall bodies, &c.

Fig. 2. *Plate* VII. repreſents Mr. Haukſbee's electrical machine, the various parts of which will be eaſily comprehended by inſpecting the figure. This machine has no rubber, no prime conductor, or field for making experiments; for no ſuch things were wanted at his time; but it may be eaſily accommodated with them all. A conductor, for inſtance, may hang from the ceiling, a rubber may be ſupported by a ſpring fixed under the globe, and a table placed near the machine may receive the apparatus neceſſary for making experiments. The inconveniences of this conſtruction are, that the operator cannot well turn the wheel himſelf. An aſſiſtant is neceſſary for it, who muſt ſit to his work. This machine admits one globe only, but a conſiderable variety of globes, and cylinders, or ſpheroids, may be ſucceſſively applied to it.

Fig. 3. *Plate* VII. repreſents the abbé Nollet's electrical machine, a conſtruction much in uſe about the time that the peculiar phenomena of the Leyden phial were firſt diſcovered. In thoſe early times electricians had no idea, that it was poſſible to make the electric revolve too faſt. They, therefore, made the wheels of their machines very large, which of courſe required a large and ſubſtantial frame; the electric was rubbed by the hand, the prime conductor was a bar of iron, or a gun barrel, and ſometimes a chain, ſuſpended in ſilken lines from the top of the room, and the apparatus was placed upon an adjoining table.

The phenomena which were produced by the above-mentioned machines naturally excited a deſire of exciting a much greater power of electricity; and with this view Dr. Watſon contrived the machine repreſented by *fig.* 4. *Plate* VII., in which four large globes might be whirled at once, and their power might be united.

N. B.—It is only for the purpoſe of not enlarging the plate, that the ſame prime conductor has been repreſented as belonging to two machines, *viz.* to *fig.* 3, and *fig.* 4.

This machine was furniſhed with proper rubbers for all the four globes, and theſe rubbers were adjuſtable by means of a ſcrew for each rubber.

Fig. 5. *Plate* VII. repreſents a machine contrived by Mr. Wilſon. Its conſtruction is ſuch that the ſame perſon may turn the wheel at the ſame time that he performs the experiments. But the rubber is not inſulated, and both the rubber and the cylinder are not ſufficiently diſtant from other bodies. The prime conductor ſtands upon the ſame frame, which was undoubtedly an advantage over the other machines of that time; but being ſupported by ſilk ſtrings, it was liable to a conſtant ſhake, which rendered it unfit for a great many experiments.

Fig. 6. *Plate* VIII. repreſents an elegant ſort of electrical machine, of a very compact form, and capable of conſiderable power. The machinery is contained in the braſs box *a*, and it conſiſts of a braſs wheel, whoſe teeth move an endleſs ſcrew, at the lower part of the axis, which comes out of the box, and ſupports the glaſs globe *d*; there being a braſs ſocket on the upper part of the axis, in which the neck of the globe is cemented. The braſs box *a* is ſcrewed to the table by means of a clamp, which is always fixed to it; and it will be eaſily conceived that by turning the winch *b*, the globe *d* will be cauſed to turn horizontally: *e* is the rubber which is ſupported by a braſs ſpring, and may be made to preſs more or leſs upon the glaſs globe, by means of an adjuſtment at *c*. The prime conductor *f* is ſupported by a ſeparate ſtand upon a glaſs pillar, and is to be placed upon the table adjoining to the machine. The rubber of this machine is not inſulated, yet this defect was obviated by removing the rubber *e*, and fixing another rubber upon an inſulating ſtand, which was clamped to the table cloſe to the machine. Upon the whole it muſt be acknowledged that this machine is both very portable and very uſeful, nor can any thing work more pleaſantly, as long as the work within the box *a* remains in proper order; but we have already obſerved that this conſtruction is apt to wear out pretty faſt, and is generally attended with an unpleaſant rattling. This machine is alſo attended with another inconvenience, which is the upright poſition of the globe and the rubber, in conſequence of which whatever is put upon the latter, as the amalgam, &c. is apt to drop out.

Fig. 7. *Plate* VIII. repreſents a machine contrived by Mr. Read, a philoſophical inſtrument maker. This machine may be eaſily diſtinguiſhed from the others which are repreſented upon the ſame table in the plate, by obſerving its bottom board, which is faſtened to the table by means of the two clamps *o*, *o*. The cylinder *d* of this machine ſtands perpendicular to the horizon, and is ſupported by a braſs arm *e*, which receives the upper end of the axis; and motion is given to it by means of a pulley at the lower end of the axis, and a wheel *g* which lies parallel to the table; a ſtring going round both the wheel and the pulley. The prime conductor *a* is furniſhed with teeth or points by way of collector, and is ſcrewed to the wire of the coated jar *b*, ſtanding in a ſocket, between the cylinder and the wheel; ſo that the coated jar *b* ſerves as a Leyden phial, and as a ſtand for the conductor. The rubber *r* is ſupported by a braſs ſpring, which may be adjuſted by a ſcrew that paſſes through the arm *e*. But this rubber cannot be inſulated. This machine was, ſome years ago, much uſed for medical purpoſes; for when Mr. Lane's diſcharging electrometer *c* was annexed to it, the operator might adminiſter as many ſhocks as he pleaſed, preciſely of the ſame ſtrength.

When this machine was uſed for ſimple electrization, or for other purpoſes where no ſhocks were required, then the coated jar *b* was removed, and another jar, not coated, was placed inſtead of it, which then ſerved as a mere inſulating ſtand to the conductor *a*.

Fig. 8. *Plate* VIII. exhibits Dr. Prieſtley's electrical machine, of which he gives the following deſcription in his Hiſtory of Electricity. "The machine," he ſays, "which I would adviſe a philoſopher to conſtruct for his own uſe, is the reſult of my beſt attention to this ſubject. I have uſed it above ſix months (how much I leave the reader to imagine) without ſeeing the leaſt reaſon to make any alteration of conſequence in it; and believe it to have almoſt all the advantages which an electrical machine deſigned for the cloſet can have.

"The frame conſiſts of two ſtrong boards of mahogany *a*, *a*, of the ſame length, parallel to one another, about four inches aſunder, and the lower an inch on each ſide broader than the upper. In the upper board is a groove, reaching almoſt its whole length. One of the pillars *b*, which are of baked wood, is immoveable, being let through the upper board, and firmly fixed in the lower, while the other pillar ſlides in the groove above-mentioned, in order to receive globes or cylinders of different ſizes; but it is only wanted when an axis is uſed. Both the pillars are perforated with holes, at equal diſtances, from the top to the bottom; by means of which, globes may be mounted higher or lower, according to their ſize; and they are tall, to admit the uſe of two or more globes at a time, one above the other. Four of a moderate ſize may be uſed, if two be fixed on one axis: and the wheel has ſeveral grooves for that purpoſe.

"If a globe with only one neck be uſed, as in the plate, a braſs arm with an open ſocket *c* is neceſſary to ſupport the axis beyond the pulley; and this part is alſo contrived to be put higher or lower, together with the braſs ſocket in which the axis turns. The axis *d* is made to come quite through the pillar, that it may be turned by another handle, without the wheel, if the operator chooſes. The frame being ſcrewed to the table, may be placed nearer to, or farther from, the wheel, as the length of the ſtring requires, in different ſtates of the weather. The wheel is fixed in a frame by itſelf *e*, by which it may have any ſituation with reſpect to the pulley, and be turned to one ſide, ſo as to prevent the ſtring from cutting itſelf. The hinder part of this frame is ſupported by a foot of its own.

"The rubber *f* conſiſts of a hollow piece of copper, filled with horſe hair, and covered with a baſil ſkin. It is ſupported by a ſocket, which receives the cylindrical axis of a round plate of glaſs *g*, the oppoſite part of which is inſerted into the ſocket of a bent ſteel ſpring *h*. Theſe parts are eaſily ſeparated, ſo that the rubber, or the plate of glaſs that ſerves to inſulate it, may be changed at pleaſure. The ſpring admits of a twofold alteration of poſition. It may be either ſlipped along the groove, or moved in the contrary direction, ſo as to give it every deſirable poſition with reſpect to the globe or cylinder; and it is, beſides, furniſhed with a ſcrew *i*, which makes it preſs harder or lighter, as the operator chooſes.

"The prime conductor *k* is a hollow veſſel of poliſhed copper, in the form of a pear, ſupported by a pillar, and a firm baſis of baked wood, and it receives its fire by means of a long arched wire, or rod of very ſoft braſs, *l*, eaſily bent into any ſhape, and raiſed higher or lower, as the globe requires; and it is terminated by an open ring, in which are hung ſome ſharp pointed wires *m*, playing lightly on the globe when it is in motion. The body of the conductor is furniſhed with holes, for the inſertion of metallic rods, to convey the fire wherever it is wanted, and for many other purpoſes convenient in a courſe of electrical experiments. The conductor is, by this means, ſteady, and yet may be eaſily put into any ſituation.

"When poſitive electricity is wanted, a wire, or chain, as is repreſented in the plate *n*, connects the rubber with the table or the floor. When negative electricity is wanted, that wire is connected with another conductor, which muſt be placed upon a ſeparate inſulating ſtand near to the machine, while the conductor *k* is connected by another wire or chain with the table. If the rubber be made tolerably free from points, the negative power will be as ſtrong as the poſitive.

"In ſhort, the capital advantages of this machine are, that glaſs veſſels, or any other electric body, of any ſize or form, may be uſed, with one neck, or two necks, at pleaſure; and even ſeveral of them at the ſame time, if required. All the eſſential parts of the machine, the globe, the frame, the wheel, the rubber, and conductor, are quite ſeparate; and the poſition of them to one another may be varied in every manner poſſible."

The progreſs of the ſcience of electricity ſince Dr. Prieſtley contrived the above-deſcribed machine, has ſhewn the imperfection of ſeveral of its parts, and the uſeleſs complication of the whole. The ſhape, and eſpecially the long neck of the prime conductor, would not at preſent be uſed by any electrician; it being ill ſuited to the performance of experiments, and very apt to diſſipate the electricity, when a great deal of that power is furniſhed by the electric, which is the caſe with moſt of the modern machines furniſhed with the zinc amalgam. The neceſſity of an intricate frame, capable of admitting more than one globe or cylinder, is alſo ſuperſeded by the obſervation, that one well formed large cylinder produces a much greater quantity of electricity, than four or more ſmall ones, and the friction is much more conſiderable in the latter than in the former caſe.

Fig. 9. *Plate* VIII. repreſents a compact machine, ſomewhat ſimilar to the laſt, but much more commodious. It conſiſts of a pillar of mahogany *a*, ſtanding upright upon three feet. This pillar divides in two plates to receive a wheel *b* in the lower part of it, and in the upper part a pulley *c*, which is turned by a leathern ſtrap *d* tightened by means of a ſmall buckle. In the centre of the pulley is a ſtrong iron ſpindle, turning in two firm braſs ſockets, faſtened to each ſide of the pillar. In one of theſe ſockets the extremity of the ſpindle turns upon a centre, by means of a piece of iron *e* ſcrewed into it, while the other is held tight by a braſs claſp, which may be made to hold it cloſer, or more looſely, at pleaſure, by means of a ſcrew *f*. The iron ſpindle terminates in a male ſcrew, anſwering to a female ſcrew in the braſs cap of the globe *g*; and by this means any globe may be taken out, and another put into the machine with very little trouble, if theſe parts be always made to the ſame pattern. The rubber *h* is ſeparated from the ſpring *i* by a plate of glaſs *j*, which effectually inſulates it; but the chain *k* connects them together when poſitive electricity is wanted, as in the uſual method of electrifying. The ſpring may be made to preſs more or leſs, by means of a ſcrew *l*; and it may be raiſed higher or lower, to ſuit globes of different ſizes, by means of a contrivance which is not repreſented in the plate. The prime conductor *m n o* is like that of the preceding machine, and it muſt be placed upon a table adjoining to the machine. When negative electricity is wanted, the chain *k* muſt be removed from the rubber, and hung upon the prime conductor, ſo as to connect it with the table; and a ſhort braſs rod, with a knob at its end, muſt be ſcrewed into a ſmall ſocket, which will be found in the rubber above the glaſs plate. This braſs rod will then ſerve for a negative prime conductor. As this machine is apt to ſhake when in action, its three feet may be ſcrewed to a large board, upon which the perſon who turns the wheel may alſo reſt his feet.

It will be obviouſly remarked that the prime conductor of this machine has the ſame imperfections that have been mentioned in the deſcription of the preceding machine.

Fig. 10. *Plate* IX. exhibits the electrical machine contrived and uſed by F. Beccaria of Turin, a diſtinguiſhed electrician. This machine comprehends all the improvements, and is conſtructed with all the precautions, which the ſtate of the ſcience at that time could ſuggeſt. But no regard whatever was paid either to ſize or portability. T S is the glaſs cylinder, to the extremities of which two wooden caps were adapted, and the whole turned round the points of the ſcrews V, V, which entered a little way the centres of the caps. One of theſe caps was formed like a pulley, to receive the ſtring which went round the wheel R. The form of the frame will be eaſily comprehended by inſpecting the figure; and as for its ſtrength and ſize, they may be eaſily derived by obſerving, that beſides the wheel and cylinder it had a place between the handle of the wheel and the front, large enough to contain two men, *viz.* one who turned the wheel, and another who rubbed the cylinder T S. And the two men with the whole machine were inſulated; for the legs E, F, G, H, were of glaſs. The circular boxes, which are ſeen on the floor round the legs, are ſemicircular boxes of tin, two of which being placed round each leg formed a whole circle. When the machine was in uſe theſe tin boxes were filled with warm aſhes for the purpoſe of keeping the glaſs legs dry. The axis of the wheel R worked in a particular frame, which might be ſcrewed into the large frame at any required diſtance from the cylinder, in order to render the ſtring ſufficiently tight.

The prime conductor, which is not drawn in the plate, conſiſted of a cylinder of tin 12 feet long and one foot in diameter; it preſented a conical termination to the middle zone of the cylinder T S, and had its oppoſite extremity of a ſemiglobular ſhape. This prime conductor was ſuſpended upon ſilk ſtrings.

The great diſparity between the ſize of the cylinder and that of the whole frame, is what will eaſily ſtrike the attentive obſerver; yet it muſt be acknowledged, that to a real philoſopher who had nothing elſe in view, but the improvement of the ſubject, this machine muſt, at that early period, have afforded ample ſatisfaction; and, in fact, whoever will peruſe Beccaria's inſtructive work, entitled "Elettriciſmo artificiale," will readily perceive how uſeful it proved to its inventor. It afforded either poſitive or negative electricity with equal facility; for as the whole machine was inſulated, when poſitive electricity was required, a chain was appended to the machine which formed the communication between it and the ground; and when negative electricity was wanted, the chain was placed from the prime conductor to the ground, and then the whole machine became a negative conductor. We need not point out how many parts of this machine have been rendered uſeleſs, or defective, by ſubſequent improvements.

The form of electrical machines moſtly uſed of late, is repreſented in *fig.* 11, *Plate* IX. A B C is the bottom board, which, when the machine is to be uſed, is faſtened to the table Y Z, by means of the clamp at C: D, E, are two upright pieces of wood, firmly faſtened to the bottom board A B C, and ſupporting the glaſs cylinder F G, and the wheel H. The two necks of the cylinder are furniſhed with caps, one of which has an axis, which paſſes through a hole in the upright ſupport E, and has a pulley firmly fixed to its outer extremity. The axis of the other cap runs in a ſmall hole towards the upper part of the ſupport D: O is the pillar which ſupports the rubber or cuſhion P; and is fixed with a joint to the bottom board. The middle part of this pillar is of glaſs, which renders the rubber inſulated: Q is a braſs ſcrew, which, paſſing through the lower part of the pillar O, ſcrews into a piece of wood which is firmly fixed in the bottom board. This ſerves to regulate the preſſure of the cuſhion upon the cylinder. The rubber conſiſts of a cuſhion of leather ſtuffed with hair, and fixed to a backboard, which is ſcrewed to the upper part of the pillar O. A piece of ſilk S comes from the lower edge of the rubber, and paſſing between it and the cylinder, extends itſelf over the cylinder, until it nearly meets the points of the collector. The prime conductor W is ſeparate from the machine; it is of a cylindrical form, with globular terminations, and is ſupported by a glaſs pillar upon a circular wooden foot. That end of the prime conductor which ſtands fartheſt from the cylinder is generally furniſhed with a thick wire, about four or five inches long, and terminating in a braſs ball.

It is evident that with this machine poſitive or negative electricity may be had at pleaſure; for when poſitive electricity is wanted, the rubber is connected with the ground, and when negative electricity is wanted, then the prime conductor is connected with the ground, and the negative electricity is obtained from the rubber. Sometimes another conductor is connected with the rubber.

When the glaſs cylinder is very large, ſuch as of 18 inches, or two feet, in diameter, then the frame of the machine is made to ſtand upon the ground, with this difference from the above, that inſtead of the bottom board A B C, the two upright ſupports reach down to the ground, where they ſpread out into a double foot, and are, at about midway between the cylinder and the ground, faſtened to each other by two ſtrong horizontal bars. The pillar of the rubber is faſtened to a projection in the upper one of thoſe bars. The ſtand of the prime conductor is likewiſe high enough to reſt upon the ground.

Fig. 12. *Plate* IX. repreſents Nairne's electrical machine, a moſt compact, ſimple, and, at the ſame time, powerful machine, uſeful for electrical experiments in general, but particularly adapted to the purpoſes of medical electricity. A is the glaſs cylinder: B, B, two glaſs pillars which ſupport the cylinder A: C is the handle by which the cylinder is turned: G, and R, are two metallic conductors for the poſitive and the negative electricities. Theſe conductors are ſupported by the glaſs pillars D, D: E is the bottom board into which the pillars B, B, that ſupport the cylinder, are firmly fixed. Underneath this board are faſtened pieces of wood forming four grooves: F, F, are two pieces of board, part of which are inſerted into two of the four grooves under the board E. In theſe pieces the pillars D, D, that ſupport the conductors, are fixed: H is a braſs knob, one of which is ſoldered on the outſide of each conductor.

The cuſhion or rubber is attached to the ſide of the conductor R, next to the cylinder: K is a piece of ſilk, one end of which is glued to the under part of the cuſhion, and it is turned over, ſo that part of the ſilk ſtands between the cuſhion and the cylinder, and projects over the latter, as at K, until it nearly reaches the collecting pointed wires which are fixed to the ſide of the other conductor.

L, L, are the heads of two wooden ſcrews which paſs through the board E, and are to be ſcrewed until their lower ends preſs againſt the upper part of the ſliding pieces F, F, when theſe are ſlipped into the grooves under the ſaid board. One of theſe ſcrews ſerves to keep the rubber in contact with the cylinder; for when the ſliding piece F of that conductor, which carries the rubber, is puſhed into the groove, ſo that the rubber may be preſſed againſt the cylinder, the ſcrew L will confine it in that ſituation. The other ſcrew, L, ſerves to keep the conductor G ſteady.

The ends N, N, of the conductors may be removed, and then the opening of a coated electric jar, faſtened within each conductor, is diſcovered, as is repreſented in *fig.* 14. *Plate* X. where one conductor only of this machine is to be ſeen. In the inſide of each jar a piece of cork is fitted, and in the cork a ſmall glaſs tube coated, and likewiſe a braſs wire with a ball, as ſhewn in *fig.* 14.

The machine is faſtened to the table by means of a ſtrong iron clamp; and is worked, as the figure indicates, by a ſimple winch, without any multiplying wheels. There is a remarkable nice apparatus accompanied with this machine, which may be adapted to all caſes of medical electricity. The principal parts of this apparatus are repreſented in *figs.* 13 and 14. *Plate* X.

In *fig.* 13. part of the electrical machine is ſhewn, in order to exhibit the flexible prolongations, which are fixed to the conductors for the purpoſe of giving ſparks to any part of the human body: *d, d,* are two compound joints, each of which has not only a vertical, but alſo an horizontal motion, when applied to the conductor: *f, f, f,* are three metallic tubes, connected by means of four pieces of wood, and two pliable joints. One of thoſe tubes is ſcrewed to the joint *d*, and to the laſt a large ball *h* is ſcrewed, which communicates the ſpark. To the ſame tube a piece of wood *g* is faſtened, having a hole at right angles to the tube, and K is a glaſs handle, the upper part of which fits that hole; ſo that by applying the hand to the lower part of the glaſs handle, the ſpark may be given to any part of the body. In the figure a perſon is repreſented, who directs the communications with the conductors, to his ſhoulders, by means of the glaſs handles *k, k.*

Fig. 14. repreſents a perſon paſſing ſhocks through his leg. In this caſe the end cover from one of the conductors is removed; the chain *b* is ſuſpended to the knob of the jar, and is made to communicate with the chain O, which is furniſhed with a wire at the other end *p*, and to this wire a piece of wood with a hole is attached, which fits the top of the glaſs handle *k*: *n* is the diſcharging electrometer, fixed for the purpoſe, upon the conductor, and another wire O, with another glaſs handle *k*, is fixed to it: then the two wires *p, p,* being applied to any part of the body through which the electric ſhock is to be paſſed, and the machine being worked, the ſhocks will, without any alteration of the apparatus, be repeatedly ſent through that part, &c. for ſuppoſe that the conductor, which is repreſented in the figure, is the poſitive conductor, the external ſurface of the jar will be charged poſitively, whilſt the fluid of the inſide will paſs through the chain *b*, to the table, &c. and when the jar is charged enough for the diſcharge to paſs from the conductor to the knob of the diſcharging electrometer *n*, the diſcharge will take place, and the ſhock will paſs through the part which is interpoſed between the two wires *p, p*.

The two additional grooves under the bottom board of the machine are uſed only for the conveniency of packing the machine into as ſmall a box as poſſible; and for this purpoſe the ſliding pieces F, F, which ſupport the pillars of the conductors, are ſlipped into the two grooves which are ſituate nearer to the handle ſide of the machine.

"The *figs.* 15, 16, *Plate* X. and 17, *Plate* IX. exhibit an extremely portable electrical machine and its parts, invented by the Rev. W. Pearſon, of Lincoln. This machine is intended for medical purpoſes, and eſpecially for the adminiſtration of electricity in caſes of ſuſpended animation. Upon repeated trials it has proved ſufficiently uſeful, and its peculiar advantages are, great portability, and a ſufficient power; it is guarded ſo as not to be readily affected by moiſture; it is capable of being uſed without a table or ſtand, in caſes of neceſſity; it is rendered fit for uſe upon the ſhorteſt notice, and it is not very liable to be broken. In *fig.* 15. the machine is repreſented as viewed by an eye ſituated directly over it. A B C D is a ſmall box $9\frac{1}{2}$ by $7\frac{1}{2}$ inches within, and 6 inches deep, made of half inch board: upon the bottom of the box lies a plate of glaſs alſo $9\frac{1}{2}$ by $7\frac{1}{2}$ inches, cemented to the wood at the four corners by common electrical cement; this plate is coated on both ſurfaces with tin-foil ſeven inches by five, as repreſented at Q, *fig.* 16. (except that the ſlips of tin-foil at H and I are paſted or gummed upon the under ſide only,) and is uſed as a ſubſtitute for a jar of 35 inches of coated ſurface, it being of no conſequence what the ſhape of the glaſs be, provided it have a proper quantity of coating. M E N is a cylinder of glaſs of four inches diameter, the body of which is $7\frac{1}{2}$ inches long; at M and N are braſs or boxen caps, cemented as in other machines, upon the ſmall cylindrical ends of which the cylinder revolves, by means of the ſimple winch C, which may be taken off or put on at pleaſure, either by ſcrewing, or by being inſerted upon a ſquare ſhoulder. The central points of revolution of N and M are at about 2½ inches from the top of the box, the firſt inſerted into a circular hole in one end of the box, and the other *let down* in an open place made down through the other, which has a detached piece of ſimilar wood to fit it, and to keep the cylinder in its place. L is the cuſhion, and E the ſilk placed in the uſual way; D is a ſcrew with a milled head, which, by the aſſiſtance of a tapped nut, placed faſt in the inſide of the box at four inches from the bottom, preſſes againſt the elaſtic part of the *ſupport* of the cuſhion which is hid from the eye; this ſupport, which may be of elaſtic wood, coated above D with tin-foil, or of any elaſtic metal, is ſcrewed faſt to the back of the box near the bottom in the inſide. The chain at D is hung on the ſcrew at pleaſure, as the wood is found to be in a good or bad conducting ſtate.

“ F is a piece of light wood turned very ſmooth, and neatly covered with tin-foil, its ends being rounded. This piece, which I ſhall call the collector, is furniſhed with about a dozen fixed pins of braſs, projecting againſt the ſide of the cylinder, as repreſented in the figure, as near as may be without touching it. The collector is ſix inches long, and ſomewhat more than an inch in diameter, and is ſupported by two ſolid glaſs pieces C, C, of an inch and three-quarters in length, and nearly half an inch in diameter, cemented into the ſide of the box at 4½ inches from the bottom, and each at an inch from the end of the collector: by this means the collector becomes inſulated, and has a chain to be hooked on an eye of wire, fixed on any part thereof, ſo as to fall occaſionally upon the upper inſulated coating of the plate of glaſs in the bottom of the box; the chain, however, muſt not be ſo long as to extend beyond the coating by any motion of the box.

“ B is a glaſs tube of about one-eighth of an inch bore, and about 3 or 3½ inches long, with a ring of braſs or horn, that has a male ſcrew cemented upon the middle of it, to ſcrew into another ring that has a female ſcrew, and is cemented into the front ſide of the box at 4½ inches from the bottom. Through this tube paſſes a braſs wire, as thick as will eaſily move in it, about 4½ inches long, tapped about an inch at each end, and a little ſmoothed; on each end of this wire is a tapped nut, which ſcrews back or forwards to or from the ends of the tube, ſo as to hold the wire in any ſituation that may be required, with regard to the diſtance of its ends from thoſe of the tube. The wire has alſo two braſs balls, one of which has its diameter leſs than that of the tube, that it may move through the circular hole into the box, to prevent its falling on the glaſs plate, which it might do if ſcrewed off and on within the box. O, O, are the directors, with handles of glaſs, each ſix inches long, beſides the balls and wires.

“ There is yet one part of the apparatus which it was not neceſſary to exhibit in the plate; *viz.* the inſulating ſtool; this is made exactly of a ſize to cover the box, and has four feet of glaſs, almoſt ſix inches long. Underneath that part of the ſtool which covers the collector, ſlides a little drawer, which contains the tube, with its appendages, milled nut, chains, handles of the directors, and amalgam, and muſt be taken from the ſtool when uſed. When packed, the four feet of the ſtool go exactly into each corner, and the edge of the drawer juſt within the ſide of the box, by which means the ſtool is kept in its place as a cover; and laſtly, the wires of the directors paſs through the ſtool, which is of inch plank, at the middle near the two ends, and, by ſcrewing into the fixed nuts in the edges of the box's ends at K and K, until the balls touch the wood of the ſtool, fix the whole ſo firm that a handle, ſuch as is uſed in a cheſt of drawers, fixed on the centre of the ſtool, ſerves for carrying the whole apparatus by.

“ With reſpect to the uſe, the machine being freed from moiſture and duſt, and amalgam applied to the cylinder, the ſhock is adminiſtered in the following manner; *viz.* let the ſmall chain fall from the collector upon the upper coating of the glaſs plate, and place the inner ball at the required ſtriking diſtance, ſuppoſe a quarter of an inch, as the caſe may require, and fix it there by means of the adjuſting nuts, and the quantity of the charge will be limited in the ſame manner as by Lane's electrometer; then connect one chain with the conducting wire which paſſes through the tube, and the other with a braſs ring connected with the ſlip of the under coating at H, or at I, as is moſt convenient, and hook the oppoſite ends upon the wires of the directors, whereby a ſhock may be ſent through any particular part of the body. When the ſpark only is required, the ſmall chain is removed from the collector, and alſo the long chain connected with the hook at H, is taken away; the inner ball is then fixed ſo as to touch the collector by means of the adjuſting nuts; in which caſe the collector, the wire in the tube, and the ſecond long chain connected therewith, form together one conductor. After the exterior end of this chain is attached to the wire of one of the directors, the ſpark may be directed into any particular part; when the eye is the part affected, a pointed wire muſt be uſed inſtead of the wire carrying the ball, which muſt be made to ſcrew into the ſocket of the director. When a ſpark is taken out of the body, the patient muſt ſtand on the ſtool, and hold the chain, connected as before, in his hand; and then the operator or aſſiſtant may take ſparks from him, as in other machines.”

The laſt ſpecies of electrical machines are thoſe which, inſtead of a globe or cylinder, contain one or more flat circular plates, fixed to an axis and turned by a ſimple winch.

The honour of having invented the plate electrical machines has been claimed by two diſtinguiſhed perſons, *viz.* by Dr. Ingenhouſz, phyſician to the emperor of Germany, and by Mr. Ramſden, an exceedingly ingenious mathematical inſtrument maker, in London. Dr. Prieſtley was of opinion, that each of theſe gentlemen, independent of the other, conſtructed a machine, in which a circular glaſs plate was the electric. It has been, however, alſo confidently aſſerted, that Dr. Ingenhouſz conceived the original idea, and Mr. Ramſden executed it. The glaſs plate of thoſe machines which Mr. Ramſden firſt conſtructed was about nine inches in diameter. The plate turned vertically, and rubbed againſt four cuſhions, each an inch and a half long, placed in the oppoſite ends of the vertical diameter. The prime conductor was a braſs tube, having two horizontal branches, which came within about half an inch of the circumference of the glaſs plate, ſo that each branch took off the electricity excited by two of the cuſhions. This original machine could not afford the negative electricity, as the rubbers could not be eaſily inſulated. To remedy this defect, the table upon which the machine ſtood, and likewiſe the perſon who worked it, were placed upon a large inſulating ſtool, and the prime conductor was connected with the ground; then the table, the operator, and whatever elſe ſtood upon the inſulating ſtool, were in a negative ſtate; but this negative power being communicated to a ſurface conſiderably large in proportion to the ſize of the machine, was of courſe very weak, and altogether the contrivance was but a clumſy one.

Since the firſt years of its invention, this plate machine has been frequently varied, and has received ſeveral eſſential improvements. Its ſize, as well as its power, has been greatly increaſed; and, in fact, one of the moſt powerful electrical machines extant, is of this kind, and belongs to the Teylerian muſeum at Haerlem. It was conſtructed under the direction of Dr. Van Marum, who performed a vaſt number of very intereſting experiments with it.

This machine conſiſts of two circular glaſs plates, each 65 inches in diameter, which being fixed parallel to each other, and 7½ inches aſunder, on a common axis, are turned by means of a winch, without any accelerated motion, and are rubbed by eight rubbers, all being fixed in a proper frame, the conſtruction of which is clearly ſhewn in *Plate* I*. and *Plate* X. of *Electricity*; for the electrical machines, which are delineated in thoſe plates, differ in no eſſential part from that which is at preſent under conſideration. Each plate is rubbed on both ſurfaces; two rubbers being on one ſide, and two on the oppoſite ſide of each plate. The prime conductor is divided into two branches, which enter between the plates, and by means of points, collect the electric fluid from their inner ſurfaces only. Two men are in general employed to work this machine; but when it is to be kept in action for a long time, then four men are put to it.

Since its firſt conſtruction this machine has undergone ſeveral alterations, and has been conſiderably improved.

The power of this Teylerian machine is very extraordinary, in all probability exceeding that of any other electrical machine that was ever conſtructed. And the following particulars will convey ſome idea of that power.

A very ſharp ſteel point preſented to the prime conductor of this machine, drew a luminous ſtream of electricity about half an inch long. When a ſharp ſteel point was fixed to the conductor, ſo as to project three inches from its ſurface, on working the machine that point threw out ſtreams of light about ſix inches in length, when a ball of three inches in diameter was preſented to it; and the luminous ſtreams were only two inches long when another point was preſented inſtead of the ball.

The ſenſation, commonly called the ſpider's web, on the face of the by-ſtanders, when this machine is in action, is frequently felt at the diſtance of eight feet from the prime conductor. A thread ſix feet long, ſuſpended perpendicularly, was ſenſibly attracted by the prime conductor at the diſtance of 38 feet. A pointed wire, preſented to the prime conductor, appeared luminous even at the diſtance of 28 feet. When another conductor was preſented to the prime conductor of this machine, after the manner ſhewn in *Plate* X. of *Electricity*, and a communication was made between the former and the ground, by means of a long braſs wire ⅜ths of an inch in diameter; it was found that whilſt a ſtream of electric fluid paſſed from the latter conductor to the former, the braſs wire gave ſmall ſparks to conducting bodies that were placed near it. The ſparks between the two conductors were generally 21, but ſometimes even 24 inches long. This ſpark was crooked, and darted many lateral bruſhes, as is ſhewn in the above-mentioned *Plate* X. A ſingle ſpark from the prime conductor melted a conſiderable length of gold leaf. A Leyden phial, containing about one ſquare foot of coated ſurface, was fully charged by about half a turn of the winch, ſo as to diſcharge itſelf; and by repeated trials it was found, that in one minute's time this phial diſcharged itſelf 76, 78, and often even 80 times.

The difficulty of obtaining a negative power of electricity in the common plate electrical machines, and the neceſſity of having a ſmaller machine at hand than the above deſcribed one, induced Dr. Van Marum to contrive a ſmall machine which might eaſily and expeditiouſly afford either a negative or a poſitive power; and after ſome conſideration and a few trials, he contrived a machine which anſwered that object remarkably well. It is only an improvement upon the plate machine. See *fig.* 18. *Plate* XI. which ſhews a perſpective view of it. The axis of the glaſs plate of this machine is ſupported by a ſingle ſtrong column A, which for that purpoſe is provided at top with a bearing-piece K, on which two braſs collar-pieces D, D, are fixed, and carry the axis. O is a counterpoiſe of lead fixed to the end of the axis cloſe to the winch, to prevent too great friction in the collar next to it. The other extremity of the axis carries the circular glaſs plate, which is 31 Engliſh inches in diameter.

The large ball H is ſupported by a glaſs pillar, and performs the office of prime conductor; it has a ſemi-circular branch, the extremities of which are furniſhed with two croſs braſs pieces, ſomewhat like the letter T, which, by means of points, receive the electricity from the excited plate. This ſemi-circular branch has an axis which paſſes through the ball H, and turns in it; ſo that the arch E E may be placed either in a vertical direction, which is the poſition repreſented in the figure, or it may be ſituated horizontally. P is a copper tube terminating in a ball; and it moves like a radius upon the ſtem of the ball S. I I is another arch of braſs wire, half an inch in diameter, fixed to the extremity of the bearing-piece K, upon which it turns, ſo that it may be placed in any ſituation. The rubbers Y, Y, are ſeparately inſulated upon the glaſs pillars W, W, and are applied to the glaſs plate nearly in the direction of the horizontal diameter of the plate.

The ſuperiority of this machine over other plate machines of the uſual conſtruction, principally conſiſts in the contrivance of altering the poſition of the ſemi-circular branch E E; for by this means, the collecting terminations of E, E, may be placed in contact with the rubbers, and thus the prime conductor will inſtantly exhibit negative electricity; whereas in the poſition repreſented in the figure, the prime conductor H will exhibit poſitive electricity. But in this caſe, when the conductor is poſitively electrified, the rubbers muſt be made to communicate with the ground, therefore the ſemi-circular arch I I has been added, which muſt be turned ſo as to touch the rubbers, and form that communication. And when the negative power is wanted, then the arch E E is turned ſo as to touch the rubbers, and the arch I I is turned againſt the naked ſurface of the plate to receive and carry off the poſitive electricity. Mr. Nicholſon, ſome years ago, diſcovered a method of rendering the prime conductor of a cylinder machine either poſitive or negative, at pleaſure. Phil. Tranſ. for 1789. See EXCITATION.

After the deſcription of thoſe various machines, it may be naturally aſked, which of them might be recommended in preference to the others. The anſwer to which is, that not every machine is adapted to all purpoſes; therefore, an electrical machine muſt be choſen according to the object in view, *viz.* whether it be wanted for all kinds of experiments in the large way, or for delicate experiments in a private ſtudy, or for medical purpoſes, &c. We may nevertheleſs point out certain peculiarities and certain obſervations, which may help to direct the choice of an electrical machine.

Upon the whole it appears, that the cylinder, or the circular plate, is the beſt ſhape for the electric of a machine; for they are eaſily procured, eſpecially the cylinders, and admit of a vaſt variety of ſizes; but it muſt be obſerved, that there is a conſiderable difference between the mounting and the working of a cylinder machine and a glaſs plate machine. With equal powers, the mounting of a plate machine is conſiderably more expenſive, and requires a much greater accuracy of workmanſhip than the mounting of a cylinder machine. With reſpect to the uſe, the plate machine is not ſo eaſily managed as the cylinder machine. It has, in the firſt place, more rubbers than one to take care of, or to keep in order, and on account of the great friction, it is rather hard to work. On the other hand, the plate machine furniſhes a more abundant quantity of electric fluid than that with a cylinder; and it is to be remarked, that if the two machines furniſh ſparks of the ſame length, the ſpark from the conductor of the plate machine is much more active and more pungent than the ſpark from the cylinder machine; hence the former will charge a battery quicker than the latter. This ſuperior denſity of the ſpark from a plate machine, ſeems to be owing to this; namely, that the plate is rubbed on both ſurfaces, and the electricity is taken away by the collector from one only of thoſe ſurfaces; whereas in the other kind of machines the outer ſurface only of the cylinder is rubbed, and the electricity is received immediately by the collector; but the farther conſideration of this phenomenon belongs to another part of this work. See the article EXCITATION.

In the preceding account of the various electrical machines, we have omitted to notice one ſpecies of theſe machines, *viz.* thoſe whoſe electric conſiſts of ſilk ſtuff, ſuch as is called ſatin, or luteſtring, or the like; and our reaſons for this omiſſion are, that all thoſe which have been occaſionally deſcribed in journals, and other works, are very cumberſome and defective; beſides which, they have little power in compariſon to the glaſs machines, and ſoon wear out, or are put out of order. Were we not furniſhed with more ſubſtantial electrics, ſuch as glaſs, ſulphur, ſhell-lac, &c. we might then turn our thoughts towards conſtructing a machine with ſilk; but being furniſhed as we are with the above-mentioned electrics, the ſilk machines are far from deſerving our attention.

We ſhall now conclude this article with a few directions neceſſary for the preſervation and for the proper management of an electrical machine.

It is hardly neceſſary to obſerve, that every ſpecies of electrical machine will naturally require ſome particular precaution; but the following directions are more or leſs applicable to all kinds of machines furniſhed with a glaſs electric.

Moiſture, and duſt; but particularly the former, being detrimental to the power of an electrical machine, it becomes neceſſary to guard from both as much as may be practicable; hence when not actually in uſe, the electrical machine ſhould be kept in a dry and clean place, and at leaſt the glaſs part of it ſhould not be ſuffered to remain dirty and ſoiled. If the machine has been long neglected, the operator, in order to render it ready for uſe, muſt in the firſt place remove the rubber; he muſt then place the machine at a moderate diſtance from the fire; ſo as to render every part of it very dry, but not too warm. This done, and the duſt removed, the glaſs part of the machine muſt be repeatedly rubbed with a clean and warm handkerchief or towel; the rubber likewiſe muſt be cleaned, removing all the old amalgam that may have adhered to it. The glaſs cylinder, or plate, in its rotation, frequently contracts ſome dark ſpots or concretions upon its ſurface, which tend to diminiſh its power. Theſe ſpots, which adhere pretty faſt to the glaſs, may be removed by applying a finger's nail to each ſpot, or by rubbing them off with a piece of coarſe canvas. Previouſly to the replacing of the rubber, the following operation generally contributes to increaſe the excitation. It conſiſts in touching the cylinder with the bottom of a tallow candle in ſtreaks parallel to the axis of the cylinder, then rub the cylinder again with a dry and warm linen cloth; taking care that this cloth be not very old, for in that caſe it is apt to leave filaments about the glaſs, and about the reſt of the machine. This done the rubber is fixed in its place, and its ſupport is adjuſted, ſo that the rubber may bear upon the glaſs with a proper degree of preſſure. Formerly the amalgam, which greatly increaſes the power of excitation, was ſpread upon the rubber, before the rubber was put in its place; but experience has ſhewn, that it is much better to fix the rubber clean in its place, and then to apply the amalgam upon a piece of leather to the ſurface of the cylinder whilſt this is revolving in its uſual directions; for by this means the revolution of the cylinder, or plate, will carry away from the leather a ſufficient quantity of amalgam, and will depoſit it upon the rubber. The leather with the amalgam needs not be kept in contact with the glaſs longer than while the cylinder makes eight or ten revolutions; moving, at the ſame time, the piece of leather with the amalgam from one end of the cylinder to the other. Now if the cylinder be turned, and a hand or the ends of the fingers be preſented to it, a crackling noiſe, which is accompanied with luminous bruſhes in a dark room, indicates that the cylinder is in good action; then the prime conductor being ſituated in its proper place, you may proceed to perform the experiments. During the performance, the electrified part of the machine is apt to attract duſt from all quarters, to obviate which the room ought to be previouſly ſwept and duſted, and likewiſe the operator ought to have a clean cloth at hand to wipe off all particles of duſt and filaments, which in ſpite of all his precautions will frequently run to the cylinder, to the conductor, &c.

The amalgam remains to be deſcribed. Mr. Canton, as far as we are informed, firſt applied the amalgam of tin and mercury to the rubber of an electrical machine, which was undoubtedly a capital improvement; for by this means an electrical machine will have its power more than quadrupled. The tin amalgam is eaſily made, for if you triturate tin-foil and mercury, (in the proportion of one of tin to two parts of mercury,) in a mortar, or even in the palm of your hand, the amalgam will be formed in a minute or two.

The amalgam of mercury and any metallic ſubſtance that may be amalgamed by it, contributes to increaſe the electric power of glaſs, but ſome are more efficacious than others. *Moſaic gold* has alſo been found efficacious for the purpoſe of excitation. The zinc amalgam, however, which was firſt recommended by Dr. Higgins, has upon the whole been found the moſt efficacious. This amalgam, which conſiſts of one part of zinc with four or five parts of mercury, is, according to Mr. Cavallo, prepared in the following manner. "Let the quickſilver," he ſays, "be heated to about the degree of boiling water, and let the zinc be melted in a crucible or iron ladle. Pour the heated quickſilver into a wooden box, and immediately after pour the melted zinc in it. Then ſhut up the box, and ſhake it for about half a minute. After this you muſt wait until the amalgam is quite cold, or nearly ſo, and then you may mix ſome greaſe with it by trituration. If the melted zinc be poured into the quickſilver when cold, a very ſmall portion of the former will be amalgamed, the reſt remaining in lumps of different ſizes."

Mr. Cuthbertſon gives the following preparation of the amalgam in his Practical Electricity. "Take," he ſays, "one part of tin and zinc, melt them in a crucible, and pour them on two parts of mercury, which is put into a wooden box made for the purpoſe; ſhake the box till the metals are cold. The amalgam is then to be pulverized in a metal mortar to a very fine powder, and afterwards mixed with a ſufficient quantity of hog's lard, to make into a paſte."

Electrical *Phial.* See Leyden Phial.

Electrical *Repulſion.* See Electrical *Attraction.*

Electrical *Rubber.* See Rubber.

Electrical *Shock.* See Leyden Phial, and Shock.

Electrical *Star* and *Pencil.* See Star, and Point.

Electrical *Varniſh.* See Coating *of Electrics.*

Electrical *Well.* See Well.

ELECTRICITY, (from the Greek ηλεκτρον, *amber,*) is the name of an unknown natural power, which produces a great variety of peculiar and ſurpriſing phenomena, the firſt of which are ſuppoſed to have been obſerved in a mineral ſubſtance, called *amber*, whence they have been denominated *electrical phenomena.* Theſe phenomena have been particularly examined, and are claſſed under diſtinct and comprehenſive denominations, ſuch as the attraction, the repulſion, the light, the ſhock, &c. of electricity: and ſeveral rules, or natural laws, have been derived from the concurring reſults of a great many experiments. Theſe phenomena, theſe laws, the hypotheſes that have been offered in explanation of their cauſe, and, in ſhort, whatever belongs to them, is collectively called the *ſubject*, or the *ſcience* of *electricity.* The minute and peculiar deſcriptions of all theſe particulars belong to diverſe parts of this Cyclopædia; but a conciſe view of the whole ſubject will be found in the preſent article, whence a comprehenſive idea of it may be derived, which may afterwards be enlarged by recurring to the ſeparate articles, under their peculiar denominations.

If a clean and dry piece of glaſs, or of amber, be rubbed, by ſtroking it four or five times with a clean and dry hand, and be afterwards preſented to ſmall and light bodies of any kind; theſe will be alternately attracted and repelled, and attracted and repelled again, and ſo on, by the glaſs or the amber, until the power entirely ceaſes. If this experiment be performed in a dark room, various luminous ſparks will be perceived between the ſmall bodies and the glaſs or the amber. Now in this experiment the glaſs or the amber is ſaid to be the *electric, viz.* a body capable of acquiring the above-mentioned power of attracting, &c. and when actually poſſeſſed of that power, is ſaid to be excited; friction in this caſe being the cauſe of that excitation. The attraction and the repulſion, which are of a peculiar nature, (that is, different from all other known kinds of attraction and repulſion,) together with the light, &c. are called *electrical phenomena;* the hand, which has excited the electric by its friction, is called the *rubber;* and when a machine is formed, which contains the electric and the rubber, ſo diſpoſed, that, by an eaſy motion, the former may be commodiouſly excited by the friction of the latter, this is called the *electrical machine.*

If to the amber, or to the glaſs, a piece of metallic wire be affixed, having a metallic ball at its end, and after having excited the amber or the glaſs, this be ſo ſuſpended as that the above-mentioned metallic ball be preſented to the light bodies, an alternate attraction and repulſion will take place between the light bodies and the ball, exactly as in the former experiment it took place between the light bodies and the amber, or the glaſs, itſelf; therefore the electric virtue will paſs through the metallic wire; hence the metallic wire is called *a conductor of electricity.*

If the laſt experiment be repeated with this difference, *viz.* that, inſtead of the wire, a ſilk ſtring be interpoſed between the ball and the electric; the light bodies will not be attracted and repelled by the ball, which ſhews that the electric virtue will not go through ſilk; hence ſilk is ſaid to be a *non-conductor of electricity.*

All the bodies we are acquainted with are either conductors or non-conductors of electricity; but in various degrees. And it has been obſerved that all thoſe bodies, which are non-conductors, may be excited like the above-mentioned glaſs, or amber, alſo that all thoſe bodies, which are conductors, cannot be excited: in conſequence of which *electrics*, and *non-conductors*, mean the ſame kind of bodies; and likewiſe *non-electrics* and *conductors* denote the ſame bodies, but of the other claſs. A body, ſurrounded entirely by non-conductors, is ſaid to be *inſulated;* thus a piece of metal, ſuſpended in the air by means of a ſilk ſtring, is inſulated, becauſe the only bodies that touch it, *viz.* the ſilk and the air, are non-conductors.

Rubbing or friction is one of the means of exciting an electric; but there are ſeveral other ſources of that power independent of friction.

Some bodies are rendered electrical by heating and cooling, like the tourmalin; others are rendered electrical by coagulation and cooling after fuſion, or by pouring them when melted into another electric, like ſulphur. Certain effervеſcences, and evaporation, or the converſion of water into ſteam, and *vice verſâ* the converſion of ſteam into water, do alſo produce electricity. The ambient air, the clouds, with the rain, ſnow, and hail, which fall from them, and fogs, are generally, or always, electrified in various degrees. The thunder and the lightning are electrical phenomena ariſing from the electricity of the clouds; and this electricity of the clouds ſeems principally to ariſe from the evaporation and condenſation of vapour.

A remarkable electrical power is likewiſe poſſeſſed by four aquatic animals, all inhabitants of the ſea; and theſe are, the *torpedo*, the *gymnotus electricus*, the *ſilurus electricus*, and another fiſh, which has not as yet been ſufficiently examined, nor has it received a name.

Laſtly, electricity is likewiſe produced by the diſpoſition of certain metallic ſubſtances in a particular order, and eſpecially when other ſubſtances are interpoſed among theſe metallic ones; and it is to be remarked, that the power of this ſource of electricity may (by increaſing the number of the above-mentioned orderly diſpoſitions) be augmented to an unlimited degree. This mode of producing electricity is of modern diſcovery, and is commonly known under the name of *Galvaniſm*, which ſee.

We have hitherto ſpoken of electricity as if it were a ſingle power. It is now neceſſary to ſhew, that there are two electrical powers analogous, yet contrary, to each other, and they are, (in all caſes of the production of electricity, as well as in the effects,) to be found cloſely connected with each other. In order to ſhew the nature and the difference of theſe two powers, we muſt recur to the above-deſcribed experiment, with the glaſs or with the amber; for though either of theſe bodies, when excited by the friction of the human hand, will produce ſimilar electrical appearances; yet their powers are different and oppoſite to each other. Their difference conſiſts in the following particulars.

1. If any light pendulous bodies, ſuch as bits of cork ſuſpended by threads, and inſulated, be electrified by touching them with the excited piece of glaſs; then, on removing the glaſs, thoſe light bodies will ſtand at ſome diſtance from each other, ſhewing a mutual repulſion. The ſame effect will take place, if another parcel of ſuch pendulous light bodies be electrified by touching them with the excited piece of amber, or with an excited piece of roſin, which produces the ſame effect. Now if the above-mentioned two parcels of pendulous and electrified bodies be brought ſufficiently near to each other, they will inſtantly attract each other, and after this attraction, theſe bodies will no longer exhibit any ſign of being electrified. It follows, from this, that the electricity of the excited glaſs is different from that of the

excited roſin or amber; and accordingly the former has been called the *vitreous*, and the latter the *reſinous electricity*. The firſt particular then in which the two electricities differ from each other is, that bodies electrified with either kind of electricity repel each other, but bodies electrified with the vitreous electricity, will attract bodies electrified with the reſinous electricity.

The peculiar circumſtance, which takes place in the laſt-mentioned caſe; (*viz.* that when bodies poſſeſſed of one kind of electricity, attract bodies that are in an equal degree poſſeſſed of the other kind of electricity, all ſigns of electricity are thereby annihilated,) ſuggeſted a ſuppoſition, that probably one of theſe powers is an exceſs, and the other a defect of ſomething which bodies naturally poſſeſs; and upon the probability of this ſuppoſition, the vitreous electricity was alſo called the *plus* or the *poſitive electricity*, and the reſinous was alſo called the *minus* or the *negative electricity*. This ſuppoſition or hypotheſis explains the above-mentioned circumſtance of the attraction; for an exceſs on one ſide is compenſated by a defect on the other, and the bodies are left in a natural ſtate.

2. If a pointed conducting body, ſuch as a needle, be preſented to the excited glaſs in a dark room, that point will appear illuminated with a bright globule, or ſtar-like appearance; but if the pointed body be preſented to an excited piece of amber or of roſin, that point will be illuminated with a pencil, or bruſh-like appearance of rays of light.

3. And laſtly, in various caſes, in which the vitreous electricity paſſes from a body overcharged with it, to another body overcharged with reſinous electricity; an evident current is obſerved from the former to the latter; but not *vice verſâ*; which tends to corroborate the above-mentioned hypotheſis of poſitive and negative electricity, and likewiſe indicates that the vitreous is the poſitive, whilſt the reſinous is the negative electricity.

The method of aſcertaining whether a given electrified body is poſſeſſed of the vitreous or of the reſinous electricity, is eaſily derived from the above-mentioned diſtinctions. For inſtance, let A be the given electrified body. Take any other inſulated and eaſily moveable body B, ſuch a light piece of cork ſuſpend by a thread, and electrify it by touching it with an excited piece of glaſs, which of courſe communicates to it the vitreous electricity. Let now the body B be brought cloſe to the body A, and if a repulſion takes place, the two bodies muſt be poſſeſſed of the ſame kind of electricity, and ſince B is electrified with the vitreous electricity, A muſt likewiſe be poſſeſſed of the vitreous electricity. If when B is brought cloſe to A, an attraction takes place, then A muſt be poſſeſſed of the reſinous electricity. The inſtruments properly conſtructed for aſcertaining the particular kind of electricity in an electrified body, are called *electrometers*.

That the two kinds of electricity do always accompany each other is proved by a variety of facts, the principal of which are as follows.

1. If the perſon who rubs a piece of glaſs, or amber, &c. be inſulated, after the excitation of the glaſs, the perſon as well as the glaſs or other electric will be found electrified; but with this difference, that if the electric acquires the vitreous electricity, the perſon will be found electrified with the reſinous electricity, and *vice verſâ*. In ſhort, whenever two bodies are rubbed againſt each other, and any electricity is thereby excited, both bodies are neceſſarily electrified, but with contrary electricities.

2. Whenever a body is electrified, the contiguous air, or any other body ſituated within a certain diſtance of the former, will alſo appear electrified, but with the contrary electricity. Thus, ſuppoſe that a piece of glaſs G be excited by friction with the human hand, let two ſmall pendulous bodies be brought pretty near it, and theſe, by their mutual repulſion, or divergency, will ſhew that they are electrified, and if their ſtate of electricity be examined in the manner already mentioned, they will be found poſſeſſed of the reſinous electricity; *viz.* contrary to that of the excited glaſs. This contrary electricity is ſtronger or weaker, according as a body is placed nearer to, or farther from, an electrified body; and the limit, within which this contrary electricity may be perceived, is called the *ſphere of action* of the electrified body.

3. The ſame individual body will not, when rubbed, acquire always the ſame kind of electricity; for certain rubbers will excite in it the reſinous, and others will excite in it the vitreous electricity. Thus, if a ſtick of ſealing-wax be rubbed with leather, the ſealing-wax will acquire the reſinous, and the leather will acquire the vitreous electricity; but if it be rubbed with a piece of tin-foil, then the ſealing-wax will acquire the vitreous, and the tin-foil will acquire the reſinous electricity.

Here it is neceſſary to obſerve, that whenever the rubber is ſaid to acquire electricity, (as the leather, or the tin-foil, or any other conducting body,) it is always underſtood, that this rubber is inſulated; otherwiſe the electricity which it acquires will be carried away as ſoon as it is generated.

We muſt now ſtate the principal laws of communicated electricity; and here it muſt be obſerved, that moſt of the phenomena of electricity, and its grandeſt effects, belong to its tranſition, or to its being communicated from one body to another; thus the tranſition of electricity from one body to another occaſions the light, the hiſſing, the crackling noiſe, and even the tremendous atmoſpherical thunder; by its quick paſſage it melts metallic bodies, ſets fire to inflammables, deſtroys animal and vegetable life, and ſo forth.

Whenever a body is electrified, either by excitation or by the contact of another electrified body, that power is confined upon it only by electrics, and it remains upon that body a longer or a ſhorter time, according as the electrics which confine it are more or leſs perfect. If a finger, or any other conductor, be preſented to an excited electric body, it will receive a ſpark from that body, which ſpark conſiſts of a certain portion of the electricity of that electric. In this caſe, the electricity of the latter will not all be conveyed to the finger or other conductor, becauſe as that body is a non-conductor, it cannot convey the electricity of all its ſurface to that ſide to which the conductor has been preſented. Hence, if a conducting ſubſtance be ſucceſſively preſented to different parts of an excited electric, it will receive a ſpark at every approach, and that without repeating the excitation, until all the power of that electric is exhauſted, and then a new excitation is neceſſary for the purpoſe of reviving it.

If a conducting body, not inſulated, be expoſed to an excited electric at a moderate diſtance, it acquires on that ſide the electricity contrary to that of the electric. This electricity becomes ſtronger the nearer that body is brought to the electric, and at laſt the conductor receives a ſpark from the electric (on account of the attraction exiſting between the two electricities), and thus the balance is reſtored. If the conductor, which is preſented to the electric, be inſulated, it will appear electrified at both extremities; but with this difference, that the ſide contiguous to the electric will appear poſſeſſed of the electricity contrary to that of the electric, and the oppoſite ſide will appear poſſeſſed of the ſame kind of electricity. There is a point not quite in the middle of that body, which does not appear to be electrified at all. Theſe two different electricities of the conductor become ſtronger the nearer that body is brought to the electric, and at laſt the former receives a ſpark from the latter, and becomes entirely poſſeſſed of the ſame kind of electricity with the electric. All theſe effects will take place alſo when ſome other non-conducting ſubſtance, beſides air, is interpoſed between the excited electric and the conducting body; ſuch as a thin plate of glaſs, of roſin, of ſealing-wax, of ſulphur, &c. but in this caſe no ſpark can paſs from the excited electric to the conductor, unleſs it forces its way by burſting the interpoſed non-conductor. In fact, the noiſe of a ſpark ariſes from its burſting or diſplacing the air which is interpoſed between the excited electric and the conductor which is preſented to it.

Now, ſince in the laſt mentioned caſe the ſpark cannot paſs from the excited electric to the other body, unleſs it burſts the interpoſed electric or non-conductor, it follows, that if the interpoſed electric be pretty ſtrong, ſo as to reſiſt the effort of the two electricities, a great quantity of electricity may be accumulated on both ſides of it; and this is what conſtitutes a charged electric; or, as it is more commonly called, from the place of its diſcovery, a *Leyden phial.* The following illuſtration will render this ſubject of charged electrics more intelligible. Let a large pane of glaſs be covered on both ſides with ſome metallic body or other conductor, for inſtance, with tin-foil, but ſo that the tin-foil may on either ſide be about two inches ſhort of the edge of the glaſs. Let one of theſe coverings or coatings be made to communicate with an electric powerfully excited, and a quantity of electricity will be communicated to that coating, at the ſame time that the action of that electricity will induce the contrary electricity on the oppoſite coating, provided that this communicates with the ground. Now it is evident, that a ſpark cannot paſs from one coating to the other, ſo as to compenſate or to annihilate the two contrary electricities, unleſs it breaks a hole through the pane of glaſs, or paſſes over its uncoated edge; which indeed will actually take place if the electricities be accumulated upon the coatings beyond the reſiſting power of the glaſs. But before this burſting takes place, let the pane of glaſs be removed from the vicinity of the electric, and it will remain charged; that is, a great quantity of vitreous or poſitive electricity will remain adhering to one ſide of it, and an equal quantity of the reſinous or negative electricity will remain adhering to the other ſide. Theſe two electricities ſeem to be kept cloſe to the glaſs by their mutual attraction, and yet cannot come together becauſe that attraction is not powerful enough to break the glaſs. And it is in conſequence of that attraction that if one coating of the glaſs be touched whilſt the other remains inſulated, the electricity cannot be removed; but if a conducting communication be made from one coating to the other, an exploſion, attended with a vivid ſpark, will take place between that communication or circuit, and that coating which has been touched laſt, which ariſes from the paſſage of the electricity from one ſide of the pane of glaſs to the other, in conſequence of which the two contrary electricities are annihilated, and the glaſs is ſaid to be *diſcharged.* It will be eaſily comprehended, that whether the coated glaſs for this experiment be in the form of a flat plate, or of a bottle, or of a jar, or of any other kind, the effect muſt be always the ſame, provided the coatings of the two ſides, or of the inſide and outſide of a bottle, do not come too near the edge or opening of the bottle; for in that caſe the electricity would go from one coating to the other by paſſing over the ſurface of the glaſs, in which caſe the glaſs is ſaid to have diſcharged itſelf. It is not known where the charge does actually reſide. It certainly does not reſide in the coating, for the coating may be removed and replaced again without diſcharging the glaſs; the coating only ſerving to form a communication between the various points of the ſurface of the glaſs. Nor do we know by what mechaniſm the electricity which is communicated to one ſide induces the contrary electricity on the other ſide of the glaſs, or of any other electric; for any other ſubſtantial electric may be coated and charged like glaſs. We are only acquainted with the effects, and with theſe we muſt for the preſent remain ſatisfied.

The thinner a plate of glaſs or of other electric is, the higher charge it may acquire; but it is at the ſame time more liable to be broken by a ſpontaneous diſcharge; therefore, for this experiment of charging, &c. the glaſs muſt be choſen of a moderate thickneſs. By increaſing the quantity of coated electric ſurface, an immenſe force of electricity may be accumulated, which, when it is afterwards diſcharged, produces aſtoniſhing effects. For this purpoſe ſeveral coated jars are connected together, ſo as to be charged and diſcharged like a ſingle jar, and this combination is called an *electrical battery.*

If the above-mentioned circuit of communication between the two coatings of a charged phial or jar, or plate, &c. be formed by the parts of a human being, a ſhock attended with a diſagreeable ſenſation will be felt through the interpoſed parts; as for inſtance, if he touches one coating with one hand, and then touches the oppoſite coating with the other hand, he will feel an unpleaſant ſhock, which is more or leſs painful according as the charge is higher or lower.

If various perſons join hands, and while the perſon at one end of the file touches one coating of the charged jar, the perſon at the other end touches the oppoſite coating, all the file of perſons will feel the ſhock at the very ſame perceivable inſtant of time. The charge of a Leyden phial has been found to paſs through a circuit of ſeveral miles in an unappreciable ſmall portion of time; but a ſmall quantity of electricity has been obſerved to employ a very ſhort portion of time in paſſing through a pretty long conductor, but not of the beſt kind.

From the above-mentioned ſenſation which an animal body receives from the diſcharge of a charged electric, that diſcharge is often called ſimply *the ſhock;* thus it is ſaid that the ſhock is paſſed through a wire, or through any thing elſe. The effects of this ſhock or diſcharge are various according to the height of the charge; and when it is proportionate to the object in view, ſurpriſing effects are produced by it. Metallic bodies are fuſed, electric ſubſtances are broken with violence, animals are killed, inflammable ſubſtances are ſet on fire; and, in ſhort, all the effects uſually produced by the lightning may be imitated by it. If the circuit of communication be formed by means of a wire and a ſeparate conductor, or the hand of a human being be ſituated very near the wire which forms the circuit, but ſo as itſelf to form no part of the circuit; on making the diſcharge through the wire, a ſmall ſpark will be ſeen between the wire which forms the circuit and the conductor or hand that ſtands cloſe to it; ſo that the conductor, or hand, &c. though actually out of the circuit, will feel ſome effect of the diſcharge. This effect is called the *lateral ſhock,* or *lateral exploſion.* A coated glaſs is capable of receiving and of holding a greater charge in condenſed, than in rarefied, air, or even than when ſtanding under the uſual atmoſpherical preſſure. If the communication between the two ſides of a charged phial be made by the interpoſition of imperfect conductors, as a ſlender piece of wood, a wet packthread, &c. the diſcharge will be made ſilently, or without exploſion, and its force is thereby weakened conſiderably. The force of the diſcharge is alſo weakened by the length of the circuit, though that circuit may conſiſt of the very beſt conductors; which ſhews that the electricity finds ſome obſtruction in paſſing even through the beſt conductors known. We muſt now return to the phenomena of the electricity which is communicated to conductors.

An inſulated conductor, having received ſome electricity from an excited electric, or from another electrified conductor, (in which caſe it is ſaid to be *electrified by communication,*) will act in every reſpect like an excited electric; excepting that when it is touched by another conductor communicating with the earth, the former gives one ſpark to the latter, and by that means all its electricity is diſcharged, becauſe the electricity belonging to all its parts is eaſily conducted through its own ſubſtance to that ſide of it, to which the other conductor has been preſented. Hence it appears that, in general, the electricity, which is diſcharged from an electrified and inſulated conductor, is much more powerful than when diſcharged from an excited electric; for the conductor, eſpecially when very extenſive, may acquire a vaſt quantity of electricity, by receiving ſpark after ſpark from an excited electric, and may afterwards, when touched, diſcharge it all at once. When an inſulated conductor is touched by another inſulated and electrified conductor, the electricity will be divided between the two conductors, but not equally; excepting when the two conductors are equal, ſimilar, and ſimilarly ſituated.

If their ſurfaces are equal and diſſimilar, that which is more extended will acquire a greater ſhare of electricity than the other. Whether the conductors are hollow or ſolid, it makes no difference.

If the two conductors are equal and ſimilar; but one of them is ſituated very near another conductor, but without touching it, then that conductor which is ſo ſituated will acquire a greater ſhare of electricity than the other, which is ſuppoſed to remain only expoſed to the ambient air.

When electricity is communicated to a capillary ſtream of water or other fluid, iſſuing out of a veſſel, the ſtream is accelerated by it, but if, inſtead of being capillary, this ſtream be of a conſiderable ſize; then electrization will not accelerate it.

Electrization promotes the evaporation of bodies which are actually evaporating; but not in a great degree. If the face or any other part of the body be expoſed, within a ſmall diſtance, to an excited electric, or to a conductor ſtrongly electrified, it will feel a peculiar ſenſation, as if a ſpider's web were drawn over it. The noſtrils thus preſented will perceive a peculiar ſmell, much reſembling that of phoſphorus, and if a body be kept ſome time within thoſe effluvia, it will afterwards retain that ſmell during ſome minutes. If the tongue be expoſed to a ſtream of electricity iſſuing out of an electrified body, it will be affected with a ſlight but peculiar kind of ſubacid taſte.

It was for a long time believed that electricity communicated to animal and vegetable bodies, accelerated the pulſation of the former, and promoted the growth of the latter; but it is at preſent much doubted whether it really produces any of theſe effects. Nevertheleſs electrization, in medical caſes, has been found uſeful at leaſt as a ſafe and active ſtimulant.

An electric ſpark, (that is, a ſeparate quantity of electricity,) will go a greater or leſſer diſtance through the air, in order to reach a conductor, according as its quantity is more or leſs conſiderable, as the parts from which it flies, and thoſe upon which it ſtrikes, are more or leſs acute, and as the conductor is more or leſs perfect. The noiſe, and the light with which the ſpark is attended, is greater or leſs, according to the quantity of electricity; according as the parts from which it flies, and thoſe upon which it ſtrikes, are more blunt or more ſharp; and according as the conductors are more or leſs perfect. Thus, for inſtance, a ſharp pointed body will throw off electricity to, and will receive it from, a greater diſtance, than a body of any other ſhape; but that paſſage then occaſions no noiſe, and is attended with very little light; becauſe, in this caſe, the electricity does not come in a ſeparate large body, but in a continued ſtream. If a pointed wire be concealed in a glaſs tube, which projects a ſhort way beyond it, or if it be covered with tallow, bees'-wax, ſulphur, &c. then it will take a ſtrong ſpark from an electrified conductor. When a point, proceeding from an electrified body, projects into the ambient air, a remarkable current of air, or wind, proceeds always from it, whether the point and the conductor be electrified with the vitreous or with the reſinous electricity, which ariſes from the particles of air being repelled by the point as ſoon as they become poſſeſſed of the ſame kind of electricity.

With reſpect to the electricity of the atmoſphere, the particulars which have been aſcertained are, that the air, at a ſmall diſtance from the ground, from houſes, trees, &c. is always electrified generally with poſitive electricity, but not always in an equal degree. The thunder and the lightning have alſo been aſcertained to be electrical phenomena; but other meteors, ſuch as the northern lights, water ſpouts, ſhooting ſtars, &c. have only been conjectured to be produced by electricity.

Thus we have drawn a general and comprehenſive ſketch of the ſubject of electricity. But for a minute and extended deſcription of all the particulars which belong to it, the reader is referred to the articles of each peculiar denomination; ſuch as CONDUCTORS, ELECTRICS, EXCITATION, LEYDEN PHIAL, LIGHTNING, &c.

ELECTRICITY, *Medical.* See MEDICAL *Electricity.*

ELECTROMETER, (from the Greek words ηλεκτρον, *amber*, and μετρον, *meaſure*,) an inſtrument uſeful for meaſuring the quantity, and determining the quality, of electricity in an electrified body; *viz.* the quantity and quality of that natural power, the effects of which were firſt obſerved in a mineral ſubſtance, called *amber*. The invention of electrometers is not much older than about the middle of the laſt, (*viz.* the 18th) century; but the greateſt variety of them, adapted to different purpoſes, has been invented within the laſt 40 years; and according to the various purpoſes, as alſo on account of their ſhapes, theſe inſtruments have obtained a variety of names, ſuch as *pith*, or *cork-ball electrometers*, *quadrant electrometers*, *bottle electrometers*, *atmoſpherical electrometers*, *electro-micrometers*, *electrical balances*, *diſcharging electrometers*, &c. A deſcription of all theſe electrometers, together with their gradual improvements, and their uſes, is as follows:

A ſimple thread held by one extremity, and preſented to an electrified body, ſeems to have been the firſt inſtrument of the kind. It only ſhewed the preſence of the electricity, by its being attracted by the electrified body. Dr. Deſaguliers called it the *thread of trial*. The Abbé Nollet uſed two threads, which ſhewed the intenſity of the electricity by the angle of their divergency, formed by their ſhadows upon a board placed behind them.

Mr. Canton added a cork ball, or a ball of pith of elder, to the extremity of each thread, which formed a conſiderable improvement; the threads acquiring thereby a greater degree of ſteadineſs, and becoming leſs apt to loſe their electricity, by having their extremities covered with the abovementioned balls. *Fig.* 1. *Plate* XII. repreſents this, Mr. Canton's, electrometer,

trometer, in its moſt uſual ſtate. A B repreſents the ſide of an oblong box about ſix inches long, but leſs than an inch broad. It is formed out of a ſingle piece of wood, and has a ſliding dove-tail cover over its whole length. When the cover is removed, and the box is inverted, the cork or pith-balls C, D, with their threads, come out of it, and remain ſuſpended, as in the figure. The balls are nicely turned in a lathe, and ſhould not be larger than an eighth of an inch in diameter. The linen threads are faſtened to the balls by paſſing them through with a needle, and making a knot at the end of each. Theſe threads are little ſhort of the length of the box A B, and are faſtened to a little ring at the extremity of the box, ſo that when not in uſe, they, with their balls, are placed in the cavity of the box, and the cover is ſlipped over them. Previous to their being paſſed through the balls, the threads have been ſometimes wetted in a weak ſolution of common ſalt, in order to render them better conductors.

A cork, or pith-ball electrometer, is alſo frequently uſed without the box A B. In that caſe, it being nothing more than a thread with a ball at each end, it may be ſuſpended by its middle to a wire at the end of the prime conductor of an electrical machine, or elſewhere. If this inſtrument be held by the end A of the box, and be thus preſented to an electrified body, the balls C, D, will recede from each other, the threads forming an angle larger or ſmaller according to the intenſity of the electricity. If, while the electrometer is thus diverging, an excited ſtick of ſealing-wax or of glaſs be brought ſideways of the balls, theſe will come cloſe to the wax or to the glaſs, when they are poſſeſſed of the oppoſite kind of electricity; but will recede from the glaſs, or ſealing-wax, or other electrified body, when they are poſſeſſed of the ſame kind of electricity.

If the operator, holding the box by the end A, and extending his arm as high as he can, expoſes the electrometer to the ambient air in an open place, or on the top of a houſe, he may eaſily aſcertain the preſence and the quality of the electricity of the air, or of a fog, by the above deſcribed method.

When, for the conveniency of certain experiments, this electrometer muſt be inſulated, then the box A B is placed upon an inſulating ſtand, as in *fig.* 2.

This uſeful inſtrument was rendered much more commodious, and was adapted to the purpoſes of atmoſpherical electricity in a manner more certain and more efficacious by Mr. Cavallo, who firſt deſcribed it in the Phil. Tranſ. Theſe improvements, under the denominations of a *pocket electrometer*, the *atmoſpherical electrometer*, and the *electrometer for rain;* are as follow:

Figs. 4. and 5. repreſent the "pocket electrometer." The handle or caſe of this inſtrument conſiſts of a glaſs tube, about three inches long, and three or four tenths of an inch in diameter. Half of this tube is covered with ſealing-wax, as is eaſily perceived in the figure. From that extremity of this tube, which is not covered with ſealing-wax, a ſmall loop of ſilk proceeds, which ſerves occaſionally to hang the electrometer on a pin, or nail. A cork is adapted to the other extremity of this tube, which being cut tapering at both extremities, can fit the opening of the tube with either extremity. Two linen threads proceed from one end of this cork, which are a little ſhorter than the length of the tube, and two little *cones* of cork or of the pith of elder are faſtened to their extremities. When this electrometer is to be uſed, that end of the cork which is oppoſite to the threads is puſhed into the mouth of the tube; then the tube forms the inſulating handle of the cork or pith-ball electrometer, as repreſented in *fig.* 5. But when the electrometer is to be carried in the pocket, then the threads are put into the tube, and the cork ſtops the aperture of the tube with its other extremity, as repreſented in *fig.* 4.—*Fig.* 3. repreſents a caſe to contain the above-deſcribed electrometer. It is like a common tooth-pick caſe, excepting that it has a piece of amber fixed on one end A, which may occaſionally ſerve to electrify the electrometer negatively: and on the other extremity it has a piece of ivory fixed upon a piece of amber B C. This amber B C ſerves only to inſulate the ivory, which being thus inſulated, if it be rubbed againſt woollen cloths, will acquire the poſitive electricity; and is of courſe uſeful for electrifying the electrometer poſitively.

Fig. 6. repreſents an inſtrument peculiarly adapted to the purpoſes of exploring the electricity of the atmoſphere. A B repreſents a common jointed fiſhing-rod, without the laſt or ſmalleſt joint. From the extremity of this rod proceeds a ſlender glaſs tube, or ſolid glaſs ſtick C, which is covered with ſealing-wax, and carries a cork, D, at its extremity, to which cork a pith-ball electrometer E is ſuſpended. H G I is a piece of twine faſtened to the other extremity A of the rod, and ſupported at G, by a ſhort ſtring F G. At the end I of the twine, a pin is faſtened, which, when puſhed into the cork D, renders the electrometer E uninſulated.

"When I would obſerve," Mr. Cavallo ſays, "the electricity of the atmoſphere with this inſtrument, I thruſt the pin I into the cork D, and holding the rod by its lower end A, project it out of a window on the upper part of a houſe, into the air; raiſing the end of the rod with the electrometer, ſo as to make an angle of about 50 or 60 degrees with the horizon. In this ſituation I keep the inſtrument for a few ſeconds, and pulling the twine at H, I diſengage the pin from the cork D, which operation cauſes the ſtring to drop in the dotted ſituation K L, and leaves the electrometer inſulated, and electrified with the electricity contrary to that of the atmoſphere. This done, I draw the inſtrument into the room, and examine the quality of the electricity, without obſtruction, either from wind or darkneſs.

"With this inſtrument I have made obſervations on the electricity of the atmoſphere, ſeveral times in the courſe of each day during ſeveral months, and from them I have deduced the following general obſervations, which ſeem to coincide with thoſe which I have made with the electrical kites.

"1. That there is in the atmoſphere, at all times, a quantity of electricity; for whenever I uſe the above-deſcribed inſtrument, it always acquires ſome electricity.

"2. That the electricity of the atmoſphere, or fogs, is always of the ſame kind, namely, poſitive; for the electrometer is always negative, except when it is evidently influenced by heavy clouds near the zenith.

"3. That in general the ſtrongeſt electricity is obſervable in thick fogs, and alſo in froſty weather; and the weakeſt, when it is cloudy, warm, and very near raining; but it does not ſeem to be leſs by night than in the day time.

"4. That in a more elevated place, the electricity is ſtronger than in a lower one; for, having tried the atmoſpherical electrometer, both in the ſtone and in the iron gallery on the cupola of St. Paul's cathedral, I found that the balls diverged much more in the latter, than in the former leſs elevated place; hence it appears, that if this rule takes place at any diſtance from the earth, the electricity in the upper regions of the atmoſphere muſt be exceedingly ſtrong."

Fig. 7. repreſents the electrometer for the rain. A B C D is a ſtrong glaſs tube about two feet and a half long, having a tin funnel, D E, cemented to its extremity, which funnel defends part of the tube from the rain. The outſide ſurface of the tube from A to B is covered with ſealing-wax; ſo alſo is that part of it which is ſheltered by the funnel. F D is a piece of cane, round which ſeveral braſs wires are twiſted in different directions, ſo as to catch the rain eaſily, and at the ſame time to offer little or no reſiſtance to the wind. This piece of cane is fixed into the tube, and a ſlender wire, proceeding from it, goes through the bore of the tube, and communicates with the ſtrong wire A G, which is thruſt into a piece of cork faſtened into the end A of the tube. The extremity G of the wire A G, is formed into a ring, from which is ſuſpended a more or leſs ſenſible pith-ball electrometer, as occaſion requires. This inſtrument is faſtened to the ſide of the window-frame, where it is ſupported by ſtrong braſs hooks, at C, B; and this part of the tube is covered with ſeveral folds of ſilk ſtuff, in order to adapt it more ſafely and commodiouſly to the hooks. The part F G projects out of the window, with the end F elevated a little above the horizon. The remaining part of the inſtrument comes through a hole in one of the lights of the ſaſh, within the room, and no more of it touches the ſide of the window than the part C B. This inſtrument ſhould be placed ſo as to be eaſily taken off, and replaced; for it will be neceſſary to clean it now and then; particularly on the approach of a ſhower of rain.

“When it rains,” ſays Mr. Cavallo, “eſpecially in paſſing ſhowers, this inſtrument, ſtanding in the ſituation above deſcribed, is frequently electrified; and, by the divergency of the electrometer, the quantity and quality of the electricity of the rain may be obſerved. With this inſtrument I have obſerved, that the rain is generally, though not always, electrified negatively, and ſometimes ſo ſtrongly, that I have been able to charge a ſmall coated phial at the wire A G.”

A commodious way of uſing electrometers in a variety of delicate experiments, ſuch as in examining tourmalins, precious ſtones, &c. is to have a ſtand made on purpoſe, and holding both ſingle and double-thread electrometers, as in *fig.* 8. B is the baſe, made of common wood: A is a pillar of ſealing-wax, or of glaſs, to the top of which a wooden head is fixed. From this circular piece of wood, or head, four glaſs arms proceed, ſuſpending four electrometers, two of which, D, D, are nothing more than ſilk threads, about four or five inches long, each of which carries a very ſmall downy feather at its extremity. The other two electrometers, C, C, are cork or pith-ball electrometers, the conſtruction of which is a variety of thoſe which have been already deſcribed: *a b* repreſents a ſtick of glaſs, about four inches long, covered with ſealing-wax, and ſhaped at top in the form of a ring. To the lower extremity of this glaſs ſtick two fine linen threads are faſtened, with pith or cork balls at their lower extremities. In the figure theſe electrometers are repreſented as being actually electrified. The glaſs ſtick *a b* ſerves as an inſulating handle, by which the electrometer may be ſupported, when it is uſed without the ſtand. Thoſe with the downy feather D D, when electrified, one with the poſitive, and the other with the negative electricity, will continue in that ſtate for a very conſiderable time, during which, if a ſmall body ſlightly electrified be gently approached to one or the other of the feathers, the fine filaments of the latter will be attracted or repelled, according as that body is poſſeſſed of the ſame, or of the contrary electricity.

Fig. 9. repreſents Mr. Henly's quadrant electrometer upon a little ſtand; and *fig.* 10. repreſents it upon the prime conductor of an electrical machine. It conſiſts of a perpendicular ſtem or pillar A B, formed at top like a ball, and furniſhed at its lower end with a braſs ferrule, by which it may be fixed in one of the holes of the prime conductor, or upon a perpendicular wire, fixed on purpoſe to the inſide coating of an electrical battery, or upon the knob of a Leyden phial, or laſtly, upon its own ſtand, when it is not actually in uſe. To the upper part of the ſtem a graduated ivory ſemi-circle E is fixed, and about the middle of this ſemi-circle there is a braſs arm, which contains a pin, or the ſmall axis of the index. The index C conſiſts of a very ſlender ſtick, which reaches from the centre of the ſemi-circle E to the braſs ferrule, and a cork ball D nicely turned in a lathe is glued faſt to its lower extremity. The wood proper for this electrometer is box wood, and both the pillar and the index ſhould be well rounded and poliſhed. When the electrometer is not electrified, the index hangs parallel to the ſtem A B, and the ball D touches the braſs ferrule, as in *fig.* 9. But when electrified, the index recedes more or leſs from the ſtem according to the intenſity of the electricity, as in *fig.* 10. This inſtrument is peculiarly uſeful for obſerving the progreſs of the charge of a Leyden phial, or of a battery.

Beccaria recommended to incloſe the upper part of the index of this electrometer between two ſemi-circles; other electricians have alſo made other alterations, which we ſhall now deſcribe; though, upon the whole, Mr. Henly's original conſtruction ſeems to anſwer as well as any other.

Mr. Cuthbertſon's conſtruction is repreſented in *fig.* 11.; *a* is a ſmall cork-ball fixed to the extremity of a very ſlender ſtick of ivory *b c d*, which, when electrified, is repelled by the braſs tube *ee*, and as this ſtick of ivory, *b c d*, moves upon an axis at *c*, the angle of divergency is indicated by its extremity *d*, upon the graduated arch *f g*. This electrometer being very ſenſible, is peculiarly uſeful for indicating the ſmall charge of a Leyden phial, or the charge of a battery in its commencement.

Fig. 12. repreſents Mr. Brook's electrometer (Phil. Tranſ. for the year 1782.) It is a complicated and expenſive inſtrument. “B is the foot or baſe, conſiſting of a ſquare board $9\frac{3}{4}$ each way, having three ſcrews for the purpoſe of ſetting the inſtrument upright: D is a ſolid piece of glaſs, which ſupports and inſulates the inſtrument. The arms G 1, and *g*, with the ball F, turn round on the wire H, (which is of ſolid braſs, as may be alſo the arm *g*,) and when in uſe are put nearly at right angles with G 2 and H, being turned to the off ſide ſo as to be as much as poſſible out of each others' atmoſpheres, or the atmoſphere of a jar, battery, prime conductor, &c. The arms G 1 and G 2 are hollow tubes of copper, not ſo heavy as wires. The balls I 1, I 2, are made of copper, and hollow, ſo as to be as light as poſſible: K repreſents a kind of face or dial-plate to the inſtrument with its index, which (by means of multiplying motion under the dial-plate) is carried once round, whilſt the arm G 2, with its ball I 2, moves through a quarter of a circle, or 90 degrees. This motion is given to it by the repulſive power of the charge, &c. of electricity between the two balls I 2 and L. The ends of the index from its centre are of different lengths. The longeſt end reaches to a graduated circle divided into 90 equal parts, anſwering to 90°, which the arm G 2 moves through. The ſhorteſt end reaches to a ſmaller circle, divided into 60 equal parts, anſwering to 60 grains weight, or 60 diviſions on the arm G 1, with its ſliding weight *m*, each of which is equal to one grain, and the whole face is covered with a watch glaſs, to prevent the electricity from flying off at the points.

“The top of the glaſs ſtick D is cemented into a braſs cap M. This cap enters the ball L at the lower part, and ſcrews into the upper part of the ball L at *a*. The top part of this cap M is tapered off to a cone about an inch and a half long or high. The lower end of the wire H has a hole made conically into it, ſo as to receive the upper part or conical end of the cap M, which permits all the upper part of the electrometer to turn round any way that may be neceſſary. The kind of ferrule O, with its baſe, is perforated for the lower end of the wire H to go through. The bent arm *b*, which ſupports the cup N, is ſcrewed into the baſe of the ferrule O, and turns freely round upon the wire H. The cup N is to receive the ball P of the arm H. This arm ſhortens or lengthens, as may be wanted, by a wire ſliding into a tube. The end of the wire is ſlit, forming a ſpring in the tube to be ſteady. In this arm is a kind of rule joint at *d*, that the arm may give way entirely if wanted. The ſemi-circular end of the arm is a ſpring, and ſlips on to a ball from the prime conductor, jar, or battery; and ſerves to connect that prime conductor, or jar, or battery, with the electrometer.

" The arm G ſcrews not to the ball F, but to a ſolid piece within the ſaid ball, and the whole, like the arms of an unequal balance, move round an axis cloſe to the ſurface of the ball F, ſo that the arm G 1 moves angularly round that axis, and the ball I 1 riſes above the ball *r*, in virtue of the electrical repulſion.

" In order to make the diviſions of G 1 exactly a grain each, firſt ſlide the weight *m* toward the ball F, till it is an exact counter balance to the weight in F. At one end of the weight *m* let the diviſions begin; then ſuſpend any tolerable pair of ſcales, ſo that the bottom of one of them may reſt on the top of the ball *r*; then lay the ball I 1 into the ſcale, and ſlide the weight *m* near to I 1, and put as many grains into the other ſcale as will juſt raiſe the ball I 1 in the ſcale; then mark the arm G 1 at the ſame end of the weight *m*, and divide the ſpace between the two marks into as many parts as there are grains in the ſcale, which may be divided and ſub-divided into halves and quarters.

" The arm G 2 being repelled, ſhews when the charge is increaſing, &c. and I 1 tells what ſuch a repulſive power is between two balls of the ſize of theſe in grains, according to the number the weight *m* reſts at when lifted up by the repulſive power of a charge. The longeſt end of the index K ſhews how many degrees of a circle G 2 is repelled, and by many trials, according to the number of grains, the arm G 1 ſhews, when it is lifted up, and the weight *m* put at different places, ſuch reſpective number of grains may be marked on the leaſt circle on the dial-plate where the ſhorteſt end of the index points; ſo that when all the grains are thus marked on the dial plate, thus aſcertained by the arm G 1, all theſe parts of the inſtrument, that is, the ball F with the arms G 1 and *g*, may be taken off, and the inſtrument is then graduated to be uſed without them; " but I do not know," Mr. Brook ſays, " how the grains can be ſo exactly marked and aſcertained as by theſe parts being on the inſtrument: nor do I mean to confine the number of grains or diviſions on G 1; but, I think, my experience ſeems to tell me, that no glaſs to be *charged*, as we call it, with electricity, will bear a greater charge than that whoſe repulſive force between two balls of this ſize equals 60 grains weight, before it will be perforated or ſtruck through. Nay, I have not found many inſtances where it would ſtand 50 grains; and I think it is very hazardous to go more than 45 grains."

" Thus, by knowing the quantity of coated ſurface, and the diameters of the balls, as I 1 and *r*, I would ſay, ſo much or ſo much coated ſurface charged to ſo many or ſo many grains repulſion between two balls of ſuch or ſuch a ſize would melt a wire of this or that ſize, or do ſuch a thing, kill ſuch an animal, &c. and if balls, wires, or arms of this ſize are found too ſmall, larger may be made on the ſame plan."

By this means electrometers may be made to ſpeak a common and an intelligible language.

The lower part of Mr. Brook's electrometers may likewiſe be called an *electrical balance*.

Notwithſtanding the intricacy of the conſtruction of Mr. Brook's electrometer, it muſt be acknowledged, that if not exactly upon that, at leaſt upon ſome ſuch plan, theſe inſtruments ſhould be conſtructed; for an equal diviſion of the arc, or ſemi-circle, into equal parts will not indicate equal increments of the repulſive force: to eſtimate which truly, Mr. Achard ſays, that the arc of the electrometer ſhould be divided according to a ſcale of arcs, the tangents of which are in arithmetical progreſſion.

The pith or cork-ball electrometers, above deſcribed, though very uſeful within doors, are, when uſed for atmoſpherical electricity, much diſturbed, and even rendered perfectly uſeleſs by wind, rain, and the moiſture of fogs. To avoid theſe defects, Mr. Cavallo, in the year 1777, made a moſt uſeful contrivance; which, in fact, opened the way to farther improvements, and rendered this kind of inſtruments both ſenſible and uſeful far beyond that of any former conſtruction. The contrivance conſiſted in encloſing the electrometer in a glaſs veſſel, and furniſhing it with other parts; which rendered it capable of being expoſed to the wind and to the rain, without the leaſt obſtruction. The conſtruction of this inſtrument (a deſcription of which Mr. Cavallo preſented to the Royal Society, and is publiſhed in the Philoſophical Tranſactions) is repreſented by the *figs.* 13, 14, and 15, *Plate* XIII. in its real ſize.

The principal part of this inſtrument is a glaſs tube, C D M N, cemented at the bottom into the wooden piece, A B, by which part the inſtrument is to be held, when uſed for the atmoſphere; and it alſo ſerves to ſcrew the inſtrument into the wooden caſe, A B O, *fig.* 1, when it is not actually in uſe. Both the foot, A B, and the caſe may alſo be made of braſs or other metal. The upper part of the tube, C D M N, is ſhaped tapering to a ſmaller extremity, which is entirely covered with ſealing-wax, melted by heat, and not diſſolved in ſpirit of wine. Into this tapering part a ſmall tube is cemented, the lower extremity, G, of which (being alſo covered with ſealing-wax) projects a ſhort way within the tube, C D M N. Into this ſmaller tube a wire is cemented, which, with its lower extremity, touches the flat piece of ivory, H, which is faſtened to the tube by means of cork, and with its upper extremity, which projects about a quarter of an inch above the tube, ſcrews into the braſs cap, E F; which cap is open at the bottom, and ſerves to defend the waxed part of the inſtrument from the rain, &c. *Fig.* 3. repreſents a ſection of this braſs cap, ſhewing its internal form; together with the manner in which it is ſcrewed to the wire that projects above the ſmall tube, L. The ſmall tube, L, and the upper extremity of the large tube, C D M N, appear like one continuate piece, on account of the ſealing-wax, which covers them both. The conical corks, P, of this electrometer, which by their repulſion ſhew the electricity, &c. are as ſmall as can conveniently be made; and they are ſuſpended by exceedingly fine ſilver wires. Theſe wires are ſhaped in a ring at the top, by which they hang very looſely on the flat piece of ivory, H, which has two holes for that purpoſe. By this method of ſuſpenſion, which is applicable to other electrometers, the friction is diminiſhed greatly, whence the inſtrument is rendered extremely ſenſible. I M and K N are two narrow ſlips of tin-foil, ſtuck to the inſide of the glaſs, CDMN, and communicating with the wooden bottom, AB. Theſe ſerve to carry away the electricity, which, when the corks, P, touch the glaſs, is communicated to it, and which, being accumulated, would diſturb the free motion of the corks.

With reſpect to practical utility, this inſtrument may be uſed for obſerving the artificial as well as the atmoſpherical electricity. When it is to be uſed for artificial electricity, this electrometer is ſet upon a table, or other convenient ſupport: then it is electrified, by touching the braſs cap, EF, with an electrified body; and this electricity will ſometimes remain upon the electrometer longer than an hour. In this ſtate, if any electrified ſubſtance be brought near the cap, EF, the corks, P, of the electrometer, by their converging or by increaſing their divergency, will ſhew the ſpecies of that body's electricity.

"It is neceſſary to obſerve," Mr. Cavallo ſays, "that to communicate any electricity to this electrometer, by means of an excited electric; *e.g.* a piece of ſealing-wax (which we ſuppoſe as being always electrified negatively) is not very readily done in the uſual manner, on account of the cap, EF, being well rounded, and free from points or ſharp edges. By the approach of the wax, the electrometer will be cauſed to diverge; but as ſoon as the wax is removed, the wires immediately collapſe. The beſt method to electrify it is to bring the excited wax ſo near the cap, that one or both the corks may touch the ſide of the bottle CDMN; after which, they will ſoon collapſe and appear unelectrified. If now the wax be removed, they will again diverge, and will remain electrified *poſitively*.

"In this operation, the wax does not impart any of its electricity to the electrometer, but only acts by means of its atmoſphere; *viz.* when the excited wax is firſt brought near the braſs cap, EF, (agreeable to the well-known law of electricity, and according to Dr. Franklin's hypotheſis,) it determines the electric fluid naturally belonging to the corks towards the cap: hence the corks repel each other. Now, if in this ſtate they touch the tin-foil on the ſides of the glaſs, CDMN, they acquire from it a quantity of electric fluid, equal to that which, by the action of the excited wax, was driven towards the cap: conſequently they collapſe, and appear unelectrified. Notwithſtanding this appearance, the cap is actually overcharged; ſo that when the wax is removed, the overplus of electric fluid which the corks had acquired from the glaſs and tin-foil, and which was crowded upon the cap, on account of the negative atmoſphere of the wax, now diffuſes itſelf equally through the cap, the wires, the corks, &c.; and therefore the corks repel each other with poſitive electricity.

"If, inſtead of the ſealing-wax excited negatively, an electric poſſeſſed of poſitive electricity be uſed, the electrometer acquires the negative electricity, and the explanation, *mutatis mutandis*, is the ſame as above.

"By conſidering this remark, it will appear that when this electrometer is electrified either poſitively or negatively, and an electrified body is brought towards the braſs cap, the electricity of that body will be of the ſame kind with that of the electrometer, if the corks increaſe their divergency; but it will be of the contrary kind, if the corks come nearer to each other."

When this inſtrument is to be uſed for obſerving the electricity of the fogs, the air, the clouds, &c. the obſerver muſt unſcrew it from its caſe, and holding it by the bottom, AB, muſt preſent it to the air in an open, free, and, if poſſible, an elevated, place; raiſing it a little above his head, ſo that he may conveniently obſerve the corks, P, which will immediately diverge, if there be any ſufficient quantity of electricity; and it may be eaſily aſcertained whether this electricity is poſitive or negative, by bringing an excited piece of ſealing-wax, or other excited electric, towards the braſs cap, EF. Upon the whole, the peculiar advantages of this electrometer, as enumerated by its inventor, are 1ſt, The ſmallneſs of its ſize; 2d, Its being always ready for experiments, without the fear of entangling the threads, or of having an equivocal reſult by the ſluggiſhneſs of its motion; 3d, Its being not diſturbed by wind or rain; 4th, Its ſuperior ſenſibility; and, 5th, Its retaining its electricity longer than any other electrometer.

Mr. Sauſſure took great pains to point out ſome ſuppoſed imperfections of the above-deſcribed electrometer, and to improve it by making ſeveral ſpecious alterations and additions, which, if not actually detrimental, evidently are of no real advantage. In the firſt place, he ſays, that the fine wires, by which the balls are ſuſpended, ſhould not be ſo long as to reach the tin-foil which is paſted on the inſide of the glaſs; yet he directs to put four pieces of tin-foil within the glaſs. Secondly, Mr. Sauſſure has altered the ſhape of the glaſs, making it broader, and with a neck very ſhort, which prevents the electrometer's retaining the electricity for any conſiderable time. Thirdly, he has made the bottom of the electrometer of braſs, for the purpoſe of uſing it like a condenſer. For example, he ſays, if it be placed on an imperfect conductor, as dry wood or marble, and if the inſtrument be electrified ſtrongly, and afterwards the top is touched, the electricity will appear to be deſtroyed; but on lifting up the inſtrument by the top, the balls will again open, becauſe the imperfect conductor formed with the baſe a kind of electrophorus, by which the electric fluid was condenſed and loſt its tenſion, till the perfect conductor was ſeparated from the imperfect one; whereas, if the conductor had been more perfect, it would have been deprived of its electricity immediately, on the application of the hand. We cannot ſee of what practical uſe this equivocal and uncertain operation can be. Fourthly, Mr. Sauſſure has added a very long pointed wire to the top of its electrometer, for the purpoſe of imbibing the electricity of the atmoſphere. This may in ſome caſes be of advantage, but in others it muſt be very diſadvantageous; for, as it appears from the above-mentioned obſervations of Mr. Cavallo, this electrometer is electrified with the electricity contrary to that of the atmoſphere, whereas, when the electricity of the atmoſphere is very ſtrong, the pointed wire, by imbibing ſome of it, may render the action of the electrometer equivocal. Laſtly, Mr. Sauſſure has placed a divided ſcale within the electrometer, for the purpoſe of meaſuring the angle of divergency; but to any perſon who is in the leaſt converſant with the uſe of ſuch inſtruments, it will eaſily appear that, by the eye, the angle of divergency may be eſtimated ſufficiently for the purpoſe; whereas, with a ſcale, a conſiderable time is required to ſteady the electrometer, and to place the eye in a proper point of view; and during this time, the electricity of the corks, &c. will be conſiderably diminiſhed.

A capital improvement to the bottle electrometer was made by the Rev. Abraham Bennet, and is deſcribed in the Philoſophical Tranſactions for the year 1787, p. 26. Inſtead of the wires with the corks, Mr. Bennet uſed two ſlips of gold-leaf, which are ſenſible to an aſtoniſhing degree, manifeſting the electricity in a ready and unequivocal manner, free from an inconvenience which frequently takes place with the cork or pith-ball electrometers. The inconvenience is, that in theſe electrometers, when they are electrified, the balls ſometimes adhere to each other for a conſiderable time before they will ſeparate, and then they ſeparate with a kind of jerk all at once.

The *figures* 16, 17, and 18, repreſent Mr. Bennet's gold-leaf electrometer; the 16th and 17th being ſections of the inſtrument. The 18th repreſents the inſtrument joined together, and ready for uſe. "It conſiſts," ſays Mr. Bennet, "of two ſlips of gold-leaf, *a, a,* ſuſpended in a glaſs, *b.* The foot, *c,* may be made of wood or metal; the cap, *d,* of metal. The cap is made flat on the top, that plates, books, evaporating water, or other things to be electrified, may be conveniently placed upon it. The cap is about an inch wider in diameter than the glaſs, and its rim about three quarters of an inch broad, which hangs parallel to the glaſs, to turn off the rain, and keep it ſufficiently inſulated. Within this is another circular rim, about half as broad as the other, which is lined with ſilk or velvet, and fits cloſe upon the outſide of the glaſs: thus the cap fits well, and may be eaſily taken off, to repair any accident happening to the gold-leaf. Within this rim is a tin tube, *e,* hanging from the centre of the cap, ſomewhat longer than the depth of the inner rim. In the tube a ſmall peg, *f,* is placed, and may be occaſionally taken out. To the peg, which is made round at one end and flat at the other, two ſlips of leaf gold are faſtened with paſte, gum-water, or varniſh. Theſe ſlips ſuſpended by the peg, and that in the tube faſt to the centre of the cap, hang in the middle of the glaſs, about three inches long, and a quarter of an inch broad. In one ſide of the cap there is a ſmall tube, *g,* to place wires in. It is evident, that without the glaſs the leaf-gold would be ſo agitated by the leaſt motion of the air, that it would be uſeleſs; and if the electricity ſhould be communicated to the ſurface of the glaſs, it would interfere with the repulſion of the leaf-gold; therefore two long pieces, *h, h,* of tin-foil are faſtened with varniſh on oppoſite ſides of the internal ſurface of the glaſs, where the leaf-gold may be expected to ſtrike, and in connection with the foot. The upper end of the glaſs is covered and lined with ſealing-wax as low as the outermoſt rim, to make its inſulation more perfect."

Mr. Cavallo, in deſcribing this electrometer of Mr. Bennet, in his Treatiſe on Electricity, 4th edition, ſays, "As it is rather difficult to faſten the ſlips of gold-leaf to this electrometer, and to cauſe them to hang parallel, I have contrived a method which remedies that defect. When the ſlips are cut and are lying upon paper, or on the leather cuſhion upon which they are cut, I make them equal in length, by meaſuring with a pair of compaſſes, and cutting off a ſuitable portion from the longeſt. I then cut two bits of very fine gilt paper, each about half an inch long, and a quarter of an inch broad; and by means of a little wax, ſtick one of them to one extremity of each ſlip of gold-leaf, ſo as to form a kind of letter T. This done, I hold up in the fingers of one hand one of thoſe pieces of paper with the gold-leaf ſuſpended to it, and hold the other with the fingers of the other hand; then bringing them near to each other, and having adjuſted them properly, *viz.* ſo as to let them hang parallel and ſmooth, I force the pieces of paper, which now touch each other, between the two ſides of a ſort of pincers made of braſs wire, or of very thin and hammered braſs plate; which pincers are faſtened to the under-part of that piece which forms the top or cover of the glaſs veſſel."

Mr. Bennet, immediately after the deſcription of his excellent electrometer, ſays, "The following experiments will ſhew the ſenſibility of this inſtrument: 1ſt, Powdered chalk was put into a pair of bellows, and blown upon the cap, which electrified it poſitively when the cap was about the diſtance of ſix inches from the nozzle of the bellows; but the ſame ſtream of powdered chalk electrified it negatively at the diſtance of three feet. In this experiment there is a change of electricity from poſitive to negative, by the diſperſion or wider diffuſion of the powder in the air. It is alſo changed by placing a bunch of fine wire, ſilk, or feathers, in the nozzle of the bellows; and is wholly negative, when blown from a pair of bellows without their iron pipe, ſo as to come out in a larger ſtream. This laſt experiment did not anſwer in dry weather ſo well as in wet. The poſitive electricity of the chalk, thus blown, is communicated, becauſe part of the powder ſticks to the cap; but the negative is not communicated, the leaf-gold collapſing as ſoon as the cloud of chalk is diſperſed.

"2dly, A piece of chalk drawn over a bruſh, or powdered chalk put into the bruſh, and projected upon the cap, electrifies it negatively; but its electricity is not communicated.

"3dly, Powdered chalk blown with the mouth or bellows, from a metal plate placed upon the cap, electrifies it permanently poſitive; or if the chalk is blown from the plate, either inſulated or not, ſo that the powder may paſs over the cap, if not too far off, it is alſo poſitive; or if a bruſh is placed upon the cap, and a piece of chalk drawn over it, when the hand is withdrawn, the leaf-gold gradually opens with poſitive electricity, as the cloud of chalk diſperſes.

"4thly, Powdered chalk, falling from one plate to another placed upon the inſtrument, electrifies it negatively."

Several other experiments were alſo made with Mr. Bennet's electrometer, out of which we ſhall collect the principal. "The inſtrument being placed in a duſty road, and the duſt ſtruck up with a ſtick near it, electrified it poſitively. Wheat flour and red lead are ſtrongly negative in all caſes where the chalk is poſitive. The following powders were like chalk: red ochre and yellow, roſin, coal aſhes, powdered crocus metallorum, aurum moſaicum, black-lead, lamp-black, (which was only ſenſible in the two firſt methods,) powdered quick-lime, umber, lapis calaminaris, Spaniſh brown, powdered ſulphur, flowers of ſulphur, iron filings, ruſt of iron, and ſand. Roſin and chalk, ſeparately alike, were changed by mixture: this was often tried in dry weather, but did not ſucceed in damp. White lead alſo ſometimes produced poſitive, and ſometimes negative electricity, when blown from a plate.

"If a metal cup be placed upon the cap, with a red-hot coal in it, a ſpoonful of water thrown in electrifies the cup negatively; and if a bent wire be placed in the cap, with a piece of paper faſtened to it, to increaſe its ſurface, the poſitive electricity of the aſcending vapour may be tried by introducing the paper into it."

The ſenſibility of this electrometer may be conſiderably increaſed by placing a candle upon the cap. By this means, the electricity of an electrical machine in one room may be perceived in the next room. Powders, in this caſe, will alſo electrify it at a much greater diſtance, &c.

When this electrometer was placed at the diſtance of ſix feet from the ſtring of a kite, having a wire through the ſtring, and raiſed in cloudy weather, the gold-leaf continued to ſtrike the ſides of the electrometer, for more than an hour together, with a velocity increaſing and decreaſing with the denſity or diſtance of the unequal clouds which paſſed over.

"No ſenſible electricity is produced by blowing pure air, projecting water, by ſmoke, flame, or exploſions of gunpowder."

The only defect of the above-deſcribed moſt uſeful gold-leaf electrometer is its not being portable, unleſs it be carried always upright; and with this imperfection the inſtrument has remained for about 20 years; until very lately, when Mr. Cavallo contrived to render it perfectly portable: and this contrivance he has permitted to be publiſhed, for the firſt time, in the preſent article.

The *figures* 19 and 20 are two ſections of this inſtrument, *Fig.* 21 repreſents it in perſpective. The letters of reference indicate the ſame parts in all the three figures. A B is a glaſs tube, cemented into the perforated braſs bottom, or ferrule, G. D C is a ſhort and narrower glaſs tube, which fits the upper part of the tube A B, by means of a piece of leather, which is cemented to that part of it which is intended to enter into A B. A third ſmaller glaſs tube, F E, is cemented into D C, and projects a little way above and below D C. The ſurfaces of theſe three tubes, from F to H, are all covered with ſealing-wax. A braſs wire, I, is cemented into the ſmalleſt tube, F E, and communicates with an oblong ſlip of braſs plate, E *a*, which is a little thicker than common writing paper, and about a quarter of an inch broad, well poliſhed and rounded off at the edges. In the *figures* 19 and 20, this ſlip of braſs is ſeen edge-ways: *o c* is a ſlip of gold-leaf, ſtuck at *o* to the braſs plate E *a*; and when electrified, making an angle *c o a* with it, which is larger or ſmaller according to the intenſity of the electricity. E *a* remains always ſtiff and immoveable: *b e* is a piece of cork, fitted tight to the lower aperture of the glaſs tube, A B. There is a ſlit in this cork, through which the lever, or braſs arm, *h i g*, moves round the axis or pin, *r*, which paſſes through the cork at right angles to *h g*. From *h* to *s* this braſs arm is as broad as E *a*; but from *s* to *g* it ſpreads the other way, *viz.* from *i* to *g*. Now it is eaſy to comprehend, that if a finger's nail be applied at *g*, through the aperture of the braſs foot, G, and be preſſed againſt that end of the arm, this arm, *h g*, may be placed in the ſituation repreſented in *fig.* 20; in which caſe, the gold-leaf will be encloſed between the arm, *h s*, and the ſlip, E *a*, and in that ſtate the inſtrument may be turned in any direction; for the elaſticity of the cork, *b c*, is fully ſufficient to retain *h g* in that poſition. The inſtrument then is ſlipped into a paper, or braſs tube, which covers the whole, and fits the outſide of the braſs foot at G. When the inſtrument is to be uſed, the nail of a finger applied to the braſs arm at *i*, and puſhed againſt it, will place it in the ſituation of *figs.* 19 and 20; and then the ſlip of gold-leaf, being diſengaged, is ready to act; moving, as already mentioned, between E *a* and *h s*. To the wire, I, which projects above the ſmall tube, F E, a ball, or another longer and pointed wire, may be affixed; or, in ſhort, this wire, I, may be made to communicate with any thing, like any other bottle electrometer.

If by any accident the gold-leaf, *o c*, happens to be damaged, the tube, D C, is taken out of the tube, A B, and a new ſlip of gold-leaf is faſtened at *o*, upon the braſs plate, E *a*. But on replacing D C into A B, the former muſt be turned, ſo as to place the ſurface of the braſs ſlip, E *a*, quite parallel to the ſurface of the arm, *h s*. Thus the gold-leaf electrometer is rendered perfectly portable; and the experience of ſome months has ſhewn that the gold-leaf, *o c*, ſuffers not the leaſt derangement by being encloſed between the two braſs ſurfaces of E *a* and *h s*.

Fig. 22. repreſents an inſtrument, invented by Mr. Coulomb, for meaſuring the force of electric repulſion by the torſion of a wire. Its inventor calls it an *electrical balance*. The inſtrument is of glaſs, and its ſhape is ſufficiently ſhewn in the figure; excepting the upper part of E, which is a braſs flat plate, and a ferrule, which is cemented to the upper part of the glaſs tube. D is a piece of thick wire, laid upon the horizontal plate E, and holding a very fine wire which paſſes through a hole in E, and proceeds all the way down through the middle of the long tube, and until it reaches about the middle of the lower or larger tube, where it holds, ſuſpended in an horizontal ſituation, the needle A B, which is made of ſilk covered with ſealing-wax, and carries at its extremity, B, a ball of the pith of elder. A graduated circle is fixed in the inſide of the large glaſs tube in the ſame plane with the needle A B, and within this circle another pith ball C is fixed, ſimilar to the ball B. When theſe balls are electrified they repel each other; and this repulſion, which occaſions the torſion of the wire that ſupports the needle A B, is meaſured by the diviſions of the graduated circle.

Mr. Cuthbertſon's electrometer, or combination of electrometers, is repreſented in *fig.* 23. " A B is a long ſquare piece of wood about 18 inches by 6, in which are fixed two glaſs ſupports D, E, mounted with braſs balls. Under the braſs ball E is a long braſs hook; the ball *b* is made of two hemiſpheres, the lower one being fixed to the braſs mounting, and the upper turned with a groove to ſhut upon it, ſo that it may be taken off at pleaſure; it is ſcrewed to a braſs tube about 4 inches long, fitted on the top of D; from its lower end proceeds an arm carrying the piece F C, conſiſting of two hollow balls and a tube, which together make nearly the ſame length as that fitted on D: G H is a ſtraight braſs wire, with a knife-edge centre in the middle, placed a little below the centre of gravity, and equally balanced with a hollow braſs ball at each end, the centre or axis reſting upon a proper ſhaped piece of braſs fixed in the inſide of the ball *b*; that part of the hemiſphere towards H is cut open, to permit that end of the balance to deſcend till it touches E; and the upper hemiſphere *b* is alſo cut open. To the under ſide of *a* is hooked a braſs wire about 4 inches long, hanging freely in a hole at the top of F. The arm G is divided into ſixty grains, and is furniſhed with a ſlider to be ſet at the number of grains the experiment requires: *k* is a common Henly's electrometer, ſcrewed upon the top of *b*.

" It is evident from the conſtruction, that if the foot ſtand horizontally, and the ball G be made to touch F, and the ſlider ſet at *o*, it will remain in that poſition, but if it ſhould by any means receive a very low charge of electric fluid, the two balls F, G, will repel each other; G will begin to aſcend, and on account of its centre of gravity being above the centre of motion, and the ſlider ſo looſe as to ſlide forward towards *b*, as ſoon as G H is out of its horizontal ſituation, the aſcending will continue with an accelerated motion till H ſtrikes upon F. If the balance be ſet again horizontal, and the ſlider ſet at 10 grains, it will cauſe G to reſt upon F with a preſſure equal to that weight, ſo that more electric fluid muſt be communicated than the above low charge, before the balls will ſeparate; and as the weight towards G is increaſed or diminiſhed, a greater or leſs quantity of electric fluid will be required to effect a ſeparation.

" When this inſtrument is to be applied to a jar or battery, for which purpoſe it was invented, one end of a wire muſt be inſerted into a hole in the ball F, and the other into a hole of any ball proceeding from the inſide of a battery or jar; *k* muſt be ſcrewed upon *b*, with its index pointing towards H; the reaſon of this inſtrument being added, is to ſhew, while the index continues to riſe, that the charge of the battery is increaſing, becauſe the other part of the inſtrument does not act till the battery has received its required charge.

" If this inſtrument be examined with attention, it will be found to conſiſt of three electrometers, and anſwers three different purpoſes; namely, a Henly's electrometer, Lane's diſcharging

charging electrometer, and Brook's ſteelyard electrometer; the firſt is not improved, but the two laſt, which were very defective when firſt invented, I flatter myſelf, are here brought to perfection: as the only uſe of Henly's electrometer to this inſtrument is, as I have ſaid before, to ſhew that the battery continues to receive a ſtill ſtronger charge, it required no improvement; but Lane's electrometer, in its primitive ſtate, could by no means anſwer the required purpoſe for batteries, becauſe the ball intended to diſcharge the battery was neceſſarily placed ſo near to the ball of the battery, that duſt, and many conducting particles, always floating in the air, were attracted, and repelled between the two balls, ſo as to render a regular intended high charge impoſſible; whereas in this, they are placed at four inches diſtance, and when the deſired height of charge is obtained, and not before, the ball of the electrometer moves of itſelf nearer to the ball, which is connected with the outſide of the battery, and cauſes a diſcharge. The defects in Brook's ſteelyard electrometer were, 1ſt, that it could not cauſe a diſcharge; and, 2dly, the difficulty of obſerving the firſt ſeparation of the balls cauſed great error; if it were not placed in an advantageous light (which the nature of the experiments does not always permit) it could not be ſeen without the attention of an aſſiſtant, which cannot always be commanded. But this inſtrument, which I have deſcribed, requires no attention or aſſiſtance; for, as ſoon as the ſeparation takes place between G and F, the ball H deſcends, and diſcharges the battery of itſelf.

"By this combination and improvement, we poſſeſs, in the preſent inſtrument, all that can ever be required of an electrometer; namely, by *k* we ſee the progreſs of the charge; by the ſeparation of G F we have the repulſive power in weight; and, by the ball H, the diſcharge is cauſed when the charge has acquired the ſtrength propoſed." Cuthbertſon's Pract. Elect.

We might now add to this article the deſcriptions of ſeveral other electrometers; but as their uſe is inferior to thoſe which have been already deſcribed, we think it uſeleſs to detain the reader with any ſuch accounts, many of which are only imperfect varieties of the above deſcribed inſtruments; ſhould, however, the reader wiſh to examine thoſe electrometers ſuch as they are, we refer him to the following works.

Darcy's electrometer. Act. Par. for 1749. Richman's electrometer. N. A. Petr. vol. iv. p. 301. Comus's electric platometer. Roz. Journ. vol. vii. p. 520. Townſend's electrometer. Adams's Eſſay on Electr. Terry's electrometer. Roz. Journ. xxiv. p. 315. Boyer Brun's electroſcope for a conductor. Roz. Journ. xxviii. p. 183. De Luc's fundamental electrometer. Idees ſur la met. Chappe's electrometer. Roz. Journ. xxxiv. p. 370. Cadet's electrometer. Annales de Chim. xxxvii. and Nich. Jour. v. p. 31. Marechaux's delicate electrometer. Gilb. xv. p. 98.

The uſe of the electrometers, which we have deſcribed, is undoubtedly very extenſive; ſome of them being capable of meaſuring the higheſt charges of electricity known, and they may be extended farther ſtill, ſhould future experimenters endeavour to adapt them to the prodigious force of lightning or to ſome other natural or artificial power of electricity; whilſt others are capable of indicating very ſmall quantities of electricity; yet there are ſeveral caſes where the electricity is ſo very feeble, as to be incapable of affecting any electrometer whatever: nevertheleſs electricians have deviſed means of diſcovering even this feeble electricity, which may be conſidered as diſtinguiſhable into two ſtates; *viz.* either the quantity of electricity is really very ſmall, and in that caſe Mr. Cavallo's multiplier will render it ſenſible; or the electricity is diffuſed over a large ſpace, ſo as to have its intenſity too weak to affect an electrometer, and in that caſe the condenſer will collect it into a narrower compaſs, &c. See MULTIPLIER, and CONDENSER.

ELECTROPHORUS, (from the Greek words ελεκτρον, *amber*, and φερω, *I bear*,) is a machine conſiſting of two plates, one of which is a reſinous electric, and the other a metallic plate. When the former is once excited, by a peculiar application of the latter, (which will be deſcribed preſently,) this machine will furniſh electricity for a very conſiderable time; ſo much ſo, that many perſons, imagining that it would never loſe its power, called it *the machine for exhibiting perpetual electricity*. It was invented by a much diſtinguiſhed Italian philoſopher, (Mr. Volta of Como,) about the year 1774, or rather earlier. *Fig.* 1. *Plate* XIV. repreſents this machine, whoſe two plates are A, and B. The lower one, B, is a circular glaſs plate, covered on the upper ſide with ſulphur, or ſhell-lac, or other reſinous electric. The upper plate, A, is of braſs, or of wood covered with tin-foil, and has a glaſs handle, which ſcrews (by means of a braſs or wooden ferrule) perpendicularly into the centre of it. This metallic plate muſt have a pretty thick edge, well rounded off.

In the firſt place, the plate B is excited by rubbing its coated ſide with a piece of new white flannel, or with a dry hand, and when powerfully excited is ſet upon a table with its coated ſide uppermoſt. Secondly, the metal plate is laid upon the excited electric, as repreſented in the figure. Thirdly, the metal plate is touched with the finger, or with any other conductor, and this contact is attended with a ſpark. Laſtly, the metal plate A being held by the extremity of its glaſs handle I, is ſeparated from the electric plate; and being elevated above that plate, will be found ſtrongly electrified with an electricity contrary to that of the electric plate; and it will give a ſtrong ſpark to any conductor that is brought near it. By ſetting the metal plate upon the electric one, touching it with the finger, and ſeparating it ſucceſſively, a great number of ſparks may be obtained apparently of the ſame ſtrength, and that without exciting the electric plate anew. If theſe ſparks be repeatedly given to the knob of a Leyden phial, this will preſently become charged. Having thus given a general idea of the conſtruction, the management, and the effects of this machine, we muſt now examine all theſe particulars, and whatever belongs to them, ſeparately, and in a more extenſive manner.

It can hardly be doubted, that an excited plate of glaſs will form an electrophorus plate capable of producing the uſual phenomena; but the reaſon why reſinous electrics are generally uſed for this purpoſe in preference to glaſs, is, that the glaſs plate, owing to its readily attracting moiſture, and partly to the ſmoothneſs of its ſurface, loſes its electricity much ſooner than an excited piece of ſealing-wax, or ſulphur, or of many other reſinous electrics. Various experiments have been inſtituted for the purpoſe of determining the ſubſtance which would anſwer beſt for an electrophorus. A compoſition of roſin and ſulphur, or ſulphur alone, anſwers very well; but the firſt is attended with an unpleaſant ſmell in melting and making it, and both, if long uſed, impart an unpleaſant effluvium to the hand that rubs, or uſes it. Sulphur alone is alſo apt to crack, ſo as frequently to require renovation.

Mr. Adams uſed a compoſition conſiſting of two parts of ſhell-lac and one of Venice turpentine. The cake of theſe two ingredients had no glaſs plate. Roſin, with bees'-wax, in the proportion of four or five parts of the former to one of the latter, is the cheapeſt compoſition, and anſwers tolerably well; but is inferior to Mr. Adams's compoſition. Mr.

Cavallo ſays, in his treatiſe on Electricity, "I tried ſeveral ſubſtances either ſimple or mixed, and at laſt I obſerved that the ſtrongeſt in power, as well as the eaſieſt I could conſtruct, were thoſe made with the ſecond ſort of ſealing-wax, ſpread upon a thick plate of glaſs. A plate that I made after this manner, and not more than ſix inches in diameter, when once excited, could charge a coated phial ſeveral times ſucceſſively, ſo ſtrong as to pierce a hole through a card with the diſcharge. Sometimes the metal plate, when ſeparated from it, was ſo ſtrongly electrified, that it darted ſtrong flaſhes to the table upon which the electric plate was laid, and even into the air, beſides cauſing the ſenſation of the ſpider's web upon the face when brought near to it, like an electric ſtrongly excited. The power of ſome of my plates is ſo ſtrong, that ſometimes the electric plate adheres to the metal, when this is lifted up; nor will they ſeparate, even when the metal plate is touched with a finger, or other conductor.

"It is to be remarked, theſe plates ſometimes will not act well at firſt; but they may be rendered very active by ſcraping with the edge of a knife the ſhining or gloſſy ſurface of the wax. This ſeems analogous to a well known property of glaſs, namely, that new cylinders, or globes, made for electrical purpoſes, are often very bad electrics at firſt, but that they improve by being worked, *i. e.* by having their ſurface a little worn. Paper alſo has nearly the ſame property."

The ſecond ſort of ſealing-wax mentioned by Mr. Cavallo, is a harder ſort than the beſt, which, perhaps, owing to its greater ſoftneſs and pliability, cannot be excited ſo powerfully, nor does it retain the electricity ſo long as the harder ſort.

The reſinous coat was at firſt generally ſpread upon a glaſs plate, but ſoon began to be laid upon a metal plate; and as this was found more uſeful on various accounts, the glaſs plate has for ſeveral years been laid aſide. When the electrophorus is of a moderate ſize, *viz.* leſs than nine or ten inches in diameter, the reſinous cake may be made to adhere to a braſs plate; but when larger (and ſome of theſe electrophorus cakes have been made as large as a yard in diameter) then they are made without any ſtiff metallic plate in Mr. Adams's manner, or have only a piece of tin-foil ſtuck to their lower ſurface.

The excitation of an electrophorus plate may be performed various ways. The ſmall plates may be excited by friction with a dry hand, or by rubbing againſt the woollen garments of the operator. When large, they may be excited by rubbing with a piece of clean and dry flannel, or with a hair-ſkin, or cat ſkin; meaning the ſkin with the hair on. Even a clean and hard hair bruſh will anſwer that purpoſe. But when the excitation has once commenced, or when the electricity of an electrophorus is decreaſing, its force may be augmented in the following manner, and without friction. Place the metallic plate upon the reſinous cake, touch it in the uſual manner; then take up the metallic plate, and diſcharge it on the knob of a Leyden phial: repeat the operation ſeveral times, which will charge the phial. Now lay the bottle upon the reſinous cake; hold the bottle by the knob, and move it ſo as to touch the various parts of the ſurface of the cake with its outſide coating, which operation will augment the force of the electrophorus. This done, the whole operation may be repeated; that is, the metal plate is again laid upon the reſinous plate, the phial is charged, &c., by which means the reſinous cake may be rendered as powerfully electrical as poſſible. The rationale of this operation is ſo obvious, as to require no particular explanation.

The activity of theſe plates, though not continuing for ever, as ſome perſons were at firſt inclined to believe, does, however, laſt a very great length of time, but always in a decreaſing ſtate. Sometimes theſe plates have been found capable of charging a phial, and of giving ſparks a week after they had been excited, and even longer; but they have been obſerved to affect an electrometer full a twelvemonth after excitation, provided they are properly preſerved.

The experiments which ſhew how both the ſurfaces of the reſinous plate are affected by the ſuper-impoſition of the metal plate, &c. as made by Mr. Cavallo, are as follow: "If," he ſays, "after having excited the ſealing-wax, I lay the plate with the wax upon the table, and the glaſs uppermoſt, *i.e.* contrary to the common method, then, on making the uſual experiment of putting the metal plate on it, and taking the ſpark, &c. I obſerve it to be attended with the contrary electricity; that is, if I lay the metal plate upon the electric one, and while in that ſituation, touch it with an inſulated body, that body acquires the poſitive electricity, and the metallic, removed from the electric plate, appears to be negative; whereas it would become poſitive if laid upon the excited wax. This experiment, I find, anſwers in the ſame manner, when an electric plate is uſed which has the ſealing-wax coating on both ſides, or one of Mr. Adams's, which has no glaſs plate.

"If the braſs plate, after being ſeparated from the wax, be preſented with the edge towards it, lightly touching it, and thus be drawn over its ſurface, I find that the electricity of the metal is abſorbed by the ſealing-wax, and thus the electric plate loſes part of its power; and if this operation be repeated five or ſix times, the electric plate loſes its power entirely, ſo that a new excitation is neceſſary in order to revive it.

"If inſtead of laying the electric plate upon the table, it be placed upon an electric ſtand, ſo as to be accurately inſulated, then the metal plate ſet on it acquires ſo little electricity, that it can only be diſcovered with an electrometer, which ſhews that the electricity of this plate will not be conſpicuous on one ſide of it, if the oppoſite ſide is not at liberty either to part with, or acquire more of the electric fluid. In conſequence of this experiment, and in order to aſcertain how the oppoſite ſides of the electric plate would be affected in different circumſtances, I made the following experiments.

"Upon an electric ſtand E, *fig.* 2, I placed a circular tin plate, nearly ſix inches in diameter, which, by a ſlender wire H, communicated with an electrometer of pith-balls G, which was alſo inſulated upon the electric ſtand F. I then placed the excited electric plate D, of ſix inches and a quarter in diameter, upon the tin plate, with the wax uppermoſt; and on removing my hand from it, the electrometer G, which communicated with the tin plate; *i. e.* with the under ſide of the electric plate, immediately opened with negative electricity. If, by touching the electrometer, I took off that electricity, the electrometer did not afterwards diverge. But if now, or when the electrometer diverged, I preſented my hand open, or any other uninſulated conductor, at the diſtance of about one or two inches over the electric plate, without touching it, then the pith-balls diverged; or if they diverged before, came together, and immediately diverged again with poſitive electricity:—I removed the hand, and the balls came together;—approached the hand, and they diverged; and ſo on.

"If, while the pith-balls diverged with negative electricity, I laid the metal plate (holding it by the extremity K of its glaſs handle) upon the wax, the balls came, for a ſhort time, towards one another, but ſoon opened again with the ſame; *i. e.* negative electricity.

"If, while the metallic reſted upon the electric plate, I touched the former, the electrometer immediately diverged with poſitive electricity, which if, by touching it I took off, the electrometer continued without divergence. I touched the metal plate again, and the electrometer opened again; and ſo on for a conſiderable number of times, until the metal plate had acquired its full charge. On taking now the metal plate up, the electrometer G inſtantly diverged with ſtrong negative electricity.

"I repeated the above-deſcribed experiments with this only difference in the diſpoſition of the apparatus; *i. e.* I laid the electric plate D, with the excited ſealing-wax, upon the circular tin plate, and the glaſs uppermoſt; and the difference in their reſult was, that where the electricity had been poſitive in the former diſpoſition of the apparatus, it now became negative, and *vice verſâ;* except that when I firſt laid the electric plate upon the tin, the electrometer G diverged with negative electricity, as well in this as in the other diſpoſition of the apparatus.

"I repeated all the above-mentioned experiments with an electric plate, which, beſides the ſealing-wax coating on one ſide, had a ſtrong coat of varniſh on the other ſide; and their reſult was ſimilar to that of thoſe made with the above-deſcribed plate.

"As to the explanation of theſe experiments, they ſeem to depend upon theſe two well-known principles; *viz.* that a body brought within the ſphere of action of an electrified body, does actually acquire the contrary electricity; and that the exiſtence of one kind of electricity upon the ſurface of any ſubſtance whatever, cauſes the exiſtence of the contrary electricity upon ſome other ſubſtance near it."

The writers of the Encyclopædia Britannica, in noticing the above-mentioned experiments of Mr. Cavallo, ſay, "He tells us, that, *if inſtead of laying the electric plate upon the table, it is ſet upon an electric ſtand, ſo as to be accurately inſulated, then the metal plate ſet on it acquires ſo little electricity, that it can only be diſcovered by an electrometer.* In what manner theſe gentlemen came to miſtake a plain fact ſo egregiouſly, is not eaſy to determine."

Finding ſuch a formal contradiction made to a matter of fact which may be eaſily tried, we had the curioſity to try the experiment, and found, from the reſult of it, that Mr. Cavallo's account was perfectly correct, and the above-mentioned writers were perfectly miſtaken.

What we have already mentioned with reſpect to the action of the electrophorus plate may be eaſily applied to each particular phenomenon ſeparately conſidered. Should the reader wiſh to examine farther obſervations and conjectures concerning them, he may conſult the Phil. Tranſ. vol. 66. p. 513. vol. 67. p. 116. and p. 389. and vol. 68. p. 1027, and 1049. See Vindicating *Electricity.*

About the year 1777 an account was received in London of certain experiments made by profeſſor Lichtenberg of Gottingen, with the electrophorus. The experiments are performed in the following manner. The reſinous plate of an electrophorus is firſt excited; then a piece of metal of any ſhape, (as a pair of ſciſſars, a piece of braſs tube, &c.) is laid upon the electrophorus plate; and to this piece of metal a ſpark is communicated of the electricity contrary to that of the plate; this done, the piece of metal is removed by means of a ſtick of glaſs, or ſealing-wax, or other electric; and the powder of roſin, kept in a linen bag, is ſhaken over the electrophorus. This powder will be found to fall about thoſe points upon the plate which were touched by the above-mentioned piece of metal, and to form ſeveral beautiful radiated configurations about thoſe points. The reſt of the plate remains almoſt entirely free from the powdered roſin. This is the caſe when the plate is excited negatively, and a ſpark of the poſitive electricity is communicated to the piece of metal laid upon it. But if the plate be excited poſitively, and a ſpark of negative electricity is given to the piece of metal; then the powdered roſin will fall upon thoſe parts of the plate which in the preceding caſe were left uncovered by it, and will leave a radiated configuration round each of the points which were touched by the piece of metal. In ſhort, the electricity of the ſpark which is communicated to the piece of metal ſeems to ſpread itſelf in a ramified manner over the plate, and round the points of contact, &c.; and the powdered roſin which is ſhaken over it is attracted only by thoſe parts of the ſurface of the electrophorus which are electrified poſitively. Prof. Lichtenberg in his work, "De nova methodo naturam ac motum fluidi electrici inveſtigandi commentatio prior," wherein theſe experiments were firſt deſcribed, did not attempt to give any explanation of the phenomena; in conſequence of which, Mr. Cavallo inſtituted a ſeries of experiments with a view of inveſtigating the cauſe of the above deſcribed phenomena; and he diſcovered that powdered roſin, by its being ſhaken out of the linen bag, was actually excited, and acquired the negative electricity; therefore, in the experiments with the electrophorus, it was not wonderful that the roſin thus excited negatively, ſhould be attracted by thoſe parts of the plate which were electrified poſitively. Mr. Cavallo likewiſe tried various other powders in a ſimilar manner, as well as otherwiſe; and found that ſome of them acquired the poſitive, whilſt others acquired the negative electricity. See his Treat. on Elect. p. iv. ch. vii. Alſo Excitation.

Mr. Bennet repeated and diverſified Prof. Lichtenberg's experiments. He took a glaſs plate, 15 inches ſquare, covered on one ſide with a thin reſinous black coating, with tinfoil paſted on the other ſide; and ſuſpended it by a loop againſt the wall, that the groſſer particles of the powder that was ſhaken near it might fall to the ground, and no more of it might adhere to the plate than was attracted by the electricity diffuſed thereon. A ſmall Leyden phial was weakly charged, and after its knob had been drawn over the plate, a cloud of chalk was projected by rubbing the lump upon a bruſh near the electrified ſurface of the plate. This produced a plain white line without any ramifications. When the experiment was performed with the Leyden phial charged a little higher, ramifications appeared about the plate at a conſiderable diſtance from each other. When the phial was charged as highly as it could bear, the ramifications were cloſe and broad, reſembling white feathers with a very broad ſhade.

A circular braſs plate, with an inſulating handle, was placed upon the reſinous plate which ſtood upon the table, and a ſpark from the charged phial was communicated to the braſs plate, which was then removed by its inſulating handle; and chalk was projected, which produced a very regular circle of ramifications, proceeding from the circumference of the ſpace covered by the braſs plate, and within the circle there were various irregular figures, ſomewhat like ſtars. A ſhock made to paſs through the above-mentioned plate generally produced more diſtinct ramifications, and ſometimes without any ſtars within the circle.

By varying the powders as well as the bodies, which are laid upon the plate, the configurations may be varied without limit. If powders of different colours are mixed and projected as above, or out of a pair of bellows, ſome of the colours will prevail in ſome places, and other colours in other places; and eſpecially if two figures of contrary electricities are made upon the ſame plate; and moſt of all when both the electrical ſtates of the figures and of the powders are contrary to each other. For example, if minium, whoſe electricity is ſtrongly poſitive, and ſulphur, which is ſtrongly negative, be powdered together, and the mixed powder be projected out of a pair of bellows upon the figures contrarily electrified; the powders will be ſeparated, and the ſulphur will fall upon the poſitive figures, whilſt the minium falls upon the negative figures; producing ſeveral curious configurations, agreeably to the well known electrical law, *viz.* that bodies, poſſeſſed of different electricities, attract each other, whilſt bodies poſſeſſed of the ſame kind of electricity repel each other. See Electrical *Experiments.*

ELECTRUM, Ἤλεκτρον. This term has been applied by the Greek and Roman writers to various ſubſtances; from which circumſtance much confuſion has ariſen, and the knowledge of the ancient naturaliſts has been on ſeveral occaſions very unjuſtly called in queſtion: at the ſame time, however, many of the claſſical writers, eſpecially among the Romans, have fallen into miſtakes on the ſubject, for the purpoſe of explaining which, it is worth while to enter ſomewhat minutely into an inveſtigation of the queſtion, "What is the electrum of the ancients?"

The anſwer given by Pliny to this queſtion is, that the word electrum denotes two ſubſtances, the one the foſſil, now called amber, and the other a certain metallic alloy, at preſent no longer in uſe, compoſed of four parts of gold and one part ſilver. Bearing this general explanation in mind, we ſhall proceed to conſider the principal paſſages among the ancient writers in which it occurs.

The word itſelf is probably derived from Ηλεκτωρ, a name applied by Homer and other early Greek writers to the ſun. Thus Achilles prepared for battle is repreſented as,

> Τευχεσι παμφαινων ὥς Ηλεκτωρ υπεριων.
>
> *Radiant in arms as the ſun Hyperion.*

Homer, the moſt ancient Greek writer, whoſe works are extant, is alſo the firſt who mentions electrum: the word is not to be found in the Iliad, but occurs thrice in the Odyſſey. A Phœnician merchant is deſcribed as poſſeſſing χρυσεον ὅρμον, μετα δ' ηλεκτροισιν εερτο, *a golden necklace ſet with beads of amber.* Eurymachus preſents Penelope with ὅρμον πολυδαιδαλον, ηλεκτροισιν εερμενον, *a curiouſly-wrought necklace, ſet with beads of amber.* Laſtly, Telemachus, on viſiting the palace of Menelaus, admires the ſplendour of the echoing halls, radiant

> Χρυσȣ τ' ηλεκτρȣ τε, και αργυρȣ ηδ' ελεφαντος.
>
> *With gold and amber, with ſilver and ivory.*

Pliny indeed quotes this paſſage as a proof that Homer was acquainted with the metallic electrum; but, in my opinion injudiciouſly, for not to mention that the former paſſages clearly relate to amber, it is not evident that the electrum and ivory here bear the ſame relation to each other as the gold and ſilver do: the one is yellow, and therefore mentioned with the gold, as the other is white, and therefore mentioned with the ſilver, but it does not by any means follow that either is metallic.

The next writer, in chronological order, is Heſiod; in whoſe poem, called *the Shield of Hercules,* the word ηλεκτρον occurs. In the paſſage alluded to it is immediately aſſociated with ivory, and, therefore, probably, as in Homer, means amber.

It may, perhaps, be objected, that as amber is not to be procured in quantity any where except on the coaſt of Ducal Pruſſia, it is very unlikely that in ſuch early times it ſhould have been ſo well known among the Greeks, and ſo common an article of ornament. But this objection will vaniſh, when we recollect that at the period now referred to, the commerce of the Phœnicians was in full activity; and that enterpriſing people, who, after eſtabliſhing colonies in Spain, opened a trade with Britain for the tin of Cornwall, might very poſſibly extend their reſearches even into the Baltic. What ſerves as a ſtriking confirmation of this is, that the oldeſt Greek writers who mention the country of amber, are much nearer the truth in this reſpect, than thoſe who wrote after the decline of Phœnicia, and acquired their knowledge of the Weſtern countries of Europe only from the timid coaſting voyages of their countrymen, to whom the pillars of Hercules were the extremity of the world in that direction. On this ſubject the teſtimony of Herodotus is of great importance; and the more ſo, as the account which he gives is not to ſerve any theory of his own, ſince he expreſsly ſays, that he himſelf does not believe it. After deſcribing the Scythians and other Northern tribes, he proceeds thus: (Lib. iii. § 115.) "Of the weſtern extremities of Europe, I can report nothing with certainty, for, that a river flowing into the North ſea, and from which, as I am informed, amber is procured, ſhould be called by the Barbarians Eridanos, I can by no means allow; nor am I acquainted with the iſlands called Caſſiterides, from which tin is procured. Indeed the very name of the river ſhews that there is ſome miſtake, for Eridanos is not a Barbarous but a Greek word, and invented by ſome poet. It is certain, however, that both tin and amber come from that extremity of the world."

From this important document we learn, that in the time of this hiſtorian both tin and amber were procured from the north-weſtern part of Europe (with reſpect to Greece); that the latter was ſaid to be obtained from a river called Eridanos, flowing into the North ſea, and that the only, or at leaſt the principal, reaſon why Herodotus doubted the truth of this, was becauſe the name Eridanos was Greek and not Barbarian. Unqueſtionably the word, in its preſent form, is Greek; but the root of it is as certainly (to uſe the phraſeology of Herodotus) Barbarian, being the ſame as the Engliſh river Rodon, and the French river Rhone, *Rhodanus;* and, in fact, there is a river at this very day called Rhodaun, which flows into the Viſtula, near Dantzic, traverſing the country in which the preſent amber mines of Pruſſia are ſituated; which ſtriking coincidence will ſurely juſtify us in conſidering this as the true Eridanus of the earlieſt Greeks.

Carthage appears about this time to have ſucceeded to the eſtabliſhments in the Weſt, formerly poſſeſſed by the mother-country Phœnicia; and, induced by commercial jealouſy, ſuppreſſed as much as poſſible all information reſpecting the countries lying weſt of Italy; hence theſe regions again became the ſeat of Greek fiction and fable, almoſt as much as in the time of Homer. The true Eridanus of the Baltic was brought within the pillars of Hercules, and repreſented by Æſchylus as a river of Iberia, and the ſame as the Rhodanus; on its banks were ſtationed by the ſame poet the ſiſters of Phaethon, who, lamenting his death, were turned into poplar trees, from which exuded tears of amber. The romance was adopted by Euripides, but the ſcene was transferred from the Rhone to the Po, as being probably the remoteſt great river of the Weſt with which he was acquainted. The later poets, both of Greece and Rome, acquieſced in the authority of Euripides, and Eridanus continued ever after to be the poetical name of the Padus, while Strabo and the geographers denied its very exiſtence; τον Ηριδανον, τον μηδαμȣ γης οντα being the very words of the above-mentioned writer.

The obſcurity which thus involved, and by degrees entirely concealed, the knowledge that had been poſſeſſed by the ancient Greeks of the native country of amber, was not ſatiſfactorily removed till the Romans extended their conqueſts to Britain and the north of Germany. In the reign of Tiberius, a regular commerce in Roman ſhips appears to have been carried on between the northern ports of Gaul and the diſtrict lying between the Elbe and Viſtula; and Nero procured thence ſuch an abundance of amber, that it was largely employed in ornamenting the amphitheatre.

But during the period in which this ignorance of the real country of amber prevailed, the ſubſtance itſelf appears to have been very common, ſo that it was uſed as a frequent term of compariſon, juſt as glaſs is with us. We ſay water as clear as glaſs. Callimachus ſays, το δ', ως αλεκτρινον, υδωρ, *water as clear as if it were made of amber;* and Virgil, "purior electro, amnis," *a river purer than amber;* and Lucian, ηλεκτρου, η Σιδωνιας υελου διαφεγγεστερον, *more tranſparent than amber or Sidonian glaſs.*

It appears, that both the Greeks and Romans were perſuaded that amber was a concrete vegetable juice, (whence indeed the latter people called this very ſubſtance ſuccinum, *a ſucco,*) and this circumſtance would induce them to receive with leſs ſuſpicion any of the harder reſins of India, ſuch as copal and lac, as real varieties of amber: and in this way is probably to be explained the aſſertion of Pliny, that amber was procured from Africa, India, and Egypt, which countries yield little, if any, of the real amber, but abundance of the hard reſins. At preſent we poſſeſs a very ſatisfactory method of diſtinguiſhing amber from the reſins, by its inſolubility in alcohol; but prior to the diſcovery of this fluid, the diſtinction between theſe two ſubſtances was not very likely to be perceived. The Egyptian name of amber, according to Pliny, was ſacal; but ſachol is an Arabian word ſtill in uſe, and is rendered in the Lexicon Copto-Arab, by the words *gummi vel reſina,* which is no ſmall confirmation of the above hypotheſis. It would be foreign to the purpoſe of the preſent article, to paſs from the conſideration of the term electrum to that of amber, which being originally appropriated to the ſubſtance now called ambergris, came through ignorance to be confounded in proceſs of time with the amber of the Baltic. I ſhall therefore proceed to ſtate ſome of the principal paſſages in which electrum is conſidered as a metal or metallic alloy.

In the Antigone of Sophocles, v. 1049, occurs the following paſſage:

> Κερδαινετ', εμπολατε τον προ Σαρδεων
> Ηλεκτρον, ει βουλεσθε, και τον Ινδικον
> Χρυσον· ταφω δ' εκεινον ουχι κρυψετε.

Diſpoſe of my Sardian electrum and Indian gold as you pleaſe, but on no account commit his body (of Polynices) *to the tomb.*—Euſtathius and all the ſcholiaſts conſider electrum as here meaning gold, eſpecially as it is ſaid to come from Sardis, in the vicinity of which was the river Pactolus, ſo celebrated for its golden ſands; but if this interpretation be admitted, it is ſurely a ſtrange tautology in the poet to make mention afterwards of Indian gold. Is it not poſſible that Sophocles may have miſtaken Sardis for Sardinia? Apollonius, in his Argonautics, repreſents the Eridanus as flowing into the Σαρδονιον πελαγος, the *Sardinian ſea.*

Of leſs dubious import, is a paſſage occurring in Strabo's deſcription of the gold-mines of Spain, εκ δε του χρυσου εψομενου και καθαιρομενου στυπτηριωδει τινι γη, το καθαρμα ηλεκτρον ειναι, &c. *Moreover the gold being cemented and purged by a certain aluminous earth, that which remains is called electrum, and this being a mixture of gold and ſilver, the latter is ſeparated by cementation, and the gold is left.*

A ſtill more particular account is given by Pliny, (Hiſt. Nat. xxxiii. § 23.) of the metallic electrum. All gold, ſays he, is naturally alloyed by ſilver in various proportions; ſome containing a tenth, ſome a ninth, and ſome an eighth part. Wherever the ſilver amounts to a fifth of the maſs, the compound is called electrum; this alloy may alſo be prepared artificially, by adding to gold the requiſite proportion of ſilver. But if this latter exceeds a fifth of the whole, the maſs ceaſes to be malleable. The nature of electrum is to reflect a richer luſtre by lamp-light than pure ſilver does. That which is native has alſo the additional property of detecting poiſons, irideſcent rings paſſing rapidly over the ſurface of the cup, accompanied by a noiſe like that of hot metal plunged in water.

Electrum was not only uſed for ornamental plate, but was occaſionally employed for coin, at leaſt for medals. Thus Lampridius, in his life of Alexander Severus, ſays, that that prince cauſed medals to be ſtruck in honour of Alexander the Great, both of electrum and gold. (Electreos aliquantos, ſed plurimos tamen aureos.)

From what has been ſaid, it appears to be at leaſt very dubious, whether the alloy of gold and ſilver, known to the Romans by the name electrum, was at all in uſe among the Greeks. The Romans themſelves appear to have preferred the white luſtre of ſilver to the yellow radiance of gold, &c. probably this taſte, together with the imperfection of the art of aſſaying, as practiſed by them, aided alſo by an idle ſuperſtitious notion of the efficacy of electrum in detecting poiſon, contributed to give to this alloy a temporary celebrity. Modern taſte, however, prefers the native luſtre of the noble metals in all their purity to any alloy of them with each other, nor is it probable, that the Roman electrum will ever again be met with at the mint or on the ſideboard.

ELECTUARY, or ELECTARY, ELECTUARIUM, in *Pharmacy.* Voſſius obſerves, that all the remedies preſcribed for the ſick, as well as the confections taken by way of regale, were called by the Greeks εκλειγματα, and εκλεικτα, of the verb λειχω, *I lick;* whence, ſays he, was formed the Latin electarium, and afterwards electuarium. This conjecture he ſupports from the laws of Sicily, where it is ordained, that electuaries, ſyrups, and other remedies, be prepared after the legal manner. The Bollandiſts, who relate this etymology, ſeem to confirm it. Act. Sanct. Mart. tom. ii. p. 131.

Electaries are medicines chiefly compoſed of powders of various kinds, mixed up with ſyrup or honey into ſuch a conſiſtence, that the powders may not ſeparate by keeping, and that a doſe may be taken upon the end of a knife, and prove not too ſtiff to ſwallow.

The ingredients of electaries are chiefly the milder drugs, thoſe which may be taken a good deal *ad libitum,* ſuch as the milder aperients, or aromatics and alteratives, in which a certain latitude may be allowed in the doſing without material riſk.

The ancient phyſicians beſtowed prodigious pains on the compoſition of particular electaries, and multiplied the ingredients to a moſt prepoſterous degree; heaping together gums, reſins, aromatics, animal ſubſtances, inert mucilaginous vegetables, ſalts, &c. &c. with the moſt indiſcriminating profuſion. They alſo made the diſtinction between electuaries and *opiates,* meaning by the latter term electaries, of which opium formed a part. This diſtinction has long been dropped, and indeed a very great reform has been made in all the more modern pharmacopœias, by ſuppreſſing a great part of the electaries, and rendering the reſt much more ſimple, and of courſe their modus operandi more intelligible.

The great defect of all electaries is their liability to mould by keeping, and thus to acquire both unpleaſant ſenſible properties, and alſo to have the virtues of ſome of their ingredients

gredients much impaired. This diſpoſition to mould is particularly found in thoſe electaries which are compoſed of ſucculent vegetables, pulps of fruits, and the like; and though the moulding is ſomewhat checked by the quantity of ſugar added, it cannot always be done effectually unleſs theſe preparations are kept very dry, whereby they harden and loſe that kind of conſiſtence which is eſſential to their uſe.

The electaries that are the beſt for keeping, are thoſe which are compoſed principally of aromatic powders, or gum-reſins; and theſe, if properly prepared, may be preſerved for years unaltered.

Though electaries, in the preſent mode of practice, are generally made from extemporaneous preſcription, a few are retained in the Pharmacopœia, together with ſome *confections*, which differ from the electaries only by name.

Electuary *of Caſſia*, is compoſed of the freſh extracted pulp of caſſia, half a pound; manna, two ounces by weight, tamarind, one ounce by weight, and roſe-ſyrup, half a pound. It is prepared by beating the manna, and diſſolving it, in a water-bath ſaturated with ſea-ſalt, in the roſe-ſyrup; then adding the pulps, and, with the ſame degree of heat, evaporating the whole to an electuary of proper conſiſtence. The doſe for an adult is from ʒ j to ℥ iſs.

Electuary *of Scammony* conſiſts of ſcammony, in powder, 1½ ounce by weight, cloves and ginger, of each ſix drams by weight, oil of caraway, half a dram by weight, and roſe-ſyrup, as much as is ſufficient. The ſpices, being powdered together, are mixed with the ſyrup; and then the ſcammony is added, and laſtly the oil of caraway. The doſe for an adult is from ℈ j to ʒ j.

Electuary *of Senna* is compoſed of ſenna, eight ounces by weight, figs, 1 lb. tamarind, caſſia, and prunes, of each ½ lb. coriander four ounces by weight, liquorice three ounces by weight, and double-refined ſugar, 2½ lbs. The ſenna is powdered with the coriander pods, and 10 ounces of the powder is ſifted out. The remainder is boiled with the figs and the liquorice, in four pints of diſtilled water, to one-half; then the liquor is preſſed out and ſtrained. It is then evaporated to the weight of about 1½ lb., and the ſugar added to make a ſyrup: then this is added by degrees to the pulps, and laſtly the powder is mixed in it. The doſe for an adult is from ʒ ſs. to ℥ ſs.

ELEEMOSYNA Carucarum, or *pro Aratris*, or *Aratri*, in our *Ancient Cuſtoms*, a penny which king Ethelred ordered to be paid for every plough in England, towards the ſupport of the poor. Sometimes it is alſo called eleemoſyna regis, becauſe firſt appointed by the king.

Eleemosynæ is alſo uſed for the poſſeſſions belonging to churches. See Alms, and Frank *Almoign*.

ELEEMOSYNARIA. See Ambry.

ELEEMOSYNARIUS, in our *Old Writers*, is uſed for the almoner, or peculiar officer who received the eleemoſynary rents and gifts, and diſtributed them to pious and charitable uſes. There was ſuch an officer in all religious houſes. The biſhops alſo uſed to have their almoners, as now the king has. Linn. Provinc. lib. i. tit. 12. See alſo Du-Cange, Gloſſ. Lat.

ELEEMOSYNARY Corporations. See Corporations.

ELEGANCE, Elegancy, from *eligo*, I chuſe, denotes a manner of doing, or ſaying things politely, agreeably, and with choice.

With choice, ſo as to riſe above the common manners; politely, ſo as to ſtrike people of delicate taſte; and agreeably, ſo as to diffuſe a reliſh which gratifies every body.

Elegance, in *Painting*, is a quality which embelliſhes and heightens the beauty of objects in a picture, of whatever nature they may be, and that either in form, in colour, or both, without deſtroying the general air of truth. It is a diminutive of grace which may unite with the grand, whilſt elegance ſeems to militate againſt it. Many attempts have been made to diſcover and define wherein elegance conſiſts, but none are ſatisfactory; and what particular combinations of lines or colours will beſt produce its effect, remain hitherto undeſcribed.

Sir Joſhua Reynolds, who poſſeſſed more of it, and has more exemplified it in his works than any artiſt that ever lived before him, or ſince, has obſerved, in his Diſcourſes, that correctneſs is its baſis. In ſaying this, he muſt not be underſtood to mean literally a correctneſs of imitation of particular forms in nature; but that general character of form in man and other objects, round which all of the ſame ſpecies vary. He obſerves alſo, "that to ſuppoſe it to proceed from incorrectneſs or deformity is poiſon to the mind of a young artiſt, and may lead him to neglect eſſential ſtudies to purſue a phantom that has no exiſtence but in the vain imagination of affected ſpeculators."

This argument, however juſt it may appear, will be found extremely difficult to reconcile with the fact, that elegance in deſign does exiſt without correctneſs; indeed, in works where extreme incorrectneſs is evident to the commoneſt obſerver, and even in better works, in too many of this great man's own productions, this union is too viſible; and elegance is rarely to be found in the works of thoſe who have made correctneſs their principal ſtudy. It ſeems, therefore, that it may moſt juſtly be ſaid to proceed from a refinement upon the general form, and therefore a variation from it; but which ought not to have been termed a deformity, ſince we ſee it in nature conſtantly exemplified; and no one is inclined to regard an elegant woman as a piece of deformity. Sir Joſhua in this appears to have followed too cloſely the accuſtomed inclination of a ſyſtematizer, and having laid down a rule that nature, in a general ſenſe, is the only guide, attaches particular circumſtances to it that have no relation, in fact, not willing to give up, for a moment, his general principle.

It is to be lamented, in contradiction to his ſentiment, that the productions of his elegant mind and pencil are too often convincing proofs, that elegance may exiſt with certain deviations from correct imitation of general Nature; nay, almoſt, that it ſcarce can exiſt without ſome encroachment on that form, and ſubſtituting ſomething ideal for ſomething real, which, nevertheleſs, has ſufficient truth not to deſtroy the fabric, and to give more pleaſure than a repreſentation of the abſolute forms ever can to a cultivated mind.

We therefore are no nearer the definition of its nature than before he wrote; and if he who poſſeſſed ſo much larger a portion of this agreeable quality than any one elſe, and was ſo well able to define and illuſtrate his conceptions by language; if he has failed in an attempt to explain, in ſome degree, the nature of elegance, it becomes almoſt a hopeleſs caſe that we may ever ſee it performed with ſucceſs.

We are better able to inform our readers what does not, rather than what does, aſſiſt in producing its effect; though, indeed, we may alſo ſpeak of ſome of thoſe characteriſtics of it which are apparent in the works of thoſe who have moſt excelled in their attempts to obtain it, without pretending clearly to guide the judgment of others who may ſeek to embelliſh their works with ſo pleaſing an ornament.

Heavineſs of line or form, groſſneſs and violence of colours, are each a ſtrong antipathy to elegance, it cannot reſide with them. On the contrary, lightneſs of form and execution, a gentle flow of line, not too violent or too tame in its varieties, are uſeful in obtaining its character; the figure that aſpires to it ſhould not be over-cloathed; parts of the figure ſhould appear, in ſome meaſure, acting under the drapery. Too violent an oppoſition of colours militates againſt it; though brilliancy of hue may well accompany it, poſitive colours are not admiſſible; where it is required, a broken hue of a ſofter ſhade better correſponds with its nature. Altogether it depends upon, or rather it is, a pleaſing arrangement of forms and colours; but what particular unions of lines will beſt give thoſe forms, or what ordering of colours it requires, we will not attempt to define.

That there is ſuch a quality we are all ſenſible, and are ſenſibly affected by it. Yet as in nature ſo we believe it to be in art. If not felt inherently and uninſtructedly, we fear it will never be acquired to any ſufficient degree to make it valuable.

How few in number are the young perſons with whom ſo long continued and ſuch zealous pains are taken to render them in their manners elegant and graceful, out of the immenſe maſs who are daily coming forward in the faſhionable world, who poſſeſs it? And how ſoon do the affected airs, which education has unhappily taught many (miſtaking them for elegant) to aſſume, become apparent and diſguſting, where what we are accuſtomed to term natural elegance is not inherent!

Sir Joſhua Reynolds poſſeſſed it by nature; his earlieſt works participate of it. Not finding any difficulty himſelf in entering into its principles, he naturally enough ſuppoſed that thoſe who took the ſame pains to inform themſelves that he did, would alſo acquire it, (for he has ſaid it may be acquired,) yet numberleſs are the artiſts who acknowledge and feel the full value of it in the work of others, and who, labouring with all their might to obtain it, never preſent a glimpſe of it in their own works. That late excellent artiſt, Opie, has often, in converſation with the writer of this article, dwelt with rapture on the elegance of works from Reynolds' pencil, and ardently expreſſed his wiſh to obtain poſſeſſion of the faculty himſelf. All who are acquainted with his works, know how far he was from blending elegance with the other great qualities they contain. It ſeems, therefore, that though thoſe who have a ſhare of it by nature may improve their ſtock; thoſe who are not ſo fortunate, will rarely, perhaps never acquire it.

The ancient works poſſeſs it largely, as ſtatues, bas reliefs, and paintings, particularly the ornamental. Among the moderns, Reynolds, Correggio, Parmigiano, and Guido Rheni, beſt exemplify it: Raphael is ſometimes elegant, but expreſſion was his object, and he who aims at that principally muſt not too often ſacrifice to elegance.

ELEGANCY, in *Oratory*, is one of the three parts of general Elocution, and reſpects the purity and perſpicuity of the language. By the former a diſcourſe is rendered correct, and by the latter intelligible; and both extend to the ſelection of ſingle words, as well as to their conſtruction in ſentences. See Purity, and Perspicuity.

Poetical elegancies, *elegantiæ poeticæ*, are of ſervice to ſcholars in making their verſes; by being too regular in the grammatical conſtruction, we loſe certain licences, wherein the elegance of language conſiſts. Elegance, though irregular, is better than regularity without elegance.

ELEGARDA, in *Ancient Geography*, a town of Aſia, in Armenia Major. Ptolemy.

ELEGIA, in *Botany*, from ελεγος, *lamentation*, perhaps in alluſion to the ſad or mourning colour of the whole plant. Linn. Mant. 2. 162. Thunb. Reſtio 4. Prod. 14. Schreb. 675. Mart. Mill. Dict. v. 2. Claſs and order, *Dioecia Triandria.* Nat. Ord. *Calamariæ*, Linn. *Junci*, Juſſ.

Gen. Ch. Male, *Cal.* Spathes within ſpathes, remote, ſingle-valved, coriaceous, lanceolate, deciduous; ſpadix thread-ſhaped, jointed, with a catkin at each joint; catkin lax, with one ſtalked floret to each ſcale; ſcales ſetaceous, membranous, flat, longer than the florets; proper perianth of ſix ſetaceous, chaffy, unequal, lax leaves. *Cor.* none. *Stam.* Filaments three, very ſhort; anthers incumbent, oval, larger than the perianth.—Female in a ſeparate plant, *Cal.* Spathes as in the male, but ſhorter; ſpadix as in the male; catkin racemoſe, compound; proper perianth of ſix leaves, the three outermoſt lanceolate, channelled, petal-like, equal. *Cor.* none. *Piſt.* Germen ſuperior, rather oblong; ſtyles three, thread-ſhaped, the length of the perianth; ſtigmas ſimple. *Peric.*, according to Thunberg, a capſule of three cells. *Seeds* ſeveral, oblong.

Eſſ. Ch. Male, Catkin compound; florets ſtalked; perianth of ſix unequal leaves. Corolla none. Female, Catkin compound; perianth of ſix leaves. Capſule of three cells.

E. *juncea.* Linn. Mant. 2. 297. Thunb. Prod. 14. (Reſtio Elegia; Linn. Syſt. Veg. ed. 14. 882. R. thyrſifer; Rottb. Deſcr. 8. t. 3. f. 4.) the only ſpecies, a native of the Cape of Good Hope. A hard ruſhy plant, with exactly the habit of a *Reſtio*, to which genus Linnæus finally referred it, but Thunberg inſiſts on its remaining diſtinct. The *roots* are perennial. *Stems* ſeveral, four feet high, ſimple or branched, rigid, a little waved, round, ſmooth, not ſo thick as a gooſe-quill, browniſh green, with ſeveral remote joints. *Leaves* none, except a few ſmooth, brown, imbricated, pointed ſcales towards the root, and a ſimilar one at each joint of the ſtem; theſe laſt fall off, and leave their black annular baſe at the joint. *Catkins* in a terminal ovate head, with broad, tumid, ovate, brown ſpathes, enveloping the catkins. The *anthers* are large and conſpicuous, brown bordered with white. *Female catkins* of a darker brown hue, eſpecially when in fruit.

Elegia, in *Ancient Geography*, *Ilija*, a place of Aſia, in Melitené, ſeated on the left bank of the Euphrates, at the entrance of this river in mount Taurus.

ELEGIAC, in the *Latin Poetry*, ſomething that belongs to *elegy*, which ſee.

Elegiac verſes, Ελεγοι, are alternately hexameter, and pentameter.

Quintilian eſteems Tibullus the chief of the elegiac poets; but the younger Pliny gives the preference to Propertius. They have each of them reaſon on their ſide; and one might make a third choice, as juſt as either of them. See Elegy.

ELEGIT, in *Law*, a judicial writ given by the ſtatute Weſtm. 2. 13 Edw. I. c. 18, either upon a judgment for a debt, or damages; or upon the forfeiture of a recognizance taken in the king's court. By the common law a man could only have ſatisfaction of goods, chattels, and the preſent profits of lands, by the two writs of "fieri facias" or "levari facias;" but not the poſſeſſion of the lands themſelves; which was a natural conſequence of the feodal principles, that prohibited the alienation, and of courſe the incumbering of the fief with the debts of the owner. And when the reſtriction of alienation began to wear away, the conſequence ſtill continued; and no creditor could take the poſſeſſion of lands, but only levy the growing profits, ſo that if the defendant aliened his lands, the plaintiff was ouſted of his remedy. The ſtatute therefore granted this writ (called an *elegit*, becauſe it is in the choice or election of the plaintiff whether he will ſue out this writ or one of the former) by which the defendant's goods and chattels are not ſold, but only appraiſed, and all of them (except oxen and beaſts of the plough) are delivered to the plaintiff, at ſuch reaſonable appraiſement and price in part of ſatisfaction of his debt. If the goods are not ſufficient, then the moiety, or one half of his freehold lands, which he had at the time of the judgment given (2 Inſt. 395.), whether held in his own name, or by any other truſt for him (ſtat. 29 Car. II. c. 3.), are alſo to be delivered to the plaintiff; to hold, till out of the rents and profits thereof the debt be levied, or till the defendant's intereſt be expired; as, till the death of the defendant, if he be tenant for life, or in tail. During this period, the plaintiff is called tenant by *elegit* (ſee Tenant). This is evidently a mere conditional eſtate, defeaſible as ſoon as the debt is levied. Till the ſtatute above-mentioned, lands were not, by the ancient common law, liable to be charged with, or ſeiſed for, debts; becauſe by theſe means the connection between lord and tenant might be deſtroyed, fraudulent alienations might be made, and the ſervices be transferred to be performed by a ſtranger; provided the tenant incurred a large debt, ſufficient to cover the land. And therefore, even by this ſtatute, only one half was, and now is, ſubject to execution; that out of the remainder ſufficient might be left for the lord to diſtrain upon for his ſervices. And upon the ſame feodal principle, copyhold lands are at this day not liable to be taken in execution upon a judgment. (1 Roll. Abr. 888.) But in caſe of a debt to the king, it appears by magna carta, c. 8, that it was allowed by the common law for him to take poſſeſſion of the lands till the debt was paid. Moreover, by the ſtatute "de Mercatoribus," paſſed in the ſame year with the former, the whole of a man's lands were liable to be pledged in a ſtatute merchant, for a debt contracted in trade; though only half of them was liable to be taken in execution for any other debt of the owner.

This execution, or ſeiſing of lands by *elegit*, is of ſo high a nature, that after it the body of the tenant cannot be taken; but if execution can only be had of the goods, becauſe there are no lands, and ſuch goods are not ſufficient to pay the debt, a "capias ad ſatisfaciendum" may then be had, after the *elegit*; for ſuch *elegit* is in this caſe no more in effect than a "fieri facias." (Hob. 58.) So that body and goods may be taken in execution, or land and goods: but not body and land too, upon any judgment between ſubject and ſubject in the courſe of the common law. Blackſt. Comm. book iii.

ELEGY, Ελεγεια, a mournful, and plaintive kind of poem. Voſſius, after Didymus, derives the term from ἒ, ἒ, λεγειν, *to ſay alas!*

The firſt inventor of the elegy is not known: ſome ſay it was one Theocles of Naxus, or according to others, of Eretria, who, in the heat of his phrenſy, firſt produced this kind of compoſition. But there is no wonder that we are at this time in the dark as to the matter. Horace aſſures us it was a point not ſettled among the grammarians even in his time, who the author was.

> "Quis tamen exiguos elegos emiſerit auctor,
> Grammatici certant, & adhuc ſub judice lis eſt."

The chief writers of elegy among the Greeks are, Callimachus, Parthenius, and Euphorion; and among the Latins, Ovid, Catullus, Tibullus, and Propertius.

The Flemiſh have diſtinguiſhed themſelves among the moderns for this kind of Latin verſe. The elegies of Bidermann, Grotius, and eſpecially Sedronius and Vallius, ſeem worthy of the pureſt antiquity. The counteſs de la Suze has diſtinguiſhed herſelf for elegies in the French tongue.

In the Engliſh, we have nothing conſiderable of the elegiac kind, but what we have of Milton, except Hammond's love elegies, and Grey's elegy, written in a country churchyard. The elegies of Hammond have had admirers among men of great eminence in literature and criticiſm; and perhaps if we did not make an exception in favour of Grey, we ſhould offend two-thirds of the lovers of poetry in this kingdom. The Engliſh and French elegies are chiefly in Alexandrine verſes.

In proceſs of time, elegy degenerated from its original intention; and not only matters of grief, but alſo joy, wiſhes, prayers, expoſtulations, reproaches, and almoſt every ſubject, were admitted into elegy.

The office of elegy is well delivered by M. Boileau:

> "La plaintive elegie en long habits de deuil,
> Sçait, les cheveux epars, gemir ſur un cercueil:
> Elle peint des aimans la joye, & la triſteſſe;
> Flate, menace, irrite, appaiſe une maitreſſe."

> "In mourning weeds ſad elegy appears,
> Her hair diſhevell'd, and her eyes in tears:
> Her theme, the lover's joys, but more his pains;
> By turns ſhe ſings, ſooths, threatens, and complains."

The diction of elegy ought to be clean, eaſy, perſpicuous, expreſſive of the manners, tender, and pathetic; not oppreſſed with ſentences, points, &c. No apoſtrophes are allowed; and the ſenſe ought to be generally cloſed in every diſtich, or two lines; at leaſt, in Latin compoſitions.

Elegy, a kind of *nome*, or air, for flutes, in high favour with the ancients, invented by Sacadas the Argian. Rouſſeau.

ELEMENTARY, ſomething that relates to the principles or elements of bodies.

The elements of a body are alſo called the elementary principles thereof. See Principle.

The whole ſpace, included within the concave, or orbit of the moon, is called the elementary region, as being the ſeat, or ſphere, of the four vulgar elements, and the bodies compounded thereof.

Elementary *Air*, *Fire*, *Geometry*, *Muſic*. See the ſubſtantives.

ELEMENTS *of the Planets*, in *Aſtronomy*, certain quantities which are neceſſary to be known, for the purpoſe of determining the theory of their elliptic motion. (See Elliptic *Motion*.) Aſtronomers reckon ſeven of theſe quantities. The five which relate to the motion of the ellipſe are, firſt, the duration of the ſidereal revolution; ſecond, half the greater axis of the orbit; third, the excentricity, from which is derived the greateſt equation of the centre; fourth, the mean longitude of the planet at any given epoch; and, fifth, the longitude of the perihelion at the ſame epoch. The two other elements relate to the poſition of the orbit; and are, firſt, the longitude (at a given epoch) of the nodes of the orbit with the ecliptic; ſecond, the inclination of the orbit to this plane. There are thus forty-nine elements to determine for the entire ſyſtem, as will be ſeen by the table at the end of this article.

To determine the elements of the orbit of a planet by three obſervations.

The time of the revolution of the planet muſt in the firſt place be ſuppoſed known, ſo that the mean motion of the planet may be given in the intervals of the obſervations. If theſe intervals are conſiderable, the motion of the aphelion ſhould likewiſe be known, as the obſervations are ſuppoſed to relate to an ellipſe fixed and immoveable; but as in general the intervals employed are not very long, the error ariſing from the motion of the aphelion is inconſiderable.

The three obſervations ſhould be diſtant from each other about a quarter of a revolution, that is, two near the apſides, and the other nearly in the mean diſtance, or two in the mean diſtances, and the other in the apſides. The aphelion is determined with the greateſt accuracy when two longitudes are taken in the apſides, but the equation of the centre is obtained with moſt advantage by taking two obſervations in the mean diſtances, for then it is determined by the double of its value. Theſe obſervations may be taken after ſeveral entire revolutions of the planet, provided its motion, and that of its aphelion, are pretty well known. We ſuppoſe likewiſe that the excentricity is nearly known, and the place of the aphelion. (For the method of finding the former when entirely unknown, ſee Excentricity.)

The three obſervations ſhould be reduced to the plane of the orbit and not to the ecliptic: it ſhould be remarked that aſtronomers always publiſh their obſerved longitudes reduced to the ecliptic; in this caſe, therefore, a reduction is neceſſary, to have the place of the planet in its own orbit.

Theſe three longitudes, which are deſtined to determine the three principal elements of the orbit, ſhould be connected by all the known inequalities ariſing from the attractions of the other planets, and likewiſe for aberration, which always augments the longitudes of the planets in their oppoſitions.

This method may be divided into three parts. In the firſt we will ſuppoſe the excentricity known, and that we wiſh to find the place of the aphelion; in the ſecond, we change the excentricity, and deduce a new place of the aphelion; and in the third we inveſtigate, by means of a third obſervation, which of the two excentricities ought to be preferred.

The time of the revolution of the planet being ſuppoſed known, we have exactly the number of degrees of mean anomaly between the obſervations, for the mean anomaly is always exactly proportionate to the time.

But though we may always know the ſum or the difference of two mean anomalies, or two mean diſtances from the apſide, one taken on one ſide and the other on the other, it is not ſo with theſe anomalies taken ſeparately, for to determine theſe two, we ſhould know both the place of the aphelion, which is the point from which they are reckoned, and the mean place of the planet: but the obſervation gives only the true place; the excentricity muſt therefore be known, which ſerves to find the mean anomaly, the true anomaly being given.

This conſideration affords a method of diſcovering by two obſervations if the place of the aphelion of a planet, as found in the tables, is exact, ſuppoſing the excentricity known, for having two obſerved longitudes, we have (by ſubtracting the place of the aphelion) two ſuppoſed true anomalies, and muſt then compute the mean anomaly with the excentricity ſuppoſed known, by the two following proportions.

1. The ſquare root of the diſtance from the perihelion is to the ſquare root of the diſtance from the aphelion, as the tangent of half the true anomaly to the tangent of half the excentric anomaly.

2. The difference between the excentric anomaly and the mean anomaly is equal to the product of the excentricity by the ſine of the excentric anomaly.

If theſe two mean anomalies differ from each other as much as the interval requires, they are exact, and conſequently the ſuppoſed place of the aphelion correct.

If the two ſuppoſed true anomalies do not give the ſame mean anomaly as they ought to do, that is, if they do not give the ſame interval of time which is derived from obſervation, it is a proof that they are not correct, and this trial will indicate that the place of the aphelion, taken from the tables, or by conjecture, is not exact. In this caſe we muſt make another ſuppoſition, giving to the place of the aphelion a few minutes more or leſs, and recommencing the ſame calculation, and we ſhall find by the reſult of the ſecond ſuppoſition what quantity ſhould really be adopted, and what the place of the aphelion is, which muſt be adopted to repreſent the interval of the two firſt obſervations (with the known excentricity or that employed in the firſt hypotheſis.)

By *firſt hypotheſis* we mean, a ſuppoſed excentricity, with ſuch a correſponding place of the aphelion as accords with the interval between the two obſervations. To arrive at this hypotheſis it was neceſſary to take ſeveral ſuppoſitions for the place of the aphelion.

If the place of the aphelion, found by the firſt hypotheſis, was exactly determined, it is a proof that the excentricity was rightly aſſumed; for to convert true anomaly into mean anomaly the excentricity is employed as in the rules given above.

If we ſuppoſe another excentricity, and repeat the ſame computation, we ſhall have for the ſecond hypotheſis a different reſult for the place of the aphelion, employing always the ſame obſervations; in this manner we may make a table of different excentricities, and on the ſide of every one write the place of the aphelion, which correſponds to each hypotheſis of excentricity.

To determine now, which is the true excentricity that ſhould be choſen, we employ the third obſervation, which is diſtant about 90° from the other two; on which the following remark ſhould previouſly be made. The interval of time between the aphelion obſervation, and that 90° on either ſide being known, the difference between the two mean anomalies is known; but if a miſtake has been committed in the excentricity, or what is the ſame thing, in the equation of the centre, all the error will fall upon the anomaly, which is 90° from the aphelion, becauſe the equation there is the greateſt; and this error will be nothing in the aphelion obſervation, where the equation of the centre is nothing, or at leaſt very ſmall. Thus, the difference between the mean anomaly near the aphelion and the mean anomaly at 90° diſtance, will be affected by the whole of the error committed in the equation of the centre. It may be ſeen, therefore, by this difference of anomaly, what equation ſhould be employed to make the difference of anomaly equal to that computed from the elapſed time between the two obſervations, and thus the equation will be determined.

We are to take, then, the excentricity of the firſt hypotheſis with the known place of the aphelion, as determined for this firſt excentricity; we then form two true anomalies, and two true longitudes of which, one is ſufficiently diſtant from the other for the equation to be as different as poſſible. Theſe are to be converted into mean anomalies, and if the difference of theſe mean anomalies is exactly that which it ſhould be, the hypotheſis is exact, and no farther calculation is required; but it is hardly poſſible to ſucceed the firſt time in aſſuming the true excentricity. We chooſe then another excentricity, with the place of the aphelion anſwering to it, that is to ſay, the *ſecond hypotheſis*; we then examine which agrees beſt with the given interval, and by the rule of proportion, we find a third, which will exactly anſwer to the interval, or to the known difference of mean anomaly between the two obſervations. By another proportion we find, what is the longitude of the correſponding aphelion. This excentricity and aphelion will correſpond to the three obſervations, and thus the problem will be ſolved.

Example.—Suppoſe three oppoſitions of Mars obſerved in 1743, 1751, and 1753, which give the longitudes of Mars upon his orbit as ſeen from the ſun, for mean time as follows, applying to the three longitudes on the ecliptic the reductions $-17''$, $-50''$, $+13''$.

Mean time of obſervation.	Long. in orbit.	Diff. of mean Anom.
1743, 15th Feb. $19^{h}\ 17'\ 40''$	$4^{s}\ 27^{\circ}\ 16'\ 15''$	
1751, 14th Sep. 8 28 0	11 21 34 10	$6^{s}\ 21^{\circ}\ 30'\ 44''.4$
1753, 16th Nov. 10 28 33	1 24 47 37	1 26 6 50.6

The places of the aphelion, taken from Halley's tables, are $5^{s}\ 1^{\circ}\ 23'\ 37''$, $5^{s}\ 1^{\circ}\ 33'\ 37''$, $5^{s}\ 1^{\circ}\ 36'\ 9''$; from which are derived three true anomalies, $11^{s}\ 25^{\circ}\ 52'\ 38''$, $6^{s}\ 20^{\circ}\ 0'\ 33''$, $8^{s}\ 23^{\circ}\ 11'\ 28''$. Convert the two firſt into mean anomalies, aſſuming the two following hypotheſes for the excentricity, ſuppoſing it firſt 1417 parts, and next 1427, the mean diſtance of the ſun from the earth being always ſuppoſed equal to 10,000 parts.

Firſt Hypotheſis.—Take the excentricity 1417 according to the tables of Halley; the mean diſtance of Mars to the ſun being 15236.9 reduced to that, which it would be if the mean diſtance of Mars was unity, and take likewiſe the aphelion ſuch as it is in the tables; this forms the firſt ſuppoſition, the two true anomalies give theſe two mean anomalies, $11^{s}\ 25^{\circ}\ 3'\ 15''.1$, $6^{s}\ 16^{\circ}\ 35'\ 21''.6$, the difference is too great by $1'\ 22''.2$, for, according to the time elapſed between the two obſervations, it ſhould only be $6^{s}\ 21^{\circ}\ 30'\ 44''.4$ according to the tables of Halley.

In continuing the ſame hypotheſis of excentricity, make another ſuppoſition for the aphelion, by increaſing by $10'$ the place of the aphelion employed in the firſt ſuppoſition. This gives two true anomalies leſs by $10'$ than the former ones. Theſe converted into mean anomalies, are $11^{s}\ 24^{\circ}\ 51'\ 15''.5$, and $6^{s}\ 16^{\circ}\ 27'\ 0''.8$, the difference is $6^{s}\ 21^{\circ}\ 35'\ 45''.3$, that is, too great by $5'\ 1''$.

Thus by changing the aphelion $10'$, the error, which was $1'\ 22''.2$, becomes $5'\ 1''$, that is, has augmented $3'\ 38''.8$. Make this proportion,

$$3'\ 38''.8 : 10' :: 1'\ 22''.2 : 3'\ 45''.$$

To render therefore this error nothing, we muſt diminiſh the place of the aphelion $3'\ 45''$, inſtead of augmenting it $10'$.

By this calculation, we are aſſured that the excentricity, taken from the tables and employed in this firſt hypotheſis with the aphelion diminiſhed $3'\ 45''$, will ſatisfy the interval of the two obſervations.

We have now to repeat the ſame operation with another excentricity.

Second Hypotheſis.—Take the excentricity 1427 greater than that of Halley by 10 parts, ſuppoſing the greater axis to remain the ſame, and the aphelion as it is found in the ſame tables. Convert the two true anomalies into mean anomalies, which give $11^{s}\ 25^{\circ}\ 2'\ 52''.6$, and $6^{s}\ 16^{\circ}\ 34'\ 0''.2$; whoſe difference, $6^{s}\ 21^{\circ}\ 31'\ 7''.6$, is greater by $23''.2$ than the truth. Make a ſecond ſuppoſition, by augmenting the place of the aphelion $10'$, and there will reſult two other true anomalies, $11^{s}\ 24^{\circ}\ 50'\ 52''.2$, and $6^{s}\ 16^{\circ}\ 25'\ 40''.1$, whoſe difference is too great by $4'\ 3''.5$.

Thus by augmenting the place of the aphelion $10'$ in this ſecond hypotheſis of excentricity, the error, which was $23''.2$, becomes $4'\ 3''.5$, that is, has increaſed $3'\ 40''.3$. To diminiſh it, therefore, $23''.2$, or to reduce it to nothing, make this proportion $3'\ 40''.3 : 10' :: 23''.2 : 1'\ 3''.2$, which quantity, taken from the place of the aphelion of the tables, will reconcile this ſecond hypotheſis with the interval between the two obſervations.

The aphelion, therefore, of the tables diminiſhed by $3'\ 45''$ for 1417 excentricity, or diminiſhed by $1'\ 3''.2$ with 1427, ſatisfies the two firſt obſervations. It remains now, by means of the third obſervation, to determine which of theſe two hypotheſes is neareſt the truth, and to determine ſuch an excentricity and place of aphelion as ſhall repreſent the three obſervations.

The interval of time between the ſecond and third obſervation gives for the difference of mean anomaly $56^{\circ}\ 6'\ 50''.6$ according to the tables. Convert the true anomalies into mean anomalies in the ſecond and third obſervation, with 1417 excentricity, the aphelion of the tables being diminiſhed $3'\ 45''$, and next with 1427 of excentricity, the aphelion being diminiſhed $1'\ 3''.2$. The mean anomaly for the third obſervation will be, in the firſt hypotheſis, $8^{s}\ 12^{\circ}\ 46'\ 17''.8$, and in the ſecond $8^{s}\ 12^{\circ}\ 39'\ 17''.8$. Thus between the mean anomalies of the ſecond and third obſervations in the firſt hypotheſis, the difference is greater by $57''.7$ than $56^{\circ}\ 6'\ 50''.6$; and in the ſecond hypotheſis the difference is too little by $2'\ 25''.8$. Adding together theſe two differences, which are in contrary directions, it will appear that a change of $10'$ in the excentricity produces $3'\ 23''\ 5$ of variation in the motion of the mean anomaly for this interval of time, and by the ſame proportion it will be found, that $57''.7$, which is the error of the firſt hypotheſis, gives $2''.84$. We muſt, therefore, add $2'\ 84''$ to 1417, the excentricity of the firſt hypotheſis, which will give 1419.84 for the excentricity, which will repreſent equally the third obſervation, provided it is combined with a ſuitable aphelion.

To correct the place of the aphelion,

$$3'\ 23''.5 : 2'\ 41''.8 :: 57''.7 : 45''.5.$$

For ſince the firſt hypotheſis of excentricity 1417, with the place of the aphelion, diminiſhed by $3'\ 45''$, gave $57''.7$ too much, and the ſecond hypotheſis of 1427, with the place of the aphelion, diminiſhed by $1'\ 3''.2$ (that is, by $2'\ 41''.8$ leſs than in the firſt caſe,) gave $2'\ 25''.8$ too ſmall, ſo as to change the error $3'\ 23''.5$, it follows, that to correct the $57''.7$ of the firſt hypotheſis, it will be requiſite to diminiſh the aphelion by a quantity leſs by $45''.5$ than in the firſt hypotheſis, in which the correction was taken $3'\ 45''$, the difference is $2'\ 59''.5$, and it is this quantity which muſt be taken from the aphelion of the tables.

It may now be ſhewn, in the firſt place, that this excentricity, 1419.84, with the place of the aphelion diminiſhed by $2'\ 59''.5$, will repreſent the firſt interval. For we have found that 1417 of excentricity with $3'\ 45''$ of diminution in the place of the aphelion, or 1427 of excentricity, with $1'\ 3''$ of diminution in the aphelion, repreſented equally the given interval or the difference of mean anomaly of the two firſt obſervations. Hence any other excentricity with a proportionate diminution of the aphelion, will repreſent this given interval, therefore 1419.84 of excentricity, with $2'\ 59''.5$ of diminution of the place of the aphelion, will agree with the two firſt obſervations.

In the ſecond place, it may be proved, that this ſuppoſition will ſatisfy the ſecond interval, or the mean anomaly between the ſecond and third obſervations; for in the firſt hypotheſis, 1417, we found $57''.7$ too much for this difference, and in the ſecond $2'\ 25''.8$ too little, according to which proportion, 1419.84 ſhould give the true difference, which anſwers to the greateſt equation of $10^{\circ}\ 41'\ 19''$. It is not neceſſary in practice to carry the calculation to tenths of ſeconds, as the obſerved longitudes cannot be obtained nearer than $5''$.

The excentricity and place of the aphelion being found, nothing remains but to determine one mean longitude of the planet; to have the three elements required, for this purpoſe, one of the three mean anomalies may be taken as found above, for example, 11^{s} 25° 6' 43''.6, and add the place of the aphelion of the tables, diminiſhed by 2' 59''.5, according to the laſt reſult, and the mean heliocentric longitude of Mars in his orbit will be 4^{s} 26° 27' 21'' for the moment of the firſt obſervation, which exceeds the tables of Halley 9''.

The following table of the elements of the planets is taken from the laſt edition of La Place's "Syſteme du Monde."

Table of the Elements of the planetary Orbits from La Place.

Duration of their ſeveral revolutions.

Mercury	$87^{d}.969255$		87^{d}	23^{h}	15'	44''
Venus	224.700817		224	16	49	11
The Earth	365.256384	1^{y}	0	6	9	8
Mars	686.979579	1	321	23	30	35.6
Jupiter	4332.602208	11	317	14	27	10.7
Saturn	10759.077213	29	174	1	51	11.2
Uranus	30689.000000	84	29	0	0	00

Semi-major axes of their orbits, or their mean diſtances.

Mercury	0.387100
Venus	0.723332
The Earth	1.000000
Mars	1.523693
Jupiter	5.202792
Saturn	9.540724
Uranus	19.183620

Proportion of the excentricity of the ſemi-major axes, for the beginning of the year 1750.

Mercury	0.205513
Venus	0.006885
The Earth	0.016814
Mars	0.093088
Jupiter	0.048077
Saturn	0.056223
Uranus	0.046683

The ſecular variations of this proportion, (the ſign — indicates a diminution.)

Mercury	0.000003369
Venus	—0.000062905
The Earth	—0.000045572
Mars	0.000090685
Jupiter	0.000134245
Saturn	—0.000261553
Uranus	—0.000026228

The mean longitudes at the commencement of 1750. Theſe longitudes are reckoned from the mean vernal equinox at the epoch of the 31ſt of December, 1749, at noon, mean time at Paris:

Mercury	281°.3194	253°	11'	14''.8
Venus	31.4963	46	20	48.0
The Earth	311.1218	280	0	34.5
Mars	24.4219	21	58	46.9
Jupiter	4.1201	3	42	29.0
Saturn	257.0438	231	20	21.9
Uranus	353.9010	228	33	53.6

Longitudes of the perihelion at the beginning of 1750.

Mercury	81°.7401	73°	33'	57''.9
Venus	141.9759	127	46	41.9
The Earth	309.5790	278	37	15.9
Mars	368°.3005	331°	28'	13''.6
Jupiter	11.5012	10	21	3.8
Saturn	97.9466	88	9	6.9
Uranus	185.1262	166	36	48.8

The ſidereal and ſecular motion of the perihelion. (The ſign — indicates a retrograde motion.)

Mercury	1735''.50	9'	22''.3
Venus	—699.07	3	46.4
The Earth	3671.63	19	49.6
Mars	4834.57	26	6.4
Jupiter	2030.25	10	57.8
Saturn	4967.64	26	49.5
Uranus	759.85	4	6.1

The inclination of the orbit to the ecliptic at the beginning of 1750.

Mercury	7°.7778	7°	00'	00''
Venus	3.7701	3	23	35
The Earth	0.0000	0	00	00
Mars	2.0556	1	51	00
Jupiter	1.4636	1	19	2
Saturn	2.7762	2	29	54
Uranus	0.8599	0	46	26

The ſecular variation of the inclination to the true ecliptic.

Mercury	55''.09	17''.50
Venus	13.80	4.47
The Earth	0.00	0.00
Mars	—4.45	—1.4
Jupiter	—67.40	—21.8
Saturn	—47.87	—15.5
Uranus	9.38	3.0

The ſidereal and ſecular motion of the node upon the true ecliptic.

Mercury	—2332.''90	12'	35''.8
Venus	—5673.60	30	38.2
The Earth	0000.00	0	00.0
Mars	—7027.41	37	58.0
Jupiter	—4509.50	24	21.0
Saturn	—5781.54	31	13.2
Uranus	—10608.00	57	16.9

Longitude of the aſcending node upon the ecliptic at the beginning of 1750.

Mercury	50°.3836	45°	20'	42''.8
Venus	82.7093	74	26	18.0
The Earth	0.0000	00	00	00 0
Mars	52.9377	47	38	38.0
Jupiter	108.8062	97	55	32.0
Saturn	123.9327	111	32	21.9
Uranus	80.7015	72	37	52.8

In the hiſtory of aſtronomy, publiſhed in the Connoiſſance des Temps for 1809, we find the following ſhort abſtract relating to the elements of the planet Veſta.

On the 25th of April, 1807, M. Burckhardt read in the claſs of ſciences a note, in which he gave the firſt ſketch of the orbit of Veſta. According to the firſt calculations the ſemi-major axis, or the mean diſtance, would be 2.6, that is to ſay, rather more than twice and a half the diſtance of the earth from the ſun; the excentricity 0.16; the place of the perihelion 248°; that of the node 107°; finally, the inclination 7°.

Mere-

More recent inveſtigations gave him 2.36 for the ſemi-major axis; 250° 20′ for the place of the perihelion; 103° 19′ 40″ for the place of the node; 7° 7½′ for the inclination; and finally, 0.093 for the excentricity.

While M. Burckhardt was calculating the elements, which we have juſt given at Paris, and to bring them to perfection, was occupied in determining the perturbations, without which only approximation for a ſhort interval can be obtained, M. Gauſs loſt no time in ſketching the orbit of a planet to which he had given a name, and which appears to be univerſally adopted.

He then found for the mean longitude on the 29th of March, at midnight, mean time on the meridian of Bremen 193° 8′ 5″; the perihelion 249° 7′ 41″; the node 103° 8′ 36″; the inclination 7° 5′ 50″; the excentricity 0.097505; and finally, the mean diſtance 2.359604.

A ſecond trial gave him 192° 9′ 54″; 249° 57′ 52″; 103° 18′ 54″; 7° 8′ 7″; 0.087223; and the mean diurnal tropical motion 980″.707.

Theſe elements, compared with ſixty-eight obſervations, have only ſhewn very ſlight errors. We find, from the journal of M. de Zach, September 1807, that according to the new inveſtigations of M. Gauſs, theſe elements have undergone ſome ſlight modifications, as follow:

192° 23′ 30″; 249° 50′ 32″; 103° 18′ 28″; 7° 8′ 11″; 0.085505; and 2.355135, with a diurnal motion of 981″.8459.

At the end of theſe elements we find, in the ſame work, a compariſon made by M. Gauſs of its ſecond orbit, with twenty-two obſervations by M. Bouvard; the errors do not amount to 17″ in right aſcenſion; they are generally ſmaller in declination, except on the 21ſt of April, where it is evident that an error of 1′ has crept into the Paris obſervations.

The following are the elements of the other new planets, Ceres, Pallas, and Juno, for the 1ſt of January, 1805.

	Inclination of the orbit.	Place of the aſcending node.	Mean diſtance.	Excentricity.	Mean diſtance in millions of miles.	Place of the aphelion.	Mean place of the planet.
Ceres	10° 38′	2ˢ 21° 7′	27670	2170	263	10ˢ 20° 2′	1ˢ 0° 12′
Pallas	34 38	5 22 31	27650	6800	263	10 1 3	0 18 13
Juno	13 4	5 21 4	26640	6770	253	7 23 11	1 12 33

Elements, in *Chemiſtry*. It neceſſarily happens in every department of human ſcience that the ſpirit of philoſophizing or generalizing outruns the careful inveſtigation of facts. A few prominent circumſtances are firſt noticed, the imagination is ſtruck with their reſemblance to each other; their characteriſtic differences are neglected, and, as it is natural to attribute ſimilar effects to the ſame operating cauſe, a general principle or theory is invented, and thus originates the firſt germ of ſcience. The advantage of thus claſſifying a number of otherwiſe independent facts is great; the memory is aſſiſted, the imagination is engaged, and in the attack or defence of a brilliant hypotheſis the mind is more intereſted, and more eaſily induced to perſevere than it would be by the gradual and laborious inveſtigation of ſimple truth.

The ſcience of chemiſtry, on account of its vaſt extent, and the number of ſtriking analogies and reſemblances that it preſents, has been peculiarly fruitful in hypotheſes, ſome of which have been partial and others general. Of the latter kind are thoſe ſpeculations concerning the elementary principles of ſubſtances, which occupied ſo much of the attention of the ancient chemiſts. The univerſe itſelf (and therefore all chemical ſubſtances) was ſuppoſed to be formed of the four elements; but, without carrying the hypothetical analyſis of bodies to their utmoſt extent, there appeared to be a number of intermediate principles to which all chemical phenomena were referred by the early inveſtigators of this ſcience. Thus, all inflammable ſubſtances were ſuppoſed to be compounded of a common inflammable element, called at firſt ſulphur, and afterwards phlogiſton, to which their generic characters were owing, united in different bodies to different ſubſtances, from which were derived their ſpecific diſtinctions. Thus alſo, all ſalts were ſuppoſed to contain a common ſaline principle; and all metals a mercurial or metalline principle. Modern chemiſtry, however, does not acknowledge any particular number of elements, but freely admits into this claſs all ſubſtances that have not hitherto been decompoſed. An element, therefore, in the preſent meaning of the term, is merely one of the laſt reſults of chemical analyſis, and hence the number of elements muſt be continually fluctuating, according to the progreſſive advance of experimental ſcience.

Element, in the ſcience of *Elocution*, is the general name of any ſimple enunciated ſound, (ſee Enunciation,) of which a letter may be ſet down as the arbitrary or viſible ſign. Elements differ both from the letters that repreſent them, and from the names of thoſe letters, in the ſame reſpect (though not in both caſes, from the ſame neceſſity) as a *tree*, or a *man*, differs both from the ſound of the *words*, man and tree, and the *forms of the letters*, of which the words are reſpectively compoſed.

Part of this diſtinction is ſufficiently obvious. No one is in any danger of ſuppoſing any reſemblance between the ſound preſented to the ear and the picture preſented to the eye. It would be well if the other not leſs important diſtinction were as ſtrongly impreſſed, and a conſequent practice were adopted, of aſſociating, in the firſt inſtance, with the *form of the letter*, not the *name* of that letter, but its *elemental* ſound: for what connection, for example, can there poſſibly be between the names *double you* and *tee-aitch*, and the actual ſounds uſually aſſigned to the letters W and Th? [And the ſame might evidently be ſaid of the Eupſilon Υ, Theta Θ, Sigma Σ, &c. of the Greek, and of many of the letters of every known alphabet, of ancient and modern times.] And what inconvenience muſt not inevitably reſult from the awkward and impertinent intervention of the complicated names of theſe letters, between the arbitrary ſign and actual ſound, which ought to be immediately aſſociated in the infant mind. Some judicious private teachers have of late ventured to reform, in ſome degree, this abuſe, by keeping their pupils unacquainted with the cuſtomary *names* of the letters, till the aſſociation between the forms and the elementary ſounds became familiar; and a laudable (though perhaps imperfect) attempt has been made by Miſs Edgeworth, in her "Rational Primmer,"* to generalize a practice ſo commendable. Still, however, as in all the inſtances that have fallen within the obſervation of the writer of this article, the practice of theſe commendable innovators has not gone ſo far as to give to their pupils the *naked ſound* of the conſonants, (which in every one of them but the three abſolute mutes, it is contended, is clearly practicable,) without ſome portion, initial or terminative, of vowel ſound. All that in reality has been effected is to give to the generality of the letters names more ſimple, and more approximate to the elementary ſound, than thoſe that are uſually given to the alphabetic characters. It will be ſhewn hereafter, that ſomething more is neceſſary, in order to ſecure all the advantages that might be derived from this innovation in the ſyſtem of elementary inſtruction.

Elements, like letters, (though not to the ſame extent,) differ in their number, in different languages; ſcarcely any (if any) language availing itſelf of all the modifications of elementary ſound, which the organs of enunciation, by the nice diverſities of action and poſition, are capable of producing. The Engliſh elements repreſented by V and Th, for example, being deficient in ſome languages, while certain guttural ſounds, familiar enough, not only in ſome parts of the continent, but even to the Highlander and the native of North Wales, are perfectly unknown in the ſouthern parts of England; though their ſigns are ſtill preſerved in our written language. See Consonant.

For anatomical definitions of the reſpective elements, ſee the reſpective titles, Vowel, Liquid, Semi-Liquid, Sibilant, Semi-Sibilant, Aspirate, and Mute; alſo, Lingual, Labial, Guttural, and Nasal. The learned reader may conſult, among others, upon this ſubject, Dionyſius Halicarnaſſenſis ("De Comp. Verb.") and Dr. John Wallis ("Grammatica Linguæ Anglicanæ"); and the Engliſh reader will do well to read with attention the Grammar of old Ben Jonſon, and, with caution, the "Analyſis of Articulate Sounds," among the additional notes to Dr. Darwin's "Temple of Nature." Thoſe who are particularly intereſted in the ſubject may alſo conſult Dr. Holder's "Elements of Speech," Lond. 1669, a ſcarce, but valuable tract; and a neglected book, bearing the ſame title, 1773, by the late John Herries. Among theſe, and ſome other writers upon the formation or anatomy of the elements, ſome differences and contradictions will be found; partly, perhaps, accountable from provincial or other peculiarities in the pronunciation of the writers themſelves; but, ſtill more, from non-obſervance of the varieties exiſting in the conformation of the mouths and organs of different ſpeakers, and the conſequent neceſſity of correſponding differences of action and poſition for the formation of the ſame element. In the theory of the formation of ſeveral of the more difficult elements of ſpeech, as in many other reſpects, he who, from an individual inſtance, haſtily proceeds to draw general concluſions, or lay down general rules, will frequently be found to be only poſitive in error, while he thinks himſelf moſt luminous in the demonſtration of practical truth. Mr. Thelwall who, for ſeveral years, has been practically employed both in the inveſtigation of theſe topics, and in the application of his principles to the removal of every ſpecies of imperfection in human utterance, has, in his unpubliſhed lectures, introduced a claſſification and ſeries of definitions, differing in many particulars, as to the poſitions and actions of the organs, from thoſe of Dr. Darwin; and aſcribing to ſome miſtakes in the theory of that celebrated phyſiologiſt a part, at leaſt, of the impediment by which his utterance was notoriouſly obſtructed. Theſe definitions, not being elſewhere extant in any printed form, will be inſerted in this work under the titles of their reſpective claſſes above referred to. According to the doctrines of this profeſſor, (ſee a ſpecies of Elementary Horn Book prefixed to a volume of Selections, &c.) of all the letters of our alphabet, three only, t, k, and p, are to be regarded as *pure conſonants*, (according to vulgar definition,) or *mute ſtops*. "All the others are elements of quantity, and capable of duration and tune (except s = c *ſoft*, ch, ſh, th̆, and fh, which, though they have quantity, have no tune). They may, therefore, be partially ſounded without the addition of any vowel; and the ſtudent is recommended to habituate himſelf ſo to ſound them, in the firſt inſtance; and then to write them out, in cadences, in combination with all the reſpective vowels with which they can enter into compoſition, both as initials and as terminatives, and to exerciſe himſelf in thoſe combinations in the ſame way."

To the uninitiated there may be ſome difficulty in realizing this theory, with reſpect to ſome of the elements here maintained to be ſuſceptible of independent ſound: but, under proper directions, the difficulty is ſurmountable, and the experiment will be found practically important, not only in the removal of impediments, but in the improvement of the grace, force, and harmony of utterance.

Elements, in the *Higher Geometry*, are the infinitely ſmall parts, or differentials, of a right line, curve, ſurface, or ſolid. Thus, (*Plate* II. *Analyſis, fig.* 27.) the ſmall ſpace PM*mp*, formed by the two ordinates, PM, *pm*, infinitely near each other, and the arc M*m* of the curve, is the element of the ſpace APM, P*p* is the element of the abſciſſe AP, M*m* that of the curve AM, &c. See Differential, Fluxion, &c.

Elements, in *Phyſics*, the firſt principles or ingredients of which all bodies are compoſed.

The natural operations which commonly occur within the cognizance of our ſenſes, and in a more particular manner the analytical proceſſes of the chemiſts, ſhew that certain ingredients, preciſely of the ſame kind, are yielded by compound bodies of different kinds. Thus water is obtained from vegetables, from animal bodies, and from certain minerals; an earthy or unevaporable ſubſtance is obtained from the ſame bodies, and ſo forth. This naturally ſuggeſted the idea, that all bodies conſiſted of certain primitive and homogeneous ſubſtances, to which philoſophers and chemiſts gave the name of *elements*, or *elementary bodies*. Therefore the elements are ſuppoſed to be the ſimpleſt bodies of the univerſe; which, whilſt they themſelves are not reducible into more ſimple components, form, by their combination in different number and various proportion, all the compound bodies that belong to the globe we inhabit.

So far the idea is natural and generally received; but the determination of the number, as well as of the nature, of theſe elements, has always been, and will probably long continue to be attended with great difficulty. Various opinions have been entertained, and various hypotheſes have been advanced, concerning the elements; ſome of which have been ſuggeſted by reaſoning entirely upon ſuppoſitions, whilſt others have, in great meaſure, reſted upon a firmer baſe; namely, the reſult of experiments. Of theſe opinions, and of theſe reſults of experimental inquiries, we ſhall now ſelect the beſt.

Epicurus thought that all bodies were modifications of one homogeneous primary ſubſtance, whoſe particles were of a particular figure, ſolid, and in their nature unalterable; and that they only required to be arranged in this or that other manner, in order to compoſe the various bodies of the univerſe. But the conſtant and unalterable properties of a great number of bodies, peculiar to each and diſſimilar from others, render this hypotheſis highly improbable; for we find that gold, iron, mercury, &c. though diſſolved, reduced, hammered, mixed, ſeparated, and ſo forth, can never be converted into other bodies, but each of them may always be reduced to its original nature; that is, the iron into iron, the gold into gold, &c. which could hardly take place if the identical elementary ſubſtance formed them all.

Certain authors make a difference between elements and principles; but it is difficult to form a clear idea of their meaning. *Principle*, they ſay, as matter, is a kind of incomplete nature, but *element* is a perfect or complete one.

Another queſtion has likewiſe been much diſcuſſed among the philoſophers of antiquity; namely, whether the elements were corruptible or incorruptible; and it is difficult to conceive how the defenders of the former could poſſibly ſupport a doctrine ſo very contradictory; for if corruptibility means a decompoſition, (and it ſeems that no other idea can be formed of it,) a corruptible element is the ſame thing as a decompoſible indecompoſible ſubſtance. If by the word corruptibility they meant ſomething elſe, we muſt acknowledge our ignorance of their meaning. It is farther to be remarked, that ſome of thoſe philoſophers admitted one corruptible element, whilſt others admitted more than one. Of the former, the principal are Heraclitus, who held fire; Anaximenes, air; Thales Mileſius, water; and Heſiod, earth; as the only element. Heſiod is followed by Bernardin, Teleſius; and Thales, by many of the chemiſts.

Among thoſe who admit ſeveral corruptible elements, the principal are the Peripatetics; who, after their maſter Ariſtotle, contend for four elements; *viz.* fire, air, water, and earth. Ariſtotle took the notion from Hippocrates; Hippocrates from Pythagoras; and Pythagoras from Ocellus Lucanus, who ſeems to be the firſt author of the dogma.

The Carteſians only admit three elements; which they pretend are all that could ariſe from the firſt diviſion of matter. See CARTESIAN *Philoſophy*.

Paracelſus and his followers attempted to eſtabliſh four elements, which they called *ſalt*, *ſulphur*, *earth*, and *mercury*. And ſome chemiſts, rejecting the laſt, retained only three, *viz.* *ſalt*, *ſulphur*, and *mercury*; but their expreſſions are ſo very indefinite and perplexed, as by no means to convey any diſtinct and ſatisfactory idea.

The late diſcoveries relative to the aerial, or permanently elaſtic fluids, (which ſhewed that thoſe fluids conſiſt of certain baſes, expanded and rendered elaſtic principally by their union with heat; alſo that heat renders ice fluid, water elaſtic, mercury volatile, &c.) produced a new and ſingular opinion reſpecting the elements, which was adopted by ſeveral philoſophers, and particularly by the count de Treſſon, in his Eſſay on the electric fluid. According to this doctrine, two primitive material ſubſtances are ſuppoſed to exiſt in nature; one that inceſſantly acts, and to which it is eſſential to be in motion; the other abſolutely paſſive, and whoſe nature it is to be inert, and move intirely as directed by the former. The active principle has, by ſome, been ſuppoſed to be a certain fluid or element, which, according to its various modifications, they thought, produces *light*, or *heat*, or *electricity*. The other principle has not been attempted yet to be defined. We need not endeavour to give a formal refutation of this doctrine, which is evidently too indefinite and inſufficient.

Our great ſir Iſaac Newton, conſidering the primary elements of bodies on the atomical ſyſtem (ſee ATOMICAL *Philoſophy*), ſays, that all things duly regarded, it ſeems probable, that God in the beginning formed matter in ſolid, maſſive, hard, impenetrable, moveable particles, of ſuch ſizes and figures, and with ſuch other properties, and in ſuch proportion to ſpace, as moſt conduced to the end for which he formed them; and that theſe primitive particles, being ſolids, are incomparably harder than any porous bodies compounded of them; even ſo very hard as never to wear out; no ordinary power being able to divide what God made one in the firſt creation. While the particles remain entire, they may compoſe bodies of one and the ſame nature and texture in all ages; but ſhould they wear away, or break in pieces, the nature of things, depending on them, would be changed; water and earth, compoſed of old worn particles, and fragments of particles, would not be of the ſame nature and texture now, with water and earth compoſed of entire particles in the beginning. And, therefore, that things may be laſting, the changes of corporeal things are to be placed only in the various ſeparations, and new aſſociations and motions, of thoſe permanent particles; compound bodies being apt to break not in the midſt of ſolid particles, but where thoſe particles are laid together, and only touch in a few points. It ſeems to him likewiſe, that theſe particles have not only a *vis inertiæ*, with the paſſive laws of motion reſulting therefrom, but are alſo moved by certain active principles; ſuch as is gravity, and that which cauſes fermentation, and the coheſion of bodies. See COHESION, EARTH, FERMENTATION, GRAVITY, and PRINCIPLE.

Of all theſe opinions, that of the four elements, under the names of *fire*, *air*, *earth*, and *water*, has been more generally adopted, and has prevailed for a much longer time; until towards the latter end of the laſt century, Dr. Higgins, in his work upon Light, attempted to increaſe their number from four to ſeven; but the great improvements in chemiſtry which followed ſoon after, (having decidedly ſhewn that water and the atmoſpherical air are compound bodies,) produced a total change of opinion relative to the elements; in conſequence of which the ſcientific perſons of the preſent day acknowledge for elements not thoſe which are ſuggeſted by their fanciful ſuppoſitions, but thoſe which they are not able to decompoſe.

According to this new ſyſtem, both philoſophers and chemiſts in coalition, (for they are both inquirers into the works of nature;) rejecting the example of their predeceſſors, endeavour to expreſs themſelves in a manner more conſonant with truth, and better authorized by the reſult of experiments. In the firſt place, they acknowledge that they are ignorant of the real number of elementary ſubſtances. Secondly, they conſider as elements all thoſe bodies which no known proceſs has been able to decompound; that is, to reduce into ſimpler bodies; allowing, at the ſame time, that this want of actual or practical decompoſition at preſent does not imply that a certain ſubſtance is abſolutely an element; for by a new method of decompoſition, that ſubſtance which has long been conſidered as an element, may be found to be a compound body; and, in fact, ſuch diſcoveries are now frequently made. Alſo, certain bodies which have at one time been looked upon as diſtinct from each other, have afterwards been found to be of the very ſame nature. Therefore, under the denomination of elements we muſt now underſtand all thoſe bodies which differ from each other in ſome eſſential property, and which have not as yet been reduced into ſimpler bodies.

The liſt, which follows, contains all the elementary bodies which were acknowledged as ſuch ſoon after the commencement of the preſent century. We ſhall then add all the material alterations, which the diſcoveries made during the few years that have ſince elapſed, have neceſſarily introduced.

Elementary ſubſtances.

Light,
Caloric, or calorific,
The electric fluid,
The magnetic fluid,
Oxygen,
Hydrogen,
Azote,
Carbon,
Sulphur,
Phoſphorus,
Radical muriatic,
Radical boracic,
Radical fluoric,
Radical ſuccinic,
Radical acetic,
Radical tartaric,
Radical pyro-tartaric,
Radical oxalic,
Radical gallic,
Radical citric,
Radical malic,
Radical benzoic,
Radical pyro-lignic,
Radical pyro-mucic,
Radical camphoric,
Radical lactic,

Radical ſach-lactic,
Radical formic,
Radical Pruſſic,
Radical ſebacic,
Radical bombic,
Radical laccic,
Radical ſuberic,
Radical zoonic,
Pot-aſh,
Soda, } The *Alkalies*.
Ammonia,
Gold,
Platina,
Silver,
Mercury,
Copper,
Iron,
Tin, } The *Metals*.
Lead,
Nickel,
Zinc,
Biſmuth,
Antimony,
Cobalt,
Mangaueſe,

Arſenic,
Tungſten,
Molybdenum,
Chrome,
Columbium,
Tantalium,
Uranium, } *Acidifiable.*
Tellurium,
Titanium,
Oſmium,
Palladium,
Rhodium,
Iridium,
Lime,
Magneſia, } *Alkaline.*
Strontites,
Barytes,
Silex, } The *Earths*.
Alumine,
Yttria,
Glucina,
Zirgonia, and.
Aguſtina.

The firſt four of theſe elements may with propriety be called hypothetical. Theſe are, *light*, or that fluid which renders objects perceivable by our eyes; *caloric*. or that fluid which is ſuppoſed to produce the phenomena of heat, *viz.* to affect us with the ſenſation of heat; the *electric fluid*, which is ſuppoſed to produce the phenomena called *electrical*; and the *magnetic fluid*, to which the properties of the magnet are attributed; for, in truth, the phenomena which fall under each of thoſe four denominations, are only *ſuppoſed* to be the effects of a ſingle fluid; reſpecting the nature of which, however, various opinions are entertained. See the articles under their denominations of HEAT, LIGHT, ELECTRICITY, and MAGNETISM.

Several of the above radicals appear, in conſequence of various experiments, to be of the ſame nature; but as this cannot be made to appear without the detail of the experiments, we muſt refer the reader to the articles of their particular names.

A very great alteration has been produced reſpecting the alkalies by the recent and capital diſcoveries of Mr. Davy, who has found that every one of the three alkalies is a compound body. The pot-aſh conſiſts of a metallic ſubſtance, which he has called *potaſium*, and oxygen; the ſoda conſiſts of another metallic ſubſtance, which he has called *ſodium*, and oxygen: ſo that pot-aſh and ſoda are two metallic oxyds. Therefore in conſequence of this diſcovery, the two alkalies, *viz.* pot-aſh and ſoda, muſt be ſtruck out of the liſt, and two new metallic ſubſtances, *viz. ſodium* and *potaſium*, muſt be placed amongſt the other metals. The components of *ammonia* have not been as yet exactly aſcertained, though no doubt remains of its being a compound ſubſtance.

Some of the earths, and eſpecially the alkaline earths, as they are commonly called, have given ſtrong indications of their being compound bodies, and of a metallic nature; but we muſt refer the reader to the articles of their peculiar names for farther particulars.

A new metallic ſubſtance was lately ſaid to have been diſcovered in tungſten, and is deſcribed under the name of *cerium* by Hiſinger. Dr. Wollaſton has very lately diſcovered, that the two metallic ſubſtances *columbium*, and *tantalium*, are one and the ſame thing; ſo that one of theſe names muſt now be ſtruck out of the liſt of metals.

ELEMENTS are alſo uſed, figuratively, for the grounds and principles of arts and ſciences.

Thus we ſay, letters are the elements of ſpeech: he does not know the firſt elements of grammar.

The ELEMENTS of mathematics have been delivered by ſeveral authors in their courſes, ſyſtems, &c. The firſt work of this kind is that of Peter Herigon, in Latin and French, publiſhed in 1664, in ten tomes; wherein are contained the elements of Euclid, Euclid's Data, Apollonius Pergæus, &c. with the elements of arithmetic, algebra, trigonometry, architecture, geography, navigation, optics, ſpherics, aſtronomy, muſic, perſpective, &c. The work is remarkable for this, that, throughout, a kind of real and univerſal characters is uſed; ſo that the demonſtrations may be underſtood by ſuch as only remember the characters, without any dependence on language or words at all.

Since Herigon, the elements of the ſeveral parts of mathematics have been laid down by others, particularly the Jeſuit Schottus, in his Curſus Mathematicus, in 1674; Sir Jonas Moor, in his New Syſtem of Mathematics, in 1681; De Chales, in 1674; Ozanam, in his Cours de Mathematique, in 1699; and, above all, Chriſt. Wolfius, in his Elementa Matheſeos Univerſæ, in two vols. 4to. the firſt publiſhed in 1713, and the ſecond in 1715; a work held in high eſtimation. There has been another edition of this excellent work publiſhed at Geneva, in five volumes in quarto; the firſt volume in 1732, the ſecond in 1733, the third in 1735, the fourth in 1738, and the fifth in 1741.

The Elements of Euclid are the firſt and beſt ſyſtem of geometry. We have abundance of editions and comments on the fifteen books of Euclid's Elements. Orontius Fineus firſt publiſhed the firſt ſix books in 1530, with notes, to explain Euclid's ſenſe. The like did Peletarius in 1557. Nic. Tartaglia made a comment on all the fifteen books about the ſame time, with the addition of ſome things of his own; and the like did Fran. Fluſſates Candalla, a noble Frenchman, in the year 1578, with conſiderable additions, as to the compariſon and inſcriptions of ſolid bodies; which work was afterwards republiſhed, with a prolix comment, by Clavius, whoſe edition has ſince been reprinted, at various places and times.

Dr. Gregory publiſhed an edition of all Euclid's works, including his Elements, in Greek and Latin, in 1703, fol. But as the whole fifteen books do not ſeem neceſſary, eſpecially for young mathematicians, ſome authors have choſen only the firſt ſix, with the eleventh and twelfth at moſt. It would be endleſs to relate the ſeveral editions hereof: there is a French one of De Chales, and a Latin one of And. Tacquet; the beſt edition of the former of which is that of Paris, in 1709, by Ozanam; and of the latter, that of Cambridge, in 1703, by Mr. Whiſton. Mr. T. Simpſon's Elements of Geometry is an excellent compendium of this kind; and Dr. Simpſon of Glaſgow publiſhed, in 1756, a Latin edition of the ſix firſt, and eleventh and twelfth books of Euclid, with notes.

ELEMI, or ELEMY, in *Pharmacy*, a pellucid reſin, of a whitiſh colour, intermixed with yellowiſh particles, and often much of the colour and conſiſtence of wax; of a pretty briſk bitter, though not diſagreeable taſte; and a ſmell ſomewhat like that of fennel.

It is uſually called gum elemi, though very improperly, inaſmuch as it takes fire readily enough, and diſſolves in oleaginous liquors, which are the characters of a reſin, not a gum. It totally diſſolves in rectified ſpirit of wine; and in diſtillation with water, ſixteen ounces of gum yield one ounce of eſſential oil. It flows from inciſions made in the trunk and large branches of a large and tall tree, of the olive kind, growing in Ethiopia and Arabia Felix. It is alſo found in Apulia, a province in the kingdom of Naples. See AMYRIS.

Pomet in his Hiſtory, and Lemery in his Dictionary of Drugs, deſcribe elemi as a white reſin, bordering on green, odoriferous, and brought from Ethiopia, in cakes of two or three pounds a-piece, and uſually wrapped up in the leaves of the Indian cane.

It is excellent in diſeaſes of the head; and is proper to digeſt, reſolve, and ſuppurate. It is held a kind of natural balſam; and is ſovereign in the cure of all ſorts of wounds.

One of the beſt officinal digeſtives, commonly called the ointment or liniment of Arcæus, conſiſts of ſix parts of the elemi, five or ſix of turpentine, and twelve of lard, or a mixture of lard and ſuet melted together.

The true gum elemi is that above deſcribed; but there are ſeveral ſpurious ſorts, ſome natural, and others factitious, frequently ſold for it.

The factitious, or counterfeit, is uſually made of reſin waſhed in oil of aſpic: though the ill ſmell, and white colour of this might eaſily diſcover the fraud. The natural gums, obtruded from elemi, are,

1. A gum brought from the American iſlands, in cags of different weights, covered up with the leaves of a plant unknown in Europe.

The ſecond may be taken for common reſin, but for its ſmell, which is ſomewhat ſweeter, and more aromatic.

The third is of an aſh colour, bordering on brown, brought over in large pieces, and very dry and friable.

Pomet does not take any of theſe for different genuine gums, but rather ſuppoſes them to be originally elemi, only impure, and coarſe, ſince melted down, and made up by the fire..

ELENCHUS, in *Antiquity*, a kind of ear-rings ſet with large pearls.

ELENCHUS, Ελεγχος, in *Logic*, by the Latins called *argumentum*, and *inquiſitio*, is a vicious or fallacious argument, which deceives under the appearance of a truth; the ſame with what is otherwiſe called *ſophiſm*.

ELEOCARPUS, in *Botany*. See ELÆOCARPUS.

ELEOSACCHARUM. See ELÆOSACCHARUM.

ELEOSELINUM, in *Botany*, a name by which ſome authors have called the paludapium or ſmallage. Ger. Emac. Ind. 2.

ELEPHANT, in *Zoology*. See ELEPHAS.

ELEPHANT, *Elephas*, gives the denomination to an ancient and honourable military order, conferred by the kings of Denmark on none but perſons of the higheſt quality and extraordinary merit.

It is called the "order of the Elephant," from its badge, which is an elephant with a caſtle on its back, ſet with diamonds, and hung on a watery ſky-coloured ribband, like the George in England.

There are different ſentiments as to the origin and inſtitution of this order; the firſt is that of Mennenius and Hoepingius, who attribute it to Chriſtian IV. who was elected king in 1584. The ſecond, that of Selden and Imhof, who derive it from Frederic II. elected in 1542. Gregorio Leti goes back as far as Frederic I. who reigned about the year 1530. Bernard Robolledus will have king John to be the author, who began to reign about 1478. Anſhelmius, Roſſærus, and Loeſcher, hold it to have had its riſe under Chriſtian I. father of Frederic I. Laſtly, Voigtius, Becman, and Bircherodius, maintain Canutus VI. to have been the firſt inſtitutor; and the occaſion thereof to have been the croiſades. This prince, according to the chronology of Swaining, reigned towards the cloſe of the twelfth century, from the year 1168 to 1191. This, at leaſt, we are certain of, that the order was ſubſiſting in the year 1494; there being a painting ſtill extant, done that year by count Reinden, a knight of this order. And we have even authentic evidences of the marquis of Mantua's being created knight of the ſame order by Chriſtian I. in 1474. There are bulls of pope Pius II. and Sextus IV. confirming the ſtatutes of the order, authorizing the holding of aſſemblies, or chapters, in the chapel of Roſchild, and ſettling the privileges of the knights. Edmondſon ſays, that it was inſtituted in 1478 by Chriſtian I. king of Denmark, on the marriage of his ſon John with Chriſtina, daughter of Erneſt, duke of Saxony.

The order was firſt called the "order of St. Mary," *ordo S. Mariæ*; though it ſeems to have had the appellation of the Elephant as early as Chriſtian I.: witneſs the figure of an elephant ſo often ſtruck on his coins, medals, &c.

The manner of its inſtitution is thus related: king Canutus having ſent a fleet againſt the Saracens in 1189, which took Siluma and Ptolemais, a gentleman among the Daniſh croiſees killed an elephant; in memory of which extraordinary accident the order was erected. This account is rendered the more probable by this; that it is referred to an era, when nothing was more common than to take the ſpoils of a vanquiſhed enemy for armories or cognizances; and accordingly, ſome of the principal arms of the like kind now on foot, *e. gr.* the lions of the Low-Countries, had their riſe at the time of the croiſades, as is ſhewn by Heuterius and Hoepingius; which circumſtances greatly corroborate the opinion of thoſe who aſcribe the order to king Canutus.

The collar of the order is of gold, compoſed of elephants and towers alternately, enamelled proper: to the front of the collar is pendent an elephant, with a caſtle on his back, alſo a man, all enamelled proper: and on the ſide of the elephant a croſs of Danebrog in diamonds. The knights all wear the badge pendent to a ſky-blue ribband, which paſſes ſcarfwiſe over the left ſhoulder to the right hip. See the abbot Juſtiniani, Hiſt. de tutti gl'Ord. Milit. e Caval. tom. ii. cap. 72.

The chapel of Roſchild was founded by Chriſtian I. for the aſſemblies or chapters of this order to be held in. It was firſt called the "Chapel of the Three Kings," *Capella Trium Regum*; afterwards Frederick I. gave it the name of the "Royal Chapel."

The order was reſtored by Frederic II. who created abundance of knights at the ceremony of his coronation, which is the only time when the Daniſh kings made any knights of the Elephant. Chriſtian V. augmented and enriched it very conſiderably. In the year 1694, a grand chapter of the order was held at Fredericſburg, in the chapel of the knights, wherein ſix German princes were admitted into the order.

We have a multitude of writings on the ſubject of this order, whereof that of Janus Bircherodius may ſerve for all the reſt; it is the lateſt, moſt ample, and learned. It was publiſhed at Copenhagen in 1705, under the title of "Breviarium Equeſtre, ſeu de illuſtriſſimo, & inclytiſſimo Ordine Elephantino," &c.

ELEPHANT's *Bones*. Many teeth and bones of animals have been found in a foſſil ſtate, both in Siberia and on the banks of the Ohio, in North America. The French academicians, on comparing ſome of theſe with the bones of real elephants, determined, that they belonged to the ſame ſpecies of animal; but Dr. Hunter has diſcovered, on a more accurate examination, that they are very different from thoſe of the elephant, and belong to another animal. The tuſks of the true elephant have a ſlight lateral bend; but thoſe brought from America have a larger twiſt, or ſpiral curve, towards the ſmaller end: the grinders of the latter are made like thoſe of a carnivorous animal, being furniſhed with a double row of high and conic proceſſes, as if deſigned to maſticate and not to grind its food; whereas thoſe of the elephant are flat, and ribbed tranſverſely on their ſurface; beſides, the thigh bone is of a very diſproportionate thickneſs to that of the elephant, and has ſome other anatomical variations. And though the American tuſks, when cut and poliſhed by the workmen in ivory, did not differ in texture and appearance from the true ivory, Dr. Hunter concludes, that genuine ivory muſt be the production of two different animals, and not of the elephant alone; and that the animal to which theſe bones belonged may be the ſuppoſed elephant or mammouth of Siberia, and other parts of the world, which is yet unknown. Phil. Tranſ. vol. lviii. art. 5.

The ingenious Ruſſian naturaliſt, M. Pallas, was led to conclude, from the circumſtance that theſe bones are equally diſperſed in all the northern regions of Europe, that the climate was probably, in the earlier ages, ſufficiently warm to be the native countries of the elephant, rhinoceros, and other quadrupeds now found only in the ſouth. But when, during his travels, he viſited the ſpots where the foſſil bones were found, and could form a judgment from his own obſervations, and not from the accounts of others, he renounced his former hypotheſis, and, in conformity with the opinion of many modern philoſophers, aſſerted that they muſt have been brought by the waters, and that nothing but a ſudden and general inundation, ſuch as the deluge, could have tranſported them from their native countries to the regions of the north. In proof of this aſſertion, he adds, that the bones are generally found ſeparate, as if ſcattered by the waves, covered with a ſtratum of mud, evidently formed by the waters, and commonly intermixed with the remains of marine plants; inſtances of which he himſelf obſerved during his progreſs through Siberia, and which ſufficiently prove that theſe regions of Aſia were once overwhelmed with the ſea.

ELEPHANT-*caterpillar*, a name given by ſome authors to a ſpecies of inſects, commonly known in Ireland by the name of Connaught-worm, and ſuppoſed to be poiſonous to cattle which feed on it. See *Connaught* WORM.

ELEPHANT, *era of the*, in *Chronology*, an era among the ancient Arabs, which commenced A.D. 578, in the year when the Abaſſines were vanquiſhed in their expedition againſt Mecca, and in which Mahomet was born. From this era the Arabs computed their time for 20 years. This was followed by another, called that of the unjuſt, or impious war; and this was finally ſucceeded by that of the Hegira.

ELEPHANT-*fiſh*. See CHIMÆRA.

ELEPHANT'S-*foot*, in *Botany*. See ELEPHANTOPUS.

ELEPHANT'S-*head*, in *Botany*, a ſpecies of the *rhinanthus*, which ſee.

ELEPHANT *mountain*, in *Geography*, a mountain on the S.E. coaſt of the iſland of Ceylon; 74 miles S.E. of Candy.

ELEPHANT'S *noſe*, or *elephant's neuſe*, as it is called by the Dutch, is a ſpecies of the acus or needle-fiſh, caught in the Eaſt Indies, ſo named from the reſemblance of its ſnout to the trunk of an elephant. It is a very ſingular ſpecies, the lower jaw running out to a very long and ſharp-pointed ſpine: it is round-bodied, and beautifully variegated with ſpots, and has on each ſide a green line running from head to tail. It is caught in ſalt waters. Ray's Ichthyogr. app. p. 4.

ELEPHANT, *water*. See HIPPOPOTAMUS.

ELEPHANTA, in *Geography*, a ſmall iſland ſituated in a large ſound, about 5½ miles E. of Bombay, on the coaſt of Hindooſtan, and acquired by the Engliſh from the Mahrattas, to whom it belonged. The circumference of the iſland is about five miles, and the number of its inhabitants, including women and children, about 200, who inhabit a neat village near the landing place; they are employed in cultivating rice and rearing goats for their ſupport; they are under our protection, and pay about 56*l.* annually to the government: the ſurplus revenue furniſhes their ſimple clothing. Their anceſtors, as they ſay, being improperly treated by the Portugueſe, fled hither from the oppoſite iſland of Salſette. Its proper name is "Gali Pouri," but the Europeans call it Elephanta, from the ſtatue of an elephant formed of black ſtone, which ſtands in this iſland, in the open plain, near the ſhore. This iſland is famous for its ſubterraneous temple, formed in a hill of ſtone, about ¾ of a mile from the beach, of which M. Niebuhr made drawings, and which he has particularly deſcribed. It is 120 feet long, and the ſame in breadth, excluſively of the chapels and adjacent chambers. Its height within is nearly 15 feet, and the whole of it is ſituated in a hill of conſiderable height, cut out in the ſolid rock. The pillars ſupporting the roof are alſo parts of the rock, which have been left ſtanding by the architect. The walls are ornamented with figures in baſ-relief, ſo prominent that they are joined to the rock only by the back. Many of theſe figures are of a coloſſal ſize, being ſome 10, ſome 12, and ſome even 14 feet high. Although theſe baſ-reliefs cannot be compared, either in deſign or in execution, with the works of the Grecian ſculptors, they are much ſuperior in elegance to the remains of the ancient Egyptian ſculpture; and they are finer than thoſe from the ruins of Perſepolis. Theſe figures, probably, mark events relating to the mythology and fabulous hiſtory of the Indians, for they ſeem to be repreſentations of gods and heroes. The modern Indians are ſo ignorant, that they can give no information concerning theſe curious remains of antiquity. One perſon, who pretended to be wiſer than the reſt, aſſured M. Niebuhr, that one of the largeſt ſtatues was that of Kaun, one of their ancient fabulous princes, notorious for the cruelties which he perpetrated upon his ſiſter's children. The ſtatue is well-formed, and has eight arms, an emblem of power, which the Indians give to their allegorical figures. None of theſe figures have beards, but all of them have very ſcanty whiſkers. At preſent all the young Indians wear whiſkers, and as they become more advanced in life, they commonly allow the whole beard to grow. The lips of theſe figures are thick, and their ears are lengthened out by large pendants; ornaments which almoſt all wear. Several of them wear a ſmall cord in the faſhion of a ſcarf; a mode now prevalent among the Bramins. One woman has but a ſingle breaſt; from which it ſhould ſeem, that the ſtory of the Amazons was not unknown to the old Indians. Several figures, as well maſculine as feminine, have one arm leaning on the head of a male or female dwarf, whence we may infer, that theſe monſters of the human ſpecies have been always objects of luxury and magnificence among the great. Several figures have hair on their heads, not of native growth, but reſembling a wig, whence we may conclude that this covering for the head is of very ancient invention. The female boſom is perfectly round, which intimates, that the Indian faſhion of wearing thin wooden caſes upon the breaſts is very ancient. The head-dreſs of theſe female figures is commonly an high-crowned bonnet. Several are naked; the dreſs of others more nearly reſembles that of the moderns. In ſeveral parts of theſe baſ-reliefs appears the famous Cobra de Capello, a ſort of ſerpent, which the human figures treat with great familiarity. Theſe ſerpents are ſtill very common in the iſle of Elephanta, and the inhabitants ſay that they are friendly to man, and do no harm unleſs provoked; their bite, however, is reckoned mortal. On each ſide of the temple is a chapel nine feet high: and the walls of theſe chapels are covered with baſ-relief figures, on a ſmaller ſcale than thoſe upon the walls of the temple. The ſmalleſt of the chapels, having no ſculptured figure but that of the god "Cannis," is ſtill in a ſtate of neat preſervation; and the inhabitants repair hither to perform their devotions. Before the entrance into this chapel is a pile of ſhapeleſs ſtones, bedaubed with red paint, ſuppoſed to be repreſentations of the new objects of worſhip adored by the Indians. Such red ſtones are not uncommon in other parts of India, and are held in high veneration. The reſt of the temple is now become the haunt of ſerpents and beaſts of prey. On a hill at a ſmall diſtance is another temple; but it is not eaſy of acceſs. In India are other temples of a ſimilar kind. (See SALSETTE.) As the Greeks, and perhaps alſo the Egyptians, drew the firſt elements of their knowledge from India, theſe monuments of Indian antiquity deſerve particular examination; as it might ſerve to throw new light on thoſe opinions and modes of worſhip, which were by degrees diffuſed through other parts of the Eaſt, and at laſt into Europe.

Mr. Goldingham, in the fourth volume of the "Aſiatic Reſearches," has given a particular deſcription of the cave of Elephanta, and of the figures which it exhibits. He eſtimates the length of the great cave at 135 feet, and its breadth at nearly the ſame dimenſions. The whole information which he could obtain from the inhabitants was, that they conceived it to have been formed by the gods. Some have, without ſufficient authority, deduced its origin from the Egyptians, from the Jews, or from Alexander the Great; but it is much more probable that the anceſtors of the Hindu race were its fabricators; and this writer is of opinion, that it was a temple dedicated principally to Siva, the deſtroyer or changer. Upon this principle he has endeavoured to deſcribe the ſeveral figures, with their appropriate attributes and accompaniments. It is not ſo eaſy, ſays this writer, to aſcertain the era of its fabrication. He has no doubt, however, that it was poſterior to the great ſchiſm in the Hindu religion, which, according to the Purana, happened at a period coeval with our date of the creation. But without tracing it to this fabulous antiquity, we have accounts of powerful princes who ruled this part of the country at a later period; particularly of one who uſurped the government in the 90th year of the Chriſtian era, famed for a paſſion for architecture. Poſſibly he might have founded the cave; but no evidence occurs to ſupport any hypotheſis beyond conjecture.

ELEPHANTANA, in *Ancient Geography*, a town of the iſland of Sardinia. Anton. Itin.—Alſo, an epiſcopal town of Africa, in Mauritania.

ELEPHANTIASIS, in *Medicine*, ἐλεφαντίασις, *elephantia*, a loathſome, contagious, and hitherto incurable diſeaſe, of the chronic kind; characterized by the appearance of tubercles, producing great deformity of the face and limbs, with a thickened, rough, and wrinkled ſtate of the ſkin, loſs of hair on the chin and body, inſenſibility of the extremities, ulcerations in the throat, noſe, fingers, &c. and other cachectic ſymptoms.

An extreme degree of confuſion has prevailed in the writings of phyſicians, with regard to this diſeaſe, in conſequence of the circumſtance, that the Arabians have deſcribed the ſame ſymptoms under the denomination of *lepra*, or *leproſy*, to which the Greek phyſicians had aſſigned the appellation of *elephantiaſis*; whence the term *leproſy* has been indiſcriminately applied to both diſeaſes. But, in our inquiries concerning the nature of leproſy, we ſhould conſtantly bear in mind, that the leproſy of the Greeks *(lepra Græcorum)* and the Arabian leproſy *(lepra Arabum)* are altogether different in nature; and that the leproſy of the Arabians is the elephantiaſis of the Greeks. The *leproſy*, properly ſo called, as deſcribed by the beſt Greek writers, is a diſeaſe of the ſkin only, and much leſs formidable than the elephantiaſis; Hippocrates ſpeaks of the former as an affection merely ſuperficial, and to be ranked among the blemiſhes, rather than among the diſeaſes of the body; (lib. περι παθων,) and Galen, (De tumorib. præter nat. cap. 13.) Actuarius, and Paulus Ægineta, make ſimilar obſervations. The Arabians have deſcribed the different varieties of the leproſy *(lepra Græcorum)* under the generic terms of morphea and albaras, with the ſpecific titles *alba* and *nigra*, white and black. See LEPROSY.

What has contributed ſtill farther to augment the confuſion, in which theſe diſeaſes have been involved, is, that moſt of the Arabians have alſo deſcribed a diſeaſe, under the title of *elephantiaſis*, which is altogether different from both the lepra and elephantiaſis of the Greeks, and which does not appear to have been known to the latter. This is a mere enlargement, or thickening of the legs, with a change of the colour and texture of the ſkin, producing a reſemblance, it is ſaid, to the leg of the elephant; it is compared, in its nature and origin, to the enlargement from varicoſe veins; and was probably ſimilar to the thick leg of Barbadoes, or, in ſome inſtances, a ſymptom of ſcurvy. Thus Avicenna, in his chapter "De Elephantia," obſerves, that it conſiſts of "an intumeſcence of the feet, ſimilar to what occurs in the varix of the veins: ſometimes, and indeed moſt frequently, it ariſes from a melancholic humour, and ſometimes from a thick phlegm, and occaſionally alſo from the ſame cauſes, which render the veins varicoſe; it is at firſt red, and afterwards black; and is relieved by the ſame circumſtances which relieve the varices." (Avicen. lib iii. Fen. xxii. Tract. i. cap. 16.) Thus alſo Rhaſis writes reſpecting the *elephantia*; "eſt cum pedis craſſities augeri videtur, et color obfuſcari, venæ quoque quæ vites vocantur apparere cæperint." (Ad Almanſor, lib. ix. cap. 93.) And Avenzoar aſſerts ſimply, that "a præternatural ſwelling happens in the legs, which is called *elephantia*, and this on account of its reſemblance in thickneſs to the legs of the elephant." (Lib. ii. cap. 26.) It ought not here to be omitted, however, that Haly Abbas ſtands alone among the Arabian writers, upon this ſubject, in point of correctneſs; for, under the term *elephantia*, both in his deſcription of the ſymptom and his obſervations on the practical treatment of the diſeaſe, he has in view the proper elephantiaſis of the Greeks; (ſee his works, Theorice, lib. viii. cap. 15. and Practice, cap. 4.) and he treats of the leproſy of the Greeks under the head lepra. But he alſo deſcribes the thick leg, diſtinguiſhing it (or at leaſt his tranſlator has ſo done) by the term *elephas*. "Quæ vero in cruribus et pedibus fiunt *elephas* vocatur, et quæ dicuntur varices venæ. Et elephanticus morbus apoſtema eſt melancholicum quod in cruribus fit et pedibus; et ejus ſignum eſt, quod pedis figura figuræ elephantis ſimilis fit, æqualis, et non diverſa." (Theorice, lib. viii. cap. 18.) We know not the original terms here employed, but if the tranſlation be correct, the intended diſtinction is obvious.

For after noticing the ulcerations of the face and noſe, belonging to elephantiaſis, properly ſo called, he ſays, "*but* the diſorder which takes place in the legs and feet is called *elephas*, (the elephant;)" and he alſo terms it the "elephant-like diſeaſe," (elephanticus morbus.) This diſtinction has been noticed by Sennertus, as a contradiction on the part of Haly Abbas; (ſee Sen. Opera lib. v. part 1. cap. 45.) where it is obvious that the diſtinction of the terms, employed by the Arabian, is overlooked. The difference between the leproſy of the Greek and Arabian writers has been ſo often pointed out by the learned, that it is remarkable how the confuſion of the two diſeaſes ſhould have ſo often prevailed. (See Fuchſii Paradoxa Medicinæ, lib. ii. cap. 16. Gregor. Horſt. Obſ. Med. lib. vii. obſ. xviii. Epiſt. Hopnero. Turner, on Diſ. of the Skin. chap. i. where part of the epiſtle of Horſtius is tranſlated. Sennertus, loc. cit. cap. 40.)

The elephantiaſis of the Greek writers, then, and of Haly Abbas, (as diſtinct from the elephas of that writer,) is the ſubject of our conſideration at preſent. The origin of the name is differently explained by different authors. The Arabians ſeem to have miſapplied the term, from a ſuppoſition that it referred alone to a ſimilarity in ſhape, colour, and other qualities of the ſkin, in the diſeaſe, to that of the elephant; but it appears to have been adopted from a more general analogy of the magnitude and ſeverity of the diſeaſe, with the ſize of the animal. "Eſt enim viſu fœdus," ſays Aretæus, "et in omnibus terribilis, quemadmodum et elephas bellua:" and Aëtius obſerves, "elephantiæ quidem ex magnitudine et diuturnitate affectionis nomen accepit." It has been ſtated, too, by the poet,

"Eſt lepræ ſpecies, elephantiaſiſque vocatur,
Quæ cunctis morbis major ſic eſſe videtur,
Ut major cunctis elephas animantibus exſtat."
Macer, de Virib. herbarum.

Upon the ſame principle, Aretæus obſerves, that it has been called the "Herculean diſeaſe;" ſince no diſeaſe is more powerful or more fatal. "Magnus quidem potentia morbus; ad mortem enim inferendam eſt omnium longè efficaciſſimus." Other peculiarities of the diſeaſe have given riſe to other denominations, to which the Greek writers allude. Thus it was alſo called *ſatyriaſis* and *ſatyriaſmos*, partly on account of the change of the features, which often occurred, and rendered the countenance ſomewhat like that given by painters to the Satyr; and partly from the exceſſive libidinous diſpoſition which accompanied the diſeaſe. (See Aëtius.) The lips, according to Galen, become thick, the noſe ſwells laterally, and therefore appears to be depreſſed, the ears grow thin, the cheeks red, and tumours ariſe here and there upon the forehead, ſomewhat reſembling horns. (De tumorib. cap. 14.) And Aëtius obſerves, that, as if by a ſort of ſpaſmodic diſtention of the muſcles of the jaws, the face is dilated, and aſſumes the appearance of laughter, as in the Satyr. Another condition of the countenance, under this diſeaſe, gained it the appellation of *leontiaſis*, or *leo*, the lion, or lion-face. Aëtius and Aretæus attribute this name to the laxity and wrinkles of the ſkin of the forehead, which reſembles the flexible eye-brows of the lion. But the Arabian writers aſcribe it to a different ſource. Haly Abbas ſays, the countenance was called *leonine*, becauſe the white of the eyes becomes livid, and the eyes of a round figure: and Avicen obſerves, that the term *leonine* was applied to the diſeaſe, becauſe it renders the countenance terrible to look at, and ſomewhat of the form of the lion's viſage.

Symptoms of the Elephantiaſis.—The ſymptoms of this incurable diſeaſe, which is ſaid to be not only moſt grievous to the individual who ſuffers it, but intolerable to byſtanders, ſo that even the domeſtics and attendants of the patient are averſe to intercourſe with him, are detailed by Aëtius and Aretæus in nearly ſimilar terms. Both theſe writers lament, that the incipient ſymptoms are not obſervable: there is no unuſual derangement of the conſtitution, no obvious external change, which, being ſeen at once, might ſuggeſt a timely application of medicine: the diſeaſe preys for a long time unobſerved on the conſtitution, and when its firſt ſymptoms begin to ſhew themſelves externally, the malady is not then commencing, but is completely eſtabliſhed, and the condition of the patient is hopeleſs. When the diſeaſe is about to appear, the perſon becomes ſluggiſh and inactive, and is ſleepy after ſlight exertions, the bowels are coſtive, but the appetite remains unchanged. Theſe ſymptoms, however, are not very unfrequent in ordinary health. The firſt external marks of the diſeaſe generally appear in the face: the cheeks and chin become thickened and red, but of a livid, not a florid hue: puſtular tumours ariſe, ſometimes with a white top, and livid baſe; and the veins under the tongue become varicoſe and black. The breathing is now ſlower and more difficult, the breath fœtid, the ſluggiſhneſs and inability of exertion increaſe, the appetite is ſtill little altered, but continual eructations occur, which are offenſive even to the patient, the urine is thick, like that of cattle, the bowels extremely conſtipated, and the venereal appetite great. The hair begins to fall off from every part of the body, from the pubes, the eye-brows, and the chin, and the hair of the head is thinned, and the ſcalp becomes rough, and chopped, with deep fiſſures. The pulſe is ſmall, ſlow, feeble, "as if moving through mud." The whole ſkin becomes thickened and rough, and ſmall livid tubercles appear, more particularly on the face, on the noſe, and about the ears: the noſe ſwells and dilates, the lips grow thick and prominent, and livid; the ears enlarge, and become red with a mixture of blackneſs, and ulcers form about their baſe; the eye-brows grow prominent, thick, ſmooth, and pendulous from their gravity, and of a livid or black colour; the eyes of a dark or brazen hue. This condition of the countenance, which ſomewhat reſembles the viſage of the lion, gave origin to the name *leontiaſis*. The teeth become black; the voice hoarſe, and obſcure. At length ſimilar puſtules and tubercles appear in the extremities, and every other part of the body; much itching is ſometimes occaſioned, and ſcratching affords ſome relief; many thick and rough *rugæ* are alſo formed over the whole ſkin, with deep fiſſures, which extend, in the feet, from the heel to the middle of the toes. As the diſeaſe increaſes the tumours of the cheeks and chin, of the toes and legs, ulcerate, and the ulcers diſcharge a fœtid ſanies, and do not heal; but new ones appear one after another, and extend, until the noſe, the toes, fingers, and even the hands and feet fall off. But even this degree of diſeaſe, ſays Aretæus, does not liberate the ſufferer from his ſevere calamity and miſerable life, although diſmembered limb by limb: for the diſeaſe, like the animal from which it derives its name, is characterized by longevity. Yet ſo weak and puſillanimous does the patient become, that he ſtill clings to life, although he avoids the ſight of friends, and receives no enjoyment whatever. The appetite for food is not greatly diminiſhed, but the ſenſe of taſte is loſt, and neither food nor drink afford him any gratification: an inſufferable languor and an unuſual ſenſe of weight in the limbs oppreſs him, but the ſenſe of feeling in every part of the body is nearly loſt; rabioſa ineſt libido; yet every thing is without pleaſure; eating and faſting, motion and reſt, cleanlineſs and filth, are equally indifferent to him. The difficulty of breathing becomes extremely great, amounting to a ſenſe of ſuffocation, as if the patient were ſtrangled: and in this way life is frequently terminated. (See Aretæi de Cauſ. et Signis Morb. dictum. lib. ii. cap. 13. Aëtii Tetrabibl. iv. Serm. i. cap. 120.)

The ancients all agree in conſidering the elephantiaſis as a cancer of the whole body, as well as in attributing it to the generation of a melancholic humour, or black bile, of great malignity, which contaminates the whole of the blood, and is diffuſed throughout the habit. They enumerate various exciting cauſes of this morbid condition of the body. Among theſe the uſe of ſtrong, viſcid, and indigeſtible food is much inſiſted upon; eſpecially the uſe of ſalted meats, of fiſh, and of *aſſes' fleſh*, from which a thick and ſluggiſh blood was ſuppoſed to be generated. Climate is alſo ſaid, together with this ſort of diet, to influence the production of the diſeaſe: whence Galen accounts for the frequent occurrence of elephantiaſis at Alexandria, where the atmoſphere is hot, and often loaded with vapours. Hence alſo Lucretius obſerves,

> "Eſt elephas morbus, qui propter flumina Nili
> Gignitur Ægypto in media, neque præterea uſquam."
> Lib. 6.

Though this aſſertion of the poet be not ſtrictly true, yet the diſeaſe appears to have originated chiefly in warm climates. Pliny conſidered the elephantiaſis as peculiar to Egypt, and obſerves that it was not brought into Italy until the time of Pompey. (Nat. Hiſt. lib. xxvi. cap. 1.) And Celſus remarks, that it was but little known in Italy in his time. (De Med. lib. iii. cap. 15.) In later ages it has occurred to a great extent in the ſouth of Europe; and is mentioned by travellers as ſtill exiſting there as well as in Arabia, Abyſſinia, and the adjoining regions: it alſo occurs in the Weſt-Indies, as we ſhall have occaſion to mention more at large below.

Contagion is another ſource to which elephantiaſis is attributed. It is not to be doubted that contact with the diſeaſed will excite elephantiaſis, as in other chronic diſeaſes, in which a morbid poiſon is generated; accordingly the diſorder is mentioned as being frequently communicated by cohabitation, either from an infected female to a ſound man, or the contrary, or by the common intercourſe of life. In the laſt caſe it has been ſuppoſed to be communicated by effluvia, as in acute diſeaſes, and the air, in which the patient breathes, is ſaid to be contaminated. (Avicenna, &c.) But, this ſeems queſtionable, both becauſe it is inconſiſtent with the general analogy, and becauſe the contagion does not appear to have been ſo virulent, or to have extended itſelf with the ſame activity, as is obſerved in contagious diſeaſes in general, which infect at a diſtance. The diſeaſe has been alſo obſerved to be hereditary; which has been attributed to the contamination of the ſeminal fluids, by which the fœtus was engendered in diſeaſe. (Haly Abbas, &c.) But, like other hereditary diſeaſes, or, more properly ſpeaking, like other diſeaſes, to which there is a connate prediſpoſition in certain individuals, the elephantiaſis is ſaid to have lain dormant for one or more generations, and to have re-appeared in the ſucceeding ones.

Too much exerciſe, as well as too much indolence, is ſaid by Aëtius to induce elephantiaſis, by contributing, as he ſuppoſes, to thicken the blood. A thickened and arid condition of the humours, indeed, is a leading ſuppoſition in the pathology of the ancients in reſpect to this diſeaſe; and a dry and corrupt condition of the liver and ſpleen is aſſigned as the principal ſource of this humoral corruption. Hence caſtration has been ſeriouſly propoſed, as a remedy, by which the habit might be rendered more moiſt and effeminate, and its humidity retained. The author, juſt quoted, obſerves, that males are more liable to the diſeaſe than females, and thoſe eſpecially about the age of puberty.

With regard *to the cure of elephantiaſis*, it is admitted univerſally by the Greek, Latin, and Arabian writers, that the diſeaſe is incurable, except in the very commencement, when its approach can ſcarcely even be ſuſpected. Numerous expedients were practiſed, however, with a view to relieve it. For although we may ſtretch our hand to the miſerable ſufferers in vain, ſays Aëtius, to leave them unaided were an act of deſpair and cruelty. "Humanum enim et plenum benevolentiæ ſignum eſt, in extremis etiam malis uſque ad experimentum procedere, ad difficultatem affectionis compeſcendam".

Moderate blood-letting from the arm is recommended to be firſt employed, and, after a few days, purging, by means of glyſters, and colocynth. The whey of milk, and aſſes' milk, with other light diet, is then to be taken; and then purging and vomiting, at intervals, by means of the black hellebore, and ſcammony, &c. (See Aëtius, loc. citat, cap. 122.) The ſame writer occupies ſeveral chapters in the enumeration of pills, and other internal medicines, proper to be adminiſtered; and of liniments and other ſubſtances for external application, among which the dung of goats, and other animals, was often recommended. Alum, ſulphur, nitre, vinegar, pepper, iris, &c. &c. were the remedies chiefly depended upon, externally. The aſhes of burnt twigs, mixed with the fat of beaſts, as of the lion, panther, &c., were alſo preſcribed, as liniments. (See Aretæi de Curat. Morb. dictum, lib. ii. cap. 13.) The fleſh of the viper was generally recommended as a remedy for the elephantiaſis. Aëtius calls it "mirabilis elephantiaſis remedium;" and it is ſaid by Aretæus to have been diſcovered to poſſeſs thoſe remedial powers by accident; an infected perſon, expoſed in a wilderneſs, having, either from hunger, or from a wiſh to get rid of life, eaten a viper alive, and afterwards recovered. Galen, and many ſucceeding writers, have recommended the uſe of vipers, prepared in various ways, as beneficial in lepra, elephantiaſis, and other diſeaſes of the ſkin. But ample experience has proved the inefficacy of this medicine. (See Palmarius de Morb. Contag.) Dr. Willan juſtly remarks, that we cannot but diſtruſt the accounts of the writers, who have more lately recommended the fleſh of vipers, "when we read in them at the ſame time, that equal advantages accrue to the patient from living on pullets fed with vipers' fleſh." (On Cutaneous Diſeaſes. Part ii. Gen. Lepra. p. 142.)

Such is the account of the loathſome and fatal diſorder, the elephantiaſis, and the means of cure uſually reſorted to, as recorded by the ancients. In the later periods of European hiſtory, eſpecially in the twelfth and thirteenth centuries, the ſame diſeaſe ſeems to have prevailed moſt extenſively throughout Chriſtendom, more particularly in the ſouth of Europe; it was not, however, altogether confined to the warmer countries, ſince it was prevalent in England. It was generally denominated *leproſy*; and from the numerous ulcerations, which were among its ſymptoms, it was alſo called *Morbus Sti. Lazari*, the diſeaſe of St. Lazarus; and many hoſpitals, or lazarettos, were erected for this diſeaſe alone. According to Matt. Paris there were 2000 of theſe lazarettos in France, and 19,000 in Europe, in the thirteenth century. (Hiſt. Engl. ad. ann. 1244.) There were ſeveral at the ſame time in England; the principal or head of theſe was in Leiceſterſhire; but it is ſaid, that the city of Norwich alone contained five. But of this ſubject we ſhall treat more at large under the head of LEPROSY. The venereal diſeaſe, for ſome time after it was firſt obſerved, in 1493, was conſidered as a variety of the elephantiaſis, or of the YAWS; and it is conjectured by ſome writers to have ſprung from that ſource; as the leproſy is ſaid to have gradually diſappeared, while Syphilis was diſſeminated. See Sprengel. Hiſt. of Medicine (Geſchichte der Artzneykunde) vol. ii. p. 660.

The elephantiaſis ſeems to be at preſent nearly extinct in Europe. In the year 1755, a hoſpital, called St. Lazare, which had been eſtabliſhed from time immemorial, is mentioned as exiſting at Le Martigues, a ſmall town in Provence, in which perſons attacked with the *leproſy* were ſhut up. The diſeaſe, as it occurred at that place and period, is ſaid to have commenced with an elaſtic ſwelling in the legs, with inſenſibility of the ſkin, gradually extending from the toes to the knee; after which the veins became varicoſe, the ſkin hard and ſcaly, and then tuberculated. All theſe ſymptoms then appeared on the face, where the ſkin grew thick, forming large wrinkles full of ſchirrous tubercles, "which make the poor wretches look frightful." The ſkin, eſpecially about the joints, is next affected in the ſame way. The patients continued in this condition, with little ſuffering, for years; the voice then became hoarſe, corroding ulcers of the palate, and throat, and internal parts of the noſe, enſued, with fœtid breath, carious teeth, and a livid hue of the face. The ſchirrous tubercles then ulcerated, the bones beneath became carious, and in a few caſes the poor creatures loſt their fingers and toes. They became hectic, and fell into maraſmus, when the ſmell of their perſpiration was intolerable, and "at length after about three or four years of ſuffering," they died. (See a letter from Dr. Joannis of Aix, in the Med. Obſ. and Inquiries, vol. i. p. 201.) The great propenſity to venery was ſtrongly exemplified in that hoſpital; and the hereditary nature of the diſeaſe, to the fourth generation, (when it ſeemed to wear out) was alſo obſerved. It was remarked too, "that the huſband rarely communicates the diſeaſe to his wife, born of healthy parents, though ſhe may bring into the world children that in time die of leproſy;" which alſo concurs with the ſtatements of the ancients. There is at preſent a lazaretto, near Funchall, in the iſland of Madeira, in which there were ten patients, labouring under elephantiaſis, in the year 1803, according to Dr. Adams. We ſhall ſpeak of the diſeaſe, as it was obſerved in that hoſpital preſently.

In the warmer climates, the elephantiaſis has been obſerved, and frequently deſcribed by phyſicians and travellers, during the laſt (18th) century. Niebuhr has given an imperfect deſcription of a malignant ſpecies of leproſy, which was prevalent in Arabia and Perſia, at the time of his journey into thoſe countries, and which the natives denominate *Dsjuddam*, and *Madsjuddam*; but it would appear to be a leſs ſevere malady than the elephantiaſis, or lepra of the Arabian writers. At Bagdat there were ſeveral barracks, in one quarter of the town, into which all the leprous perſons were compelled to retire by the magiſtrate; but they were allowed to go out every Friday, to beg alms in the markets. It is ſaid, he remarks, tous renfermés qu'ils ſont, ils continuent leurs amours; and he mentions the circumſtance of a man, ſhut up in the barrack, who contrived to infect a female, for whom he had a violent deſire, by means of linen, and then obtained an order for her impriſonment in the ſame place. (See Deſcription de l'Arabie, tom. iii. p. 119.) Bruce has alſo deſcribed the elephantiaſis as he obſerved it in Abyſſinia, which, however, ſeems to have been principally confined to the legs, and to reſemble the *elephas* of Haly Abbas, rather than the true elephantiaſis. (Travels, book v. chap. 2.)

The importation of this horrible malady into the Weſt Indies, from Africa, appears to have been one of the puniſhments, which that abominable traffic, the ſlave trade, has inflicted upon the inhabitants. The ſymptoms of the diſeaſe, as detailed by Dr. Hillary, under the title of leproſy of the Arabians, in his account of the diſeaſes of Barbadoes, accord ſo accurately with the deſcription given by the ancients, that his hiſtory appears more like a tranſcript of the chapter of Aretæus, or Aëtius, than a record of the obſervations of a modern inquirer, in another climate. Dr. Hillary deſcribes two forms of the diſeaſe, which were alſo noticed by Haly Abbas, (excluſive of the thick leg, or *elephas*,) in one of which the limbs fall off from the joints; but in the other, the ulcerations go on without this effect. The former Dr. H. calls the "leproſy of the joints." (Obſervations on the Air and Diſeaſes of the Iſland of Barbadoes, p. 322, & 335.—2d edit.)

Dr. Hillary, however, has deſcribed another diſeaſe, which is endemial in that iſland, under the title of elephantiaſis, having confounded the diſtinction between the elephantiaſis and elephas of Haly Abbas, and between the elephantiaſis of the other Arabian writers, and that of the Greeks. The elephantiaſis of Dr. Hillary appears to be the elephantiaſis of the Arabians generally, and the elephas of Haly Abbas. It is a diſeaſe confined to the leg, and uſually to one leg; which grows to a monſtrous ſize, the veins becoming varicoſe, and the ſkin thick and ſcaly, with fiſſures and chops upon the ſurface; but which affects the functions and conſtitution ſo little, that patients often live many years, ſome have lived upwards of twenty, "without being ſenſible of any other inconveniency of life, but that of carrying along with them ſuch a troubleſome load of leg." The ſeat of this diſeaſe is confined to the blood-veſſels, cellular ſubſtance, and ſkin, the muſcles, tendons, and bones below, being altogether unaffected. A great effuſion or collection of a fatty and gelatinous matter, in the cells of the membrane, conſtitutes the bulk of the diſeaſed limb: the veins and arteries being alſo conſiderably enlarged. The diſeaſe firſt appears after a febrile paroxyſm, in which great pain is felt in the inguinal glands of the ſide about to be affected. Hence Dr. Hendy gave it the appellation of the "glandular diſeaſe of Barbadoes." Dr. Rollo, in his treatiſe upon the ſame ſubject, has properly noticed the miſtake of Dr. Hillary, in applying the term elephantiaſis to this diſorder. But this error is general: the principal uſe of the term, in this country, at preſent, is its application to the *thick leg* of this deſcription, which is often ſeen in perſons who have reſided in hot climates.

The true elephantiaſis (of the Greeks) appears to have firſt viſited the iſland of Guadaloupe about the year 1730, having been imported with the negroes from Africa, according to Dr. Peyſonel, who has given a minute detail of its progreſs and ſymptoms, which agrees in all the leading points with the deſcriptions of the ancients. (See Philoſoph. Tranſactions, vol. l. part i. for 1757, art. vii.) We ſhall here tranſcribe ſome obſervations, relative only to the contagious origin of the diſeaſe, as it would be ſuperfluous to repeat the ſymptoms. "We were well aſſured," ſays M. Peyſonel, "from our obſervations that the diſtemper is contagious and hereditary; and yet the contagion is not ſo active, nor poiſonous, as that of the plague, ſmall-pox, nor even as the ring-worm, itch, ſcald, and other cutaneous diſorders: for, if that were the caſe, the American colonies would be utterly deſtroyed; and theſe perſons ſo infected, mixed as they are in every habitation, would have already infected all the negroes whom they come near.

"We believe, that this contagion does not take place, but by long frequenting the company of the infected, or by carnal knowledge. Beſides, we have obſerved, that even ſuch long frequenting, or cohabiting with them, are not always ſufficient to communicate the diſeaſe; becauſe we have ſeen women cohabit with their huſbands, and huſbands with their wives, in the diſtemper, while one is ſound, and the other infected. We ſee families communicate and live with leprous perſons, and yet never be infected; and thus, although experience, and the information of the ſick, prove the contagion, we are of opinion, that there muſt be a particular diſpoſition in people to receive the poiſon of the leproſy.

"As to what regards the diſtemper's being hereditary, it is aſſuredly ſo. We have ſeen entire families infected; and almoſt every child of a leprous father or mother fall inſenſibly into the leproſy; and yet, in ſeveral other families, we have ſeen ſome children ſound, and others tainted; the father has died of the diſeaſe, and the children grew old without any infection: ſo that, though it is certainly hereditary, yet we believe it is of the ſame nature with thoſe in families troubled with the conſumption, gravel, and other hereditary diſtempers; which are tranſmitted from father to ſon, without being ſo very regular, as to affect every one of the family." In the female children of infected parents, the diſeaſe generally firſt ſhewed itſelf at the commencement of menſtruation, and continued ſlightly till they had had one or two children, when the more ſevere ſymptoms began to appear; but there was nothing regular in the period of its occurrence in males.

The lateſt account of the elephantiaſis, occurring in Europe, is that which is given by Dr. Adams, in his "Obſervations on Morbid Poiſons," 2d. edition, publiſhed in 1807. The diſeaſe was minutely examined by that gentleman, in the lazaretto, near Funchall, in the iſland of Madeira; and his deſcription of its ſymptoms reſembles that of his predeceſſors, both ancient and modern, in the general circumſtances: there are ſeveral particulars, however, in which his account differs from the hiſtories detailed by them. We have ſeen that the ancients and moderns concur in aſſerting, that the venereal appetite is exceedingly increaſed, when the conſtitution is under the influence of elephantiaſis. But the obſervation of Dr. Adams led him to draw a concluſion directly the reverſe of that juſt ſtated. For, on examining ſeveral young men, upwards of twenty years of age, in whom the diſeaſe had commenced at or before the period of puberty, he found that they had no hair on the chin and pubes, that the teſtes were ſmall, and even ſcarcely to be felt, and that the ſcrotum, and all the organs very much reſembled thoſe of a boy of ſix or ſeven years old. And in thoſe men, who had been attacked by the diſeaſe, ſubſequent to the period of puberty, there appeared generally a waſting of the teſticles, and a diminution of the beard and hair of the pubes; and one of them, a married man, aſſured him that he had loſt the venereal deſire. Dr. Adams therefore concludes, "that all ſuch boys as are attacked with the diſeaſe, before the age of puberty, never acquire the diſtinguiſhing marks of that change in the conſtitution; on the contrary, that the teſticles, for the moſt part, diminiſh, and, as far as can be collected from their converſation, that they retain the ſimplicity of infancy in whatever relates to the ſexes;" and "that ſuch as are affected later in life, gradually loſe the power of procreation, as far as can be judged by the changes which take place in the organs." P. 267. 268.

Dr. Adams is diſpoſed to deny altogether the contagious nature of the diſeaſe; partly from the conſideration, that a country muſt be depopulated by it, if it were contagious; and partly from the fact, that none of the nurſes in the lazaretto have ſhewn any ſymptoms of the diſeaſe, and that individual lazars have remained for years at home, without infecting any part of their family. Dr. Thomas Heberden (in a paper publiſhed in the Medical Tranſactions of the Coll. of Phyſicians) has alſo contended for the ſame point. It is obvious, indeed, from all that has been written on the ſubject of elephantiaſis, that, if there be contagion, it is not of a violent nature. It muſt not be omitted, however, that the wife of the married lazar, juſt mentioned, was alſo diſeaſed, and that Dr. Adams heard of two other couple in a ſimilar condition; and alſo that the porter of the houſe had become a lazar, ſince his reſidence in the lazaretto.

In addition to the ſymptoms generally detailed, in the hiſtory of elephantiaſis, Dr. Adams has ſtated, that "in the upper and anterior part of the thigh, nearly in contact with the lower part of the ſcrotum, there is, in almoſt every caſe, a firm (to appearance) glandular ſwelling, moveable and prominent, or concealed, according as the patient is fat or lean, or in proportion to the progreſs of the diſeaſe. It is remarkable that none of the women are without it. In moſt of the men theſe tumours are particularly prominent, extending gradually upwards. In ſome there are alſo inguinal buboes. In every caſe the ſwellings are indolent, never giving pain, nor becoming diſcoloured, nor ſhewing any diſpoſition to ſuppurate." P. 273. The deſcription, which the ſame writer gives of the characteriſtic tubercles of elephantiaſis, is alſo worthy of attention. "Among the unequivocal marks," he obſerves, "we may conſider tubercles about the face, particularly on the external ear, *alæ naſi*, eye-brows, or forehead. Theſe tubercles, till an advanced ſtage of the diſeaſe, are not only ſmooth, but have for the moſt part a higher complexion than the natural ſkin, approaching nearer to the ſanguineous hue, appearing as if ſemi-tranſparent, ſplendid as if the ſurface were ſmeared with oil, and, on a cloſer examination, ſometimes exhibiting ſmall blood-veſſels ramifying on their ſurface. At firſt they riſe only a little above the ſkin, have the natural colour of that membrane, or are even paler. The circumſcription is irregular, ſeldom circular, but beſet with lateral projections, which, however, are not angular. The colour and elevation of the tubercles will, in moſt inſtances, remain ſtationary for a conſiderable time; as they become redder, or in people of a fairer complexion, more tranſparent, they acquire the ſplendour before-mentioned. Commonly the centre becomes more elevated, and ſo on towards the edges, ſo as to render the tubercle ſomewhat rougher. They ſtill, however, retain their ſplendour, till they crack in one part, in conſequence of which the tubercle is ſuffuſed with a white furfuraceous ſubſtance," &c. p. 271.

Dr. Adams ſays nothing of the mode in which the elephantiaſis proves fatal; he obſerves, indeed, that "they, for the moſt part, ſeem to die of other complaints;" he does not mention the fœtid breath, and carious teeth; and was unable to diſcover ulceration in the throat, although he admits that the *uvula* diſappears, and the *os vomer* is loſt, and the noſe therefore flattened. It is probable, indeed, that the fears of the ancients led them to exaggerate in their deſcription of the humours of the diſeaſe, which they were loath to inveſtigate minutely; and ſomewhat of the ſame apprehenſions might have been felt by Hillary, Peyſonel, and others of the moderns, who have deſcribed it as not leſs loathſome. In the account of Dr. Adams, which is illuſtrated by a portrait of a lazar, though it occaſions deformity enough, it certainly appears under much leſs hideous colours.

Method of Treatment.—It were almoſt abſurd to talk of the *cure* of a diſeaſe, which modern, not leſs than ancient, experience has uniformly denounced as incurable, when once eſtabliſhed in the habit; and which has been ſaid to be completely eſtabliſhed at the time when the unequivocal ſymptoms of the diſeaſe firſt make their appearance. Both the ancient and modern phyſicians, however, concur in aſſerting the poſſibility of curing it at its very commencement. Dr. Hillary has given the moſt ample directions for the plan of procedure both medicinally and dietetically.

"If the diſeaſe be taken in time," he obſerves, "namely, at the beginning, and firſt appearance of its ſymptoms, the ſpots above-mentioned, &c., we have ſufficient reaſons to believe it may be cured; and I have ſeen ſome inſtances of its being cured.

"Notwithſtanding that the ſeat of the venereal diſeaſe is allowed to be chiefly in the expanſions of the membrana adipoſa vel cellulosa, as well as in this diſeaſe; and is principally cured by the uſe of *mercury*, or different preparations of it; yet it is very remarkable that this diſeaſe is ſo far from being either cured, or relieved by it, that, on the contrary, it is greatly increaſed, and all its ſymptoms much aggravated by the uſe of mercurials. I grant that it ſeems to abate the diſtemper for a little time, but it ſoon returns with almoſt double force and violence after it: and *antimony*, or the beſt preparations of it, which are of little ſervice in the former, are found to be the moſt efficacious medicines in the cure of this diſeaſe, if properly given, and the diſeaſe be taken in time.

"When the above-mentioned ſpots firſt appear, either of a yellowiſh, or browniſh purple colour, in order to diſtinguiſh whether they are the true ſpots of this leproſy, (the lepra Arabum,) or they are ſpots of another kind, which are not uncommon in this climate, and look like them, but proceed from another cauſe, and are of no bad conſequence; anoint the ſpots gently with a little oleum tartari *per deliquium*, and a little after rub it well off, and if the ſpots diſappear, and return not again, they are not leprous ſpots; but if they remain, or ſoon return again after being thus anointed and rubbed, they are the true leprous ſpots, though the patient finds himſelf perfectly well in all other reſpects, and may continue ſo for many months. Wherefore it is neceſſary to attempt the cure before the diſeaſe gains further ground, and becomes inveterate.

"To which purpoſe, if the patient be of a ſanguine plethoric conſtitution, it is adviſable to bleed, to ten, twelve, or fourteen ounces; after which an antimonial vomit ſhould be given; and then let them enter on the following courſe of medicines, and continue it for two or three months." This treatment, it may be remarked, is a copy of that recommended by the ancients, from hypothetical notions of the morbid condition of the humours in elephantiaſis, and was probably repeated by Dr. Hillary from ſimilar notions, without good grounds; for as the diſeaſe is altogether of a chronic nature, and as it is well aſcertained, that, in other chronic cutaneous affections, general bleeding, and emetics are altogether deſtitute of utility, we may preſume that theſe meaſures had little influence in eſtabliſhing the cure, when that was accompliſhed.

The following are Dr. Hillary's formulæ: ℞ *ſulphuris antimonii præcipitati*, drachmas iii; *mercurii calcinati levigati*, grana xxx; *gummi guaiaci pulveris*, drachmas iii; *balſami guaiaci* quantum ſufficit; *olei ſaſſafræ*, guttas xx; miſce, fiant pilulæ 90: Of theſe pills the patient is directed to take three every night, at bed-time, together with fifty drops of the following tincture, and three ounces of the decoction.

The tincture conſiſts of antimonial wine ℥ii, aromatic tincture ℥ſs; and the decoction is as follows.

℞ *radicis ſarſaparillæ*, uncias iii; *corticis ſaſſafræ* unciam; *ſalis diuretici* unciam dimidiam; miſce, et coque, vaſe clauſo, in *aquæ puræ* libris iiiſs ad libras iiſs, et cola; colaturæ adde *tincturæ antimonii* unciam; *aquæ juniperi compoſitæ* unciam cum ſemiſſe; *ſacchari* quantum ſufficit. miſce.

Three ounces of this decoction, with fifty drops of the tincture, are alſo ordered to be taken every morning.

"This method," Dr. Hillary ſays, "ſhould be continued two months, or longer, if the ſpots do not entirely diſappear before that time, for it is neceſſary to continue them for ſome time after the ſpots are gone off. And the ſpots ſhould be rubbed well once or twice a day, with a warm dry flannel cloth, firſt holden a little over the fumes of burning ſulphur, mixed with a little antimony, and daily continued as long as the ſpots remain. If the diſeaſe does not abate, and the ſpots, torpor, and numbneſs decreaſe, it is ſometimes neceſſary to repeat the antimonial vomit two or three times during this courſe, eſpecially when the diſeaſe is hereditary or proves obſtinate: and in this caſe it is neceſſary to repeat the whole courſe over again two or three months after, however in the next ſpring or autumn following, or both, if the leaſt ſymptoms then appear, as we know no diſeaſe that is more obſtinate or more difficult to cure.

"As to the dietetic part of the cure, it is not only neceſſary that the patients live temperately, but there are ſeveral things which muſt be placed among the *lædentia* in this diſeaſe, from which the patient muſt abſtain. They muſt religiouſly abſtain from all ſwine's fleſh, and all fat meats, and every thing that is oily, fat, or greaſy, either in ſauces or other ways, and that not only during the time they are under this courſe of medicines, but for many years after. They may eat any ſort of fleſh meats at noon, that are not too fat, too much ſalted, or too high ſeaſoned, with roots, greens, and plain ſauces; but the more plain, ſimple, and the lighter, and more eaſily digeſted they are, the better: they ſhould be alſo very temperate in the uſe of wine and all ſpirituous liquors, and ſtrictly abſtain from all kinds of malt liquors, for they are by no means a proper drink in the hot climates, as they are too viſcid and glutinous a liquid, they require more labour and action, in order to digeſt and animalize them, than can be well uſed here (in the Weſt Indies); and as the heat is great, and we perſpire much and ſoon," &c. "they often do much hurt, as I have often obſerved, and therefore mention it here. Small punch, moderately acid, is a much more proper beverage for the hot climates. Their diet alſo mornings and nights ſhould be light and eaſily digeſted, and gently attenuating and diluting.

"Theſe rules may ſeem to be too rigid and ſevere to ſome, but they are abſolutely neceſſary, if the patient is obliged to continue in a hot climate, and yet deſires to recover his health, and live free from this dreadful diſtemper. It is highly probable, that removing into a colder climate may conſiderably contribute to their recovery, and re-eſtabliſhing their health, eſpecially as a hot climate is the parent and producer of this diſeaſe."

Other writers confirm the ſtatement that mercury, the effectual remedy for the venereal diſeaſe, which the elephantiaſis reſembles in ſome of its ſymptoms, is uſeleſs, if not abſolutely pernicious, in the latter. Dr. Joannis, ſpeaking of the difference between the two diſeaſes, remarks, that the leproſy is not ſo eaſily communicated as ſyphilis; "nor will it yield to the ſame remedies. On the contrary its virulence is increaſed by them, and they make it break out with more violence. This has been particularly experienced, when, after due preparations, mercurial frictions have been employed." (Med. Obſ. and Inquiries, before quoted, p. 210.) And Dr. Peyſonel ſays, that antivenereal remedies were of no ſervice, and "very often haſtened the progreſs of the diſeaſe."

Mr. Bruce procured a quantity of the inſpiſſated juice of cicuta, (the conium maculatum of Linnæus,) prepared by Baron Storck, at Vienna, which he adminiſtered diligently to ſome perſons, labouring under the diſeaſe, in Abyſſinia; but without any ſucceſs. At Martigues, ſulphur, both internally and externally, ſudorifics, antiſcorbutics, mercurials, ſweeteners, diluents, viper-broths and whey, were had recourſe to, but they had little or no effect; ſo that, when Dr. Joannis wrote, they contented themſelves with preſcribing a mild and moiſt diet, and left them to wait the laſt moment which was to free them from their ſufferings. In a word, it is obvious that the moderns, with all their powerful additions to the catalogue of the Materia Medica, have not been more ſucceſsful than the ancients in the cure of elephantiaſis, and have been led by experience to follow the plan, which they adopted, in reſpect to the dietetic courſe, as a ſlender palliative. Dr. Adams, indeed, affirms, that a *generous* diet certainly protracts life, and renders it more tolerable, according to the experience of the lazaretto in Madeira; but he admits that all other remedies have proved ineffectual. (Loc. cit. p. 281.) It may be obſerved, however, that an active medicine, which has not long been admitted into practice, has occaſionally proved ſucceſsful in the cure of ſome partial affections, which have ſometimes been deemed cancerous, and ſometimes conſidered as elephantiaſis, namely, the *lupus*, or *noli me tangere*; which corrodes and deſtroys by ulceration the parts that it attacks. This medicine is the arſenic, a preparation of which was introduced by Dr. Fowler, of York, and which experience has proved to be a ſafe and valuable remedy, for ſeveral diſeaſes. Whether this ſubſtance might prove beneficial in the early ſtates of elephantiaſis is a queſtion, which can as yet only be replied to on conjecture, deduced from a ſlight analogy.

The cure of the *thick leg* of warm climates, which is commonly at preſent called elephantiaſis, is not proſecuted with more ſucceſs, when it is once eſtabliſhed, than the diſeaſe of which we have juſt been ſpeaking. The chief meaſures of thoſe phyſicians, who have treated the diſorder in thoſe climates in its commencement, have been directed to diminiſh the febrile paroxyſms, by which it is preceded, by emetics, cathartics, diaphoretics, and the uſual remedies of fever; and afterwards to ſtrengthen the ſyſtem by the uſe of Peruvian bark, the mineral acids, and the cold bath. This method ſucceeds when the leg is not already grown large; but afterwards, Dr. Hillary obſerves, "we can only ſay with Rhaſes, that it is incurable; and nothing but amputation can relieve them from ſuch a load of leg; but, alas! this does not relieve the unhappy patient from the diſeaſe, unleſs the fever be taken off alſo, as above; for this operation has been often performed, but always without removing the diſeaſe, for the fever has certainly returned, and the morbid matter has as conſtantly fallen upon the other leg, and produced the ſame effects." (Loc. citat. p. 316.)

ELEPHANTINE, ſomething that relates to, or partakes of, the qualities of elephants.

The term is chiefly applied to certain books of the ancient Romans, wherein were recorded the tranſactions of the emperors, and the proceedings, acts, &c. of the ſenate. This we learn from Pollio and Vopiſcus, in the life of the emperor Tacitus, where he obſerves, that in the ſixth preſs of the Ulpian library, was kept one of theſe libri elephantini; wherein, for a long courſe of time, were written down the decrees and edicts of the ſenate. In ſome of theſe books were regiſtered all the acts and proceedings of the ſenate, and the magiſtrates of Rome; in others, the proceedings and events in the provinces, the armies, &c. There were about thirty-five large volumes of them, as many as there were tribes. In them were likewiſe contained the births, and claſſes of the citizens, with the muſters, and all things belonging to the cenſus. They are renewed every five years with the cenſors, and were all anciently kept in the ærarium, or public treaſury, in the temple of Saturn.

Vigenere, and ſeveral others, believe theſe books to have been called elephantine, by reaſon of their enormous bulk. but Loiſel, on the ſeventeenth chapter of the eleventh book of Aulus Gellius, gives us a different etymology; and aſſures us, they were called elephantine, becauſe compoſed of ivory leaves or tablets, which every body knows is a production of the elephant. See Diptycha.

Elephantine, in *Ancient Geography*, a town and iſland of Egypt, on the Nile, about a ſemi-ſtadium diſtant from Syene. This iſland is half a league long by a quarter wide. The town deſcribed by Strabo no longer ſubſiſts; but a ſmall village is built upon its ruins, near to which is a ſuperb gate of granite, which formed the entrance of one of the porticoes of the temple of "Cnept." A building ſurrounded by thick walls and rubbiſh formerly made a part of it; an elevated rampart at the point of the iſland ſerved to defend it againſt the inundation. The nilometer formed of a block of marble, ſo favourably ſituated in this place, for diſcovering the firſt appearance of the increaſe of the waters, and for regulating the labours of the huſbandman, is no more, a part of it being probably buried under the ſand and mud of the Nile.

ELEPHANTIS, a promontory of Aſia Minor, on the Boſphorus of Thrace, towards the northern part of the promontory Caracion.

ELEPHANTOPUS, in *Botany*, ſo named by Vailiant from ελεφας, *an elephant*. and πȣς, *the foot*, becauſe, as he himſelf informs us in the Memoires de l'Academie des Sciences for 1719, of the form and poſition of the radical leaves in E. *ſcaber*. The claſſical meaning of the word, however, is rather ivory-footed. Linn. Gen. 452. Schreb. 589. Willd. Sp. Pl. v. 3. 2389. Juſſ. 178. Gærtn. t. 165. Mart. Mill. Dict. v. 2. Claſs and order, *Syngeneſia Polygamia ſegregata*. Nat. Ord. *Compoſitæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* many-flowered, permanent, of three large, broad, acute leaves: *partial* four-flowered, oblong, imbricated; its ſcales lanceolate-awl-ſhaped, pointed, erect, four of them equal and longer than the reſt. *Cor.* compound, tubular: *florets* all perfect, four, or five, equal, ranged in a ſimple ſeries; their petal tubular, with a narrow limb, in five deep, nearly equal, diviſions. *Stam.* Filaments five, capillary, very ſhort; anthers united into a cylindrical tube. *Piſt.* Germen ovate, crowned; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, ſlender, ſpreading. *Peric.* none, except the permanent calyx. *Seeds* ſolitary, compreſſed; down of five briſtles. *Recept.* naked.

Obſ. Gærtner has rightly corrected the deſcription of Linnæus and Schreber, that the "florets are ligulate," an error ſuppoſed to have ariſen from their two external ſegments being occaſionally glued, as it were, together. This miſtake involved a much more important one, retained in the *Genera Plantarum* that "this genus ſhews there are no limits between the floſcular (tubular) and ſemi-floſcular (ligulate) flowers of Tournefort;" which remark now falls to the ground.

Eſſ. Ch. Partial calyx with four or five tubular florets, all perfect. Receptacle naked. Down briſtle-ſhaped.

Linnæus deſcribes two ſpecies of this genus, Willdenow ſix, all natives of the Weſt Indies, except the firſt and original one, E. *ſcaber*, which grows in moiſt ſhady ſandy places in the Eaſt Indies. This is the Ana-Schovadi of Rheede's Hort. Malab. v. 10. 13. t. 7, who informs us that this Malabar name is equivalent to "the traces of an elephant's foot," as if the leaves had been trodden flat by the ſteps of that animal; and that its appellation among the Bramins, Aſtipada, has the ſame ſignification. This idea was adopted in the generic name by Vaillant. The qualities of the herb are ſlightly aſtringent. Its *root* is woody and perennial. *Leaves* chiefly radical, depreſſed, elliptic-oblong, undulated, rough. *Stem* a ſpan or more in height, corymboſe. *Flowers* pale crimſon, moſt conſpicuous for the large heart-ſhaped rigid leaves of the common calyx. We know nothing remarkable of the remaining ſpecies, ſome of which have ſpiked flowers. Their general habit is rough and rigid, like the above.

ELEPHAS. See RHINANTHUS.

ELEPHAS, in *Ancient Geography*, a mountain of Ethiopia, above Egypt, near the Avalite gulf. Ptolemy. Arrian calls it a promontory.

ELEPHAS, in *Zoology*, a genus of the *Bruta* order, in the claſs Mammalia. The Linnæan character of the genus conſiſts in having no fore teeth in either jaw; elongated tuſks in the upper jaw only; proboſcis very long and prehenſile; and the body rather naked.

Of the elephas, or elephant, genus there is in the opinion of Linnæus only one ſpecies, and this, from its vaſt ſuperiority in ſize to all other quadrupeds he was acquainted with, he denominates maximus. Since the time of Linnæus we are better informed concerning the natural hiſtory of the elephant tribe; and it appears at preſent there are ſufficient reaſons for believing not only in the exiſtence of two, if not three diſtinct recent ſpecies, but alſo one, perhaps two, or even more, the remains of which are found only in a ſtate of petriſaction. Among the number of theſe it is ſcarcely to be queſtioned, in our opinion, that the maximus (or recent elephant) of Linnæus comprehends two diſtinct kinds, and that the remains of a third, an animal of the antediluvian race, and entirely different from either, is very clearly aſcertained. The remainder may require farther conſideration.

To the attention beſtowed on the purſuits of natural hiſtory in France we are in ſome meaſure indebted for the aſcertainment of the two former, but not entirely ſo; and it is not to the French naturaliſts alone that we owe the diſcovery of the third. It was a fact long ſince obvious to us, and very probably to many others, that from the ſtructure of the grinders of the elephants brought to Europe for the ſake of their ivory, there muſt be two diſtinct animals to which theſe diſſimilar teeth belonged. And, whoever has beſtowed the leaſt attention to the ſtupendous remains of the animal popularly called the behemoth, and by naturaliſts the mammoth, can on no very rational ground diſpute that there either does or has exiſted a third kind of elephant, admitting the latter as one. By the term elephant, as it reſpects the mammoth, we indeed wiſh to ſpeak with caution: it poſſeſſes ſome characters which ought, perhaps, to be conſidered as generically diſtinct from thoſe of elephas. In this place we nevertheleſs admit it under that denomination, and that not merely for the purpoſe of argument, but becauſe we know among the beſt naturaliſts of the continent, in the preſent period, it is ſo conſidered; and we ſhall not incautiouſly place our ſolitary opinion againſt this general concluſion. Its ſpecifical characters are obviouſly diſtinct from either of the living kinds, and in its generical diſtinctions it certainly approaches nearer to the elephant than any other race of animals known to us. Examples of the teeth of both the firſt mentioned kinds of elephants, of the elephants' teeth and tuſks found at a conſiderable depth in the ground in various parts of the country, and alſo the remains of the mammoth we poſſeſs in great variety, and from a due conſideration of theſe we believe ourſelves enabled to decide the important fact, that there are at leaſt two different ſpecies of the elephant tribe, and the evident teſtimony of another, which has exiſted at ſome remote period of the earth.

A valuable paper on the ſubject of the two firſt appears in the Memoirs of the French National Inſtitute by Cuvier. His obſervations are offered in a concluſive manner, and corroborate our ideas with reſpect to the two ſpecies of living elephants; the mammoth he admits as very diſtinct from either, but as a ſpecies of elephant. His remarks are the reſult of an examination of various ſpecimens in the National muſeum. This collection afforded him examples of the ſkulls of both ſpecies of the living elephants, of which we have only ſeen one, and the difference of theſe is very remarkable. The two ſpecies are named by Cuvier *Capenſis* and *Indicus*, the firſt inhabiting Africa, about the Cape of Good Hope, the other India. The African ſort has the front of the head convex and inclined, the tuſks larger, and the perpendicular layers of enamel, which, with the ſofter oſſeous matter, compoſe the grinders, exhibiting on the top, or worn ſurface, a number of rhomboidal ſpaces, and which are equally obſervable in a tranſverſe ſection of the tooth. The elephant of Aſia (Indicus) is larger: the front of the ſkull, inſtead of being convex, is deeply concave, and the upper part ſo dilated as to exhibit two pyramidal elevations; and the grinders have the enamel layers diſpoſed in the oſſeous ſubſtance in diſtinct tranſverſe parallel lines, inſtead of rhomboidal compartments. The grinder of the mammoth, we may add, has the upper ſurface divided into eight, ten, or more diſtinct conic prominences, riſing at leaſt an inch above the ſurface, and diſpoſed tranverſely in pairs. This laſt has rather the appearance of the tooth of ſome carnivorous animal than that of the elephant; and we rather ſuſpect, in contradiction to the current opinion, that its habits were different. See our article MAMMOTH.

From the conſideration of ſpecies, we muſt deſcend to varieties, of which there are ſeveral in the elephant tribe; ſome of which may perhaps hereafter be admitted as diſtinct ſpecies, as well as the former. The natural colour of the common, or Indian, elephant is cinereous, from which they ſometimes vary to white. The latter colour has been ſaid, in ſome inſtances, to ariſe from illneſs, or particular maladies to which the animal is liable; an aſſertion to which the leſs degree of probability muſt be attached, as we know the high conſideration in which the white elephants are held in India. The elephants of the Cape are of a red, or reddiſh colour, as we are well aſſured, and in particular by Levaillant in his ſecond journey through the interior of Africa. But what we conſider more remarkable and deſerving of further inveſtigation, is that, in his ſubſequent travels through the ſame parts, he ſpeaks of a race of elephants which never have tuſks, and the head of which is leſs elongated than the other ſorts. This ſeems to point out the exiſtence of a third living ſpecies.

And laſtly, while treating on this ſubject, we muſt not omit to mention that myſterious animal the ſukotyro. This is the animal introduced to the notice of Europe by a deſcription and figure given in the works of Niewhoff, a Dutch traveller, who ſpent ſome time in the Eaſt Indies, about the year 1563, and pretends to have ſeen it in the iſland of Ceylon. To us it appears of the moſt ambiguous character, and the repreſentation ſo miſerably defective, that we cannot venture any opinion on its genera, except that we believe it is not really what it profeſſes to be, an animal of a new genus. It bears ſome reſemblance to the elephant; and the French writers even call it the dwarf elephant (éléphant-nain); notwithſtanding which it exhibits no appearance of a proboſcis; its ſnout is rather that of the hog, and, in point of ſize, it correſponds with the buffalo. The leſs confidence muſt be repoſed on the authorities of the French writers in claſſing this uncertain quadruped with the elephants, ſince it is obvious, they have never ſeen the animal, and it is ſeriouſly to be apprehended, we allow more credit to Niewhoff for the exiſtence of his ſukotyro than he really merits.

It has been our aim to point out the diſtinctive characters of the two ſpecies of elephant, *capenſis* and *indicus*, in order to ſhew that what we have heretofore been taught to conſider as a ſingle ſpecies, does certainly comprehend two. It would be improper to affirm the exiſtence of more than two living kinds, although we are inclined to think there muſt be more. Writers often mention the diſcovery of bones, teeth, and tuſks of elephants, found buried at various depths in the earth, and many ingenious remarks and theories on this topic might be related. Few, however, of theſe writers ſeem aware of thoſe definitive characters, by which thoſe remains are referable to different ſpecies of the quadruped race; and it is only the obſervations of thoſe attentive to ſuch characters we can repeat with confidence. After this comment it is unneceſſary to obſerve, that thoſe relics which are generally confounded under the denomination of elephants' teeth and bones, are, in our opinion, the remains of more than one kind of animal. The obſerver ſhould be cautious alſo in deciding between the recent and foſſil bones, or, in other words, between thoſe which have merely undergone a natural decay, from remaining long in the earth, and thoſe which are ſtrictly mineralized; the laſt-mentioned, ſo far as our own obſervations extend, being indicative of ſpecies which are never found in a living ſtate. A more obvious inſtance of this than the mammoth affords, need not be adduced.

We ſhall now proceed to the hiſtory of the common elephant of India, the largeſt of all quadrupeds found at this time in a ſtate of nature. The ſize of this animal, its ſtrength, and ſagacity, have rendered it in all ages the admiration of mankind. The height of the elephant, which is often exaggerated by the early writers, appears to be from 10 to 14 feet, and one of the larger ſize is generally about 16 feet long from the front to the origin of the tail. The circumference of the neck 17 feet, and of the body in its moſt dilated part about 26 feet. The legs are ſhort and about ſix feet in circumference, and the tail ſlender, and about ſix feet long. Theſe are the dimenſions of the largeſt elephants, and exceed thoſe of the ordinary ſize by nearly one-third. In proportion to the ſize of the elephant his eyes are very ſmall, but they are lively, brilliant, and capable of great expreſſion. The mouth appears behind the trunk, which latter hangs between the two large tuſks, which are the principal weapons of the elephant's defence. The feet are ſhort, clumſy, and divided into five hoofs, or toes; the tail is terminated by a few large hairs. The teats in the female elephant are two in number, and ſituated at a ſmall diſtance behind the fore legs. But the moſt ſingular organ of the elephant is the trunk, which is at once the inſtrument of reſpiration, and the limb by which the animal ſupplies itſelf with food. The trunk of an elephant is about eight feet long, five feet in circumference near the mouth, and eighteen inches near the extremity. It is a pipe of an irregular conic figure, and widened at the end; the ſuperior ſide of the trunk is convex, and furrowed tranſverſely, and the inferior ſide is flat, and has two longitudinal rows of ſmall protuberances. The upper part of the trunk correſponds with the extremity of the noſe in other quadrupeds, and the inferior as an upper lip, including the noſtrils. The trunk is a continued canal, divided into two cavities by a longitudinal partition: theſe cavities aſcend along the fore part of the upper jaw, where they make a turn inwardly and deſcend into the palate, and then terminate in two ſeparate orifices: they have likewiſe each a ſeparate orifice at the end of the trunk. At the place where the cavities make a turn, and before they enter into the bones of the head, there is a moveable cartilaginous plate ſituated in ſuch a manner as enables the animal to ſhut the canal, and to prevent the water, with which it occaſionally fills the trunk, from entering the paſſage of the noſe, where the organs ſerving for the ſenſation of ſmell are placed: the tip is flattiſh, circular, and furniſhed with a projecting point, or fleſhy moveable hook, of extreme ſenſibility, and with which he can ſuck up the ſmalleſt objects at pleaſure, and which he manages with as much dexterity as a man does his hand, taking up grains of corn, or the ſmalleſt pieces of graſs, and conveying them to his mouth. When he drinks he thruſts his trunk into the water, and fills it by drawing in his breath and exhauſting the air. When the trunk is thus filled with water, he can either throw it out to a great diſtance, or drink it, by putting the end of the trunk in his mouth. In each jaw are four large flat grinding teeth, with the upper ſurfaces flat, and ſtriated or ſcored. The two large tuſks, by ſome called the horns of the elephant, produce the fineſt ivory. Thoſe imported into Europe are chiefly ſuch as are found in the woods of Africa. Inſtances have ſometimes occurred in which, on ſawing a tooth, a muſket bullet has been found completely imbedded in the central part without any viſible indication on the outſide, the ivory having gradually grown over and encloſed it. The ears are large and long, ſituated cloſe to the head, and are commonly pendulous, but he can raiſe them or move them with great facility, and frequently uſes them as a fan, to cool himſelf, or to defend his eyes from duſt and inſects.

The texture of the ſkin is uneven, wrinkled, and knotty, full of deep fiſſures, and reſembling the bark of an oak tree; and in the fiſſures, which are moiſt, are ſome briſtly hairs.

Buffon ſuppoſed the ancients to have been deceived when they tell us that the elephants cover like other quadrupeds, and has brought forward a multitude of arguments to prove its impoſſibility, from the peculiar ſituation of the parts of generation in the female. The vagina being placed in the middle of the abdomen ſeems to have been his principal objection, and hence Buffon aſſerts that the union of the elephants could not be accompliſhed in the ordinary way of quadrupeds. De Feynes and Travenier poſitively aſſure us that the ſituation of the ſexual organs confirms this fact, and that theſe animals cannot intermix unleſs they have more time and conveniency for the purpoſe than other quadrupeds, and that it is for this reaſon they never evince their natural paſſions, unleſs in the enjoyment of full liberty and retirement. Many anecdotes on this ſubject are related by travellers, and which in general tend to ſupport the conjectures of Buffon; but from the obſervation of M. Bleſs, who was ſecretary for the ſpace of twelve years to the Dutch government in Ceylon, M. Buffon was ſo far convinced both his judgment and the information he obtained had deceived him, that in his ſupplement he retracts the opinions advanced in the former part of his Natural Hiſtory. The obſervations of M. Bleſs are to the following effect: "I have perceived (ſays this writer) that the count de Buffon is deceived with regard to the copulation of the elephants. I know that in ſeveral parts of Aſia and Africa theſe animals, eſpecially during the ſeaſon of love, remain in the moſt inacceſſible places of the foreſts: but in the iſland of Ceylon, where I lived twelve years, the land being every where inhabited, they cannot ſo eaſily conceal themſelves, and having often examined them, I perceived that the female organ is ſituated nearly under the middle of the belly, which would lead us to think, with M. Buffon, that the males cannot cover the females in the manner of other quadrupeds. However, there is only a ſlight difference of ſituation. When the female courts the careſſes of the other ſex, ſhe proſtrates her fore legs only on the ground, and every difficulty is thus removed. I can likewiſe affirm that the elephants go with young about nine months. In the ſeaſon of love the males are ſtrongly chained for four or five weeks, and are, during that period, ſo furious, that their cornacks, or governors, cannot come near them without danger. The domeſtic female elephant, on theſe occaſions, ſometimes make their eſcape and join the wild ones in the woods. Some days afterwards her cornack goes in queſt of her, and calls her by name, 'till ſhe comes. She ſubmits with complacence, and allows herſelf to be conducted home, and ſhut up in the ſtable. According to the recent obſervations of Mr. Corſe, related both in the Philoſophical Tranſactions of London, and the Tranſactions of the Bengal Society, it appears, however, that the elephants both couple and produce young in a ſtate of domeſtication. In order to determine this experiment, a couple of elephants were put to rut in an incloſed ſpace, where they had abundance of food, and every neceſſary accommodation. At firſt they were only ſociable, at length they became more familiar, and began to ſhew ſigns of fondneſs, by frequently careſſing each other with their trunks, and on the 28th of June, at night, the expectations of their obſervers were fulfilled. They were ſeen to cover like the horſe, and this was witneſſed no leſs than five times in the courſe of ſixteen hours.

Elephants, even in a ſavage ſtate, are peaceable and gentle creatures, and are ſaid never to uſe their weapons but in defence of themſelves or companions. Their ſocial diſpoſitions are ſo ſtrong that they are ſeldom found alone, but march always in large troops; the oldeſt and moſt experienced lead the van; the younger or lame ones keep in the middle, and thoſe of a ſecond rate, as to age, walk in the rear. The females carry their young on their tuſks, embracing them at the ſame time with their trunk. They ſeldom march in regular order but when they reckon the journey dangerous, ſuch as an expedition to cultivated lands, where they expect to meet with reſiſtance, on other occaſions they are leſs cautious: ſome of them falling behind, or ſeparating from the reſt, but ſeldom ſo far as to be without the reach of aſſiſtance, by alarming and aſſembling their companions. It is dangerous to offer them the leaſt injury; for they run ſtraight upon the offender; and although the weight of their body be great, their ſteps are ſo large, that they eaſily outrun the ſwifteſt man, whom they either pierce with their tuſks, or ſeize with their trunk, dart him into the air like a ſtone, and then trample him under the feet. But they are ſaid never to attack any perſon unleſs provoked. However, as they are extremely ſenſible and delicate with regard to injuries, it is always prudent to keep out of their way. Travellers, in countries they inhabit, kindle large fires, and beat drums during the night, in order to prevent their approach. After being once attacked by men, or falling into an ambuſh, they are ſaid never to forget the injury, but ſeek every opportunity for revenge. As they are endowed perhaps with a more exquiſite ſenſation of ſmell than any other animal, owing to the great extent of their noſe, they can ſcent a man at a great diſtance, and trace him by his footſteps.

Elephants are peculiarly fond of the banks of rivers, deep vallies, and marſhy grounds, eſpecially in the depths of foreſts. They delight in drawing up water into their trunks, when they do not drink it, and amuſe themſelves in daſhing the water around: they cannot endure cold, and are equally averſe to an exceſs of heat: in order to avoid the ſcorching heat of the ſun, they retire to the thickeſt and moſt ſhady parts of the foreſt. The bulk of their bodies is ſo enormous that they do not often go into deep waters. The ordinary food of the elephant conſiſts of roots, herbs, the tender branches of trees, fruit, and grains, and they abhor animal food. When any of them diſcovers a fine paſture, he invites his companions to the repaſt, and as they devour a large quantity of food in a ſhort time, they are always ſhifting their paſture. When they meet with cultivated grounds they make prodigious deſolation, and deſtroy more plants by treading them down than they uſe for nouriſhment, which laſt is very conſiderable, and amounts to about 150 pounds of herbage every day. As they conſtantly graze in large troops they lay waſte whole fields in an hour. The Indians and negroes employ every art to prevent them from viſiting their cultivated lands, by making great noiſes and burning large fires round their fields. However, theſe precautions are not always ſufficient to prevent the elephants from viſiting them. They chaſe away the domeſtic animals, put the inhabitants to flight, and ſometimes throw down their habitations. Elephants are hardly ſuſceptible of fear; the only things which can ſurpriſe them, or ſtop their courſe, are fire works, ſuch as ſquibs, crackers, &c. the effects of which are ſo ſudden and ſo quickly repeated, that the elephants frequently turn back, and when one runs, all the reſt follow his example.

Although the ſocial diſpoſition in the elephant be remarkable, in the rutting ſeaſon their docility gives place to the ſtronger impulſe of love. They ſteal off in couples to the moſt ſecret parts of the foreſt. The elephant, when it comes into the world, is as large as a young boar, and equal to an ox in ſize when ſix months old. The young ſuck the teats of the female with the mouth, and not the trunk, as erroneouſly repreſented.

The manner of taking and taming elephants merits attention. In foreſts, and ſuch places as are frequented by elephants, the Indians chooſe a ſpot, and incloſe it with ſtrong paliſadoes: they uſe the largeſt trees as the principal ſtakes, to which are fixed ſmaller ones, in a tranſverſe direction. Theſe croſs trees are ſo fixed as to allow a man to paſs eaſily through. There is likewiſe a large entrance left for the elephant, over which, is ſuſpended a ſtrong barrier, which is let down afterwards as ſoon as he enters. In order to decoy him into the encloſure, the hunters take along with them a tame female in ſeaſon, and travel about till they come ſo near that the cry of the female can reach the male, whom they previouſly obſerve in the foreſt; then the guide of the female makes her give the cry peculiar to the ſeaſon of love, to which the male inſtantly replies and approaches. The guide then makes the female proceed towards the artificial incloſure, repeating her cries as ſhe proceeds; ſhe enters the incloſure, the male follows her, and the Indians immediately ſhut the port behind him. He no ſooner diſcovers that he is enſnared than his paſſion for the female is converted into rage and fury. The hunters entangle him with ſtrong ropes, and bring two or three tame elephants to pacify him, and in a word, by the application of torture and careſſes, reduce him in a few days to obedience.

There are many other methods of catching elephants. Inſtead of making large incloſures with paliſadoes, like the kings of Siam and other monarchs, the poor Indians are content to adopt a moſt ſimple method; they dig deep pits in the roads, frequented by elephants, covering them with branches of trees and turf, into which the elephants are precipitated by their enormous weight in attempting to paſs, and being unable to extricate themſelves, are eaſily taken.

The elephant, when tamed, is the moſt friendly and obedient of all animals, and is entirely attached to the perſon who feeds and takes care of him. He readily underſtands ſigns and the ſounds of his maſter's voice, and diſtinguiſhes the language of paſſion, command, and ſatisfaction. He receives his orders with attention, and executes them with alacrity and prudence. He eaſily learns to lower his body for the convenience of thoſe who mount him. He careſſes his friends with his trunk. With this wonderful organ he alſo lifts burdens, and aſſiſts thoſe who are loading him in laying them on his back. When yoked in a cart or waggon, he pulls equally and cheerfully, unleſs abuſed, or injudiciouſly chaſtiſed. His guide is generally mounted on his neck, with a ſmall iron rod ſharp at one end, and with this he directs his motion by pricking him on the ears and head, but more frequently it is ſufficient to direct him by the voice. A tame elephant will do more labour than ſix horſes, and he requires a quantity of food in proportion. They are the principal beaſts of burden in many parts of Africa and the Eaſt Indies. They carry ſacks and bundles of all kinds on their neck, back, and tuſks. They never loſe or damage any thing committed to their care; and it is ſaid, they will ſtand on the edge of a river, take bundles off their neck and tuſks, and lay them carefully in any part of the boat deſired, and try with their trunk whether they are properly ſituated, and if they be loaded with caſks, they go in queſt of ſtones to prop them, and prevent them from rolling.

The elephant is not only the moſt tractable, but the moſt intelligent of animals, ſenſible of benefits, reſentful of injuries, and endowed even with a ſenſe of glory. Some extraordinary inſtances of this, though often related, may bear repetition. In India they were once employed in launching ſhips; one was directed to force a veſſel of large ſize into the water, the work proved ſuperior to his ſtrength, his maſter, with a ſarcaſtic tone, deſired the keeper to take away this lazy beaſt and bring another; the poor animal inſtantly repeated his efforts, fractured his ſkull, and died on the ſpot. The celebrated ſtory of the taylor at Delhi is recorded as a remarkable example of the elephant's ſagacity. The elephant, paſſing along the ſtreets, put his trunk into the window of a taylor's ſhop, where ſeveral people were at work, one of whom pricked the end with his needle; the beaſt paſſed on, but in the firſt dirty puddle filled his trunk with water, and on his return diſcharged it over thoſe who offended him, and ſpoiled their work. This is related by Ludolph. (Hiſt. Æthiop.) who alſo gives the following anecdote. An elephant at Adſmeer, which often paſſed through the market, as he went by a certain herb-woman always received from her a mouthful of greens. At length he was ſeized by one of his periodical fits of rage, broke from his keeper, and running about the market, put the crowd to flight. Among others, was this woman, who in her haſte forgot a little child ſhe had brought with her. The animal recollected the ſpot where his benefactreſs uſually ſat, and taking the infant up gently with its trunk, removed it to a place of ſafety.

Buffon relates, that a ſoldier at Pondicherry, who was accuſtomed, whenever he received his portion of proviſions, to convey a certain quantity of it to one of theſe animals, having one day drank rather too freely, and finding himſelf purſued by the guard, who were going to take him to priſon, took refuge under the elephant's body and fell aſleep. In vain did the guard try to force him away from this aſylum, as the elephant protected him with his trunk. The next morning the ſoldier, recovering from his drunken fit, ſhuddered with horror to find himſelf ſtretched under the belly of this huge animal. The elephant, which, without doubt, perceived the man's embarraſſment, careſſed him with his trunk, in order to inſpire him with courage, and make him underſtand that he might now depart in ſafety.

In the memoirs of the French Academy of Sciences, we are told the following circumſtance. A painter was deſirous of drawing the elephant which was kept in the menagerie at Verſailles in an uncommon attitude, namely, that of holding his trunk raiſed up in the air with his mouth open. The painter's boy, in order to keep the animal in this poſture, threw fruit into his mouth, but as the lad frequently deceived him and made an offer only of throwing him the fruit, he at laſt grew angry, and as if he had known the painter's intention of drawing him was the cauſe of the affront, inſtead of revenging himſelf on the lad, he turned his reſentment on the maſter, and taking up a quantity of water in his trunk, threw it upon the paper on which the painter was drawing, and ſpoiled it.

At the Cape of Good Hope it is cuſtomary to kill theſe animals for the ſake of their teeth by the chace. Three horſemen well mounted and armed with lances attack an elephant alternately, each relieving the other as they ſee their companion preſſed, till the beaſt is ſubdued. Three Dutchmen (brothers,) who had made large fortunes by this buſineſs, had determined to retire to Europe and enjoy the fruits of their labours; but reſolved before they went, to have a laſt chace by way of amuſement; they met with their game, and began in the uſual manner; but unfortunately one of their horſes fell down and flung its rider; the enraged elephant inſtantly ſeized the unhappy man with its trunk, flung him up to a vaſt height in the air, and received him on one of its tuſks; then turning towards the two other brethren, as if it were with an aſpect of revenge and inſult, held out to them the impaled wretch writhing on the bloody tooth.

By the ancient Indians, elephants were much uſed in war. Porus, the Indian monarch, is ſaid to have oppoſed the paſſage of Alexander over the Hydaſpes with eighty-five elephants. A number of theſe taken by Alexander were afterwards, as is recorded, ſent into Greece, where Pyrrhus employed them ſome years after againſt the Romans in the battle of Tarentum. Both the Greeks and Romans ſoon learnt to get the better of theſe monſtrous animals; they opened their ranks and allowed them to paſs through; neither did they attempt to hurt them, but endeavoured to kill their guides. Now that fire-arms are the principal inſtruments of war, elephants, who are terrified at the noiſe and flame, inſtead of being uſeful in a charge, would tend only to embarraſs an army. However, in Cochin and other parts of Malabar, and alſo in Tonquin, Siam, and Pegu, where fire-arms are little underſtood, they are ſtill uſed in battle. The guide ſits aſtride upon the neck, and the combatants ſit or ſtand upon the other parts of his body. They are more commonly uſed in thoſe provinces of India where the uſe of fire-arms prevails, for fording rivers, and carrying magazines, military cheſts, or even the field pieces in ſwampy grounds, where they cannot readily be drawn by horſes. In croſſing rivers after the keepers have loaded them ſufficiently, (and they carry from three to four thouſand weight,) they faſten ropes to them, of which the ſoldiers taking hold, either ſwim or are drawn acroſs the river. They are alſo uſeful in forcing open the gates of a city or garriſon, or forcing any entrance, to prevent which, moſt of the garriſons in India have large ſpikes ſtuck in their gates that project to a conſiderable diſtance.

Elephants are however retained by princes in India, rather for the purpoſes of luxury and magnificence than any real utility, and the expence of keeping them is prodigious. The greateſt care is taken in the management and decoration of theſe animals, which after their daily feeding, bathing, oiling, and rubbing, are often painted about the ears and head with various colours, and their tuſks ſurrounded with rings of gold and ſilver. When they appear in ſtate to grace proceſſions or other ceremonies, they are cloathed in the moſt ſumptuous trappings. It is ſaid to be not an uncommon circumſtance, if a nabob is diſpoſed to ruin a private gentleman, to make him a preſent of an elephant, which he is afterwards obliged to maintain at a greater expence than he can afford; by parting with it, he would certainly fall under the diſpleaſure of the grandee, beſides forfeiting all the honour which his countrymen think is conferred upon him by ſo reſpectable a preſent. That the elephant lives to a great age is not unknown; in a ſtate of ſlavery and labour, ſome have been ſaid to live from one hundred to one hundred and thirty years; whether, as ſome writers aſſert, in its ſtate of wildneſs, it lives to the age of two hundred years cannot eaſily be determined; they are alſo ſaid not to attain their full growth till they are thirty years old, and that their propagative abilities do not fail at the age of one hundred and twenty. In Africa, where elephants are far more numerous than in Aſia, the natives hunt them for the ſake of their fleſh as well as the ivory of their tuſks. The trunks they eſteem a delicious morſel. So numerous are the herds of elephants in ſome parts of Africa, that the natives are compelled to live in ſubterraneous dwellings to avoid them. Their tuſks, which are found in the woods by the negroes, form an article of immenſe commerce in Congo and Guinea, and alſo in Acra, Ante, Benin, Rio de Calbari, and on the Gold Coaſt.

The ancients held the elephant in high veneration for his ſagacity. They pretended that he underſtood the language of men, and, what was infinitely more to its honour in their ideas, the worſhip of the gods: they adored the ſun and moon, and offered ſupplication for favours, and gratitude for benefits beſtowed. The moderns entertain other notions, and aſcribe it to a ſuperiority of intellect over the whole brute creation: for it is not inſtinct merely, but reaſon which they allow the elephant to poſſeſs. From the obſervations, however, of our countryman, Mr. Corſe, whoſe reſidence in India afforded him an opportunity of inveſtigating the ſubject with exactneſs, it does not appear that the elephant is altogether entitled to that elevated character with which it has been ſo frequently honoured; and that neither its docility nor its memory can be allowed a very high rank, when compared with thoſe of ſome other animals; and that the ſcrupulous delicacy which, it was pretended, forbad all public demonſtration of its natural paſſions, is a mere fable. A female elephant has been known to forget her young one, after having been ſeparated only for the ſhort ſpace of two days, and to repel its advances: and an elephant, alſo, which had eſcaped from its confinement, has again ſuffered itſelf to be trepanned, and reconducted to its former ſtate of captivity.

The account alluded to is given by Mr. Corſe in the Philoſophical Tranſactions for the year 1799, and cannot fail to prove highly concluſive and ſatisfactory to every curious reader. Mr. Corſe obſerves, that both male and female elephants are divided by the natives of Bengal into two caſts, namely, the Koomareah and the Mergee. The firſt conſiſts of the large and full-bodied kind; the ſecond, of the more ſlender, with longer legs and thinner trunk in proportion: it is alſo a taller animal, but not ſo ſtrong as the former. A long trunk is always conſidered as a great beauty in an elephant; ſo that the koomareah is preferred, not only on this account, but for his ſuperior ſtrength in carrying burthens, &c. Many indiſtinct varieties are again produced from the intermixture of theſe two breeds. The torrid zone ſeems to be the natural clime of the elephant, and the moſt favourable for the production of the largeſt and hardieſt race; and, when this animal migrates beyond the tropics, the ſpecies degenerates. On the coaſts of Malabar, elephants are taken as far north as the territories of Coorgah Rajah; but theſe, according to Mr. Corſe, are much inferior to the Ceyloneſe elephant.

"The tuſks in ſome female elephants," ſays Mr. Corſe, "are ſo ſmall as not to appear beyond the lip; whilſt in others, they are almoſt as large and long as in one variety of the male, called mooknah. The grinders are ſo much alike in both ſexes, that one deſcription may ſerve for both. The largeſt tuſks, and from which the beſt ivory is ſupplied, are taken from that kind of male elephant, called dauntelah, from this circumſtance, in oppoſition to mooknah; whoſe tuſks are not larger than thoſe of ſome females. An elephant is ſaid to be perfect, when his ears are large and rounded, not ragged or indented at the margin; his eyes are of a dark hazel colour, free from ſpecks; the roof of his mouth and his tongue without dark or blackiſh ſpots of any conſiderable ſize; his trunk large; his tail long, with a tuft of hair reaching nearly to the ground. There muſt be five nails on each of his fore-feet, and four on each of the hind ones; his head well ſet on, and carried rather high; the arch or curve of his back riſing gradually from the ſhoulder to the middle, and thence deſcending to the inſertion of the tail; and all his joints firm and ſtrong. In one variety of the elephant, the tuſks point downwards, projecting only a little way beyond the trunk. The tuſks of the elephant are fixed very deep in the upper jaw; and the root of the upper part, which is hollow and filled with a core, goes as high as the inſertion of the trunk, round the margins of the naſal opening to the throat; which opening is juſt below the protuberance of the forehead. Through this opening the elephant breathes, and by its means he ſucks up water into his trunk: between it and the roots of his tuſks there is only a thin bony plate. The firſt or milk tuſks of an elephant never grow to any conſiderable ſize, but are ſhed between the firſt and ſecond year, when not two inches in length. The time at which the tuſks cut the gum varies conſiderably: ſometimes a young elephant has his tuſks at five months old, and ſometimes not till ſeven. Even in a fœtus, which has arrived at its full time, theſe deciduous tuſks are formed. A young elephant ſhed one of his milk-tuſks on the 6th of November, 1790, when about thirteen months old; and the other on the 7th of December, when above four months old. Two months afterwards, the permanent ones cut the gums; and on the 19th of April, 1791, they were an inch long. Another young elephant did not ſhed his milk-tuſks till he was ſixteen months old; which proves that the time of this proceſs varies conſiderably. The permanent tuſks of the female are very ſmall, compared with thoſe of the male; and do not take their riſe ſo deep in the jaw. The largeſt elephant tuſks Mr. Corſe ever ſaw in Bengal did not exceed the weight of 72 pounds avoirdupois; at Tiperah, they ſeldom exceed 50 pounds each. Both theſe weights are very inferior to that of the tuſks brought from other parts to the India Houſe, where ſome have weighed 150 pounds each. Theſe, Mr. Corſe ſuſpects, were from Pegu. The African elephant is ſaid to be ſmaller than the Aſiatic; yet the ivory-dealers in London affirm that the largeſt tuſks come from Africa, and are of a better texture, and leſs liable to turn yellow than the Indian ones: a circumſtance which corroborates the truth of the ſpecifical diſtinction between the Aſiatic and African elephants. The increaſe of the tuſks ariſe from circular layers of ivory applied internally, from the core on which they are formed, ſimilar to what happens in the horns of ſome animals. The grinders of elephants may be conſidered as compoſed of ſeveral diſtinct laminæ or teeth, each covered with its proper enamel; and theſe teeth are merely joined to each other by an intermediate ſofter ſubſtance, acting as a cement. This ſtructure, even at firſt glance, muſt appear very curious, being compoſed of a number of perpendicular laminæ, which may be conſidered as ſo many teeth; each covered with a ſtrong enamel, and joined to one another by the common oſſeous matter: this, being much ſofter than the enamel, wears away faſter by the maſtication of the food; and in a few months after theſe teeth cut the gum, the enamel riſes conſiderably higher, ſo that the ſurface of each grinder ſoon acquires a ribbed appearance, as if originally formed with ridges. The number of theſe teeth, or proportions, of which an elephant's grinder is compoſed, varies from four to twenty-three, according as the animal advances in age; ſo that the grinder, or caſe of teeth, in a full-grown elephant is more than ſufficient to fill one ſide of the mouth. The ſhape of the grinder of the lower jaw differs from thoſe of the upper, which are very convex on the back part; whereas the lower has a bent or curved direction, adapting itſelf to the ſhape of the jaw, and is concave on the ſurface. The grinders, like the tuſks, are already formed even in the very young animal. The firſt ſet of grinders, or milk-teeth, begin to cut the gum eight or ten days after birth; they are not ſhed or caſt as the milk-tuſks are, but are gradually worn away during the time thoſe of the ſecond ſet are coming forward. Mr. Corſe could not aſcertain the exact time at which the ſecond ſet of grinders makes its appearance; but when the elephant is two years old, the ſecond ſet is then completely in uſe. At about this period the third ſet begins to cut the gum; and from the end of the ſecond to the beginning of the ſixth year, the third ſet comes gradually forward as the jaw lengthens, not only to fill up this additional ſpace, but alſo to ſupply the place of the ſecond ſet, which is, during the ſame period, gradually worn away. From the beginning of the ſixth to the end of the ninth year, the fourth ſet of grinders comes forward, to ſupply the gradual waſte of the third ſet. After this period, other ſets are produced; but in what proportion, and in what time, is not yet aſcertained: but it is reaſonable to conclude that every ſucceeding grinder takes a year longer than its predeceſſor to be completed; and conſequently that the fifth, ſixth, ſeventh, and eighth ſets of grinders will take from five to eight years (and probably much longer) each ſet, before the poſterior lamina has cut the gum.

The curious reader, deſirous of farther information on the hiſtory of elephants, may conſult the following, among other valuable publications on the ſubject, with advantage: "Deſcriptio nova Elephanti," &c. P. Gillius, 1562, 1565, (ſeorſim edita 1614); "Hiſtoria Elephanti," J. Prætorius, 1607; "Elephas, das iſt, Hiſtoriſcher und Philoſophiſcher Diſcurs vondem Elephantem," C. Horn, 1629; "L'Hiſtoire des Elephants," S. de Priezac, 1650; "Elephas Brutum non-brutum," &c. J. Lipſius, 1650; "An Account of taking and taming Elephants in Zeylon," Strachan, Phil. Tranſ.; "De Elephantis," &c. C. Cuperus, 1719; "Sur un Elephant qui a vecu à Naples pluſieurs Années," Mem. Fr. Acad.; "Geſchichte des Elephanten," Berl. 1777; "Account of catching wild Elephants at Tipura," Corſe, Bengal Tranſ., &c.

ELEPORUS, in *Ancient Geography*, a river of Italy, in Brutium.

ELERA, a town of Aſia, in Batanæa, a country of Syria. Ptolemy.

ELERO, in *Geography*, a river of Piedmont, which runs into the Tanaro, near Carri.

ELESCHEVI, a town of Ruſſian Siberia, in the government of Tobolſk, on the Tchulim; 84 miles E.N.E. of Tomſk.

ELEVATIO, in *Proſody*, the ſame as arſis. See Arsis.

Elevatio, *Arſis*, in *Muſic*, the lifting up the hand or foot in beating time, ſerves to mark the unaccented parts of a bar, and is called the *up*, or that tact or portion of a bar which occupies the ſecond or fourth part of a meaſure. It was the contrary with the ancients. An elevation of voice, in ſinging, is aſcending to the acute.

In the Roman Catholic church, the lifting up the hoſt or body of our Saviour is called elevatio, or the elevation, for which there is a particular ſervice.

ELEVATION, the altitude or height of any thing. See Altitude.

The word is formed from *elevare*, to raiſe or lift up.

Elevation *of a Star*, or other point, in the ſphere, is an arch of the vertical circle, intercepted between ſuch ſtar, or other point, and the horizon.

Hence, as the meridian is a vertical circle, a meridian altitude or elevation, *i. e.* the elevation of a point in the meridian, is an arch of the meridian, intercepted between that point and the horizon.

Elevation *of the Pole*, denotes the altitude of the pole above the horizon of any place, or an arch of the meridian, intercepted between the pole and the horizon.

Thus, in *Plate* XII. *Aſtronomy*, *fig.* 102, A Q being ſuppoſed the equator, H R the horizon, H Z P N the meridian, and P the pole; P R is the elevation of the pole.

In which ſenſe elevation ſtands oppoſed to depreſſion or depth. See Depression.

The elevation of the pole is always equal to the latitude of the place; that is, the arch of the meridian intercepted between the pole and the horizon, is always equal to the arch of the ſame meridian, intercepted between the equator and the zenith. Thus, the north pole is elevated 51° 32′ above the horizon of London; and there is the ſame diſtance, or number of degrees, between London and the equator; ſo that London is likewiſe in 51° 32′ of northern latitude.

To obſerve the elevation of the pole of any place, ſee Pole and Latitude.

Elevation *of the Equator*, is an arch of the meridian, leſs than a quadrant, intercepted between the equator and the horizon of the place.

Thus A Q, as before repreſenting the equator, H R the horizon, P the Pole, and H Z P N the meridian; H A is the elevation of the equator. See Equator.

The elevations of the equator, and of the pole, together, are always equal to a quadrant; conſequently, the greater the elevation of the pole, the leſs the elevation of the equator, and *vice verſâ*.

Thus, in the figure juſt cited, P A is ſuppoſed by the conſtruction a quadrant, and H A + A P + P R a ſemicircle; conſequently, H A + P R is a quadrant.

Elevation *of the Equator, to find the.* Find the elevation of the pole, after the manner hereafter directed, under the article Pole.

Subtract the elevation found from a quadrant, or 90°; what remains is the elevation of the equator. Thus, the elevation of the pole 51° 32′, being ſubtracted from 90°; leaves the elevation of the equator 38° 28′.

Elevation, in *Architecture*, is the orthographic projection of an edifice, or object, by a ſyſtem of rays parallel to the horizon. Hence its uſe in deſcribing the vertical parts of objects, particularly when theſe objects conſiſt of planes, and when theſe planes are parallel to the plane of projection. By the uſe of plans and elevations, we are enabled to communicate our ideas of a deſign to others, who are thereby enabled to put them in practice.

ELEVATION, in the *Romiſh Religion*, is applied to that part of the maſs wherein the prieſt hoiſts or raiſes the hoſt, with the cup above his head, for the people to adore it, after having firſt conſecrated and adored it himſelf.

Whilſt the prieſt officiates at maſs, a bell is rung at the elevation, to appriſe the people to caſt their eyes upon their new-formed Saviour and adore him.

St. Lewis decreed, that they ſhould fall on their knees at the elevation, in imitation of certain religious whom he does not name. The Chartreux, and the religious de la Trappe, ſtill obſerve this ceremony of proſtrating themſelves at the elevation.

ELEVATION, *Angle of*, in *Mechanics*, is the angle A R B (*Plate* XXII. *Mechanics fig.* 4.) comprehended between the line of direction of a projectile A R, and the horizontal line A B. See PROJECTILE and ANGLE.

ELEVATION *of a Cannon or Mortar-piece*, is the angle which the chaſe of the piece, or the axis of the hollow cylinder, makes with the plane of the horizon.

ELEVATOR, in *Anatomy*, is a name given to ſeveral muſcles of the body, which have the office of elevating or drawing upwards the parts into which they are inſerted. It has the ſame import with levator or attollens, and is directly oppoſite to depreſſor.

ELEVATOR *Alæ Naſi*, is a name given by Cowper to the *Compreſſor narium*, which ſee.

ELEVATOR *Auris*, is the ſame with attollens auriculam. See EAR.

ELEVATOR *Humeri*, is an old name for the *Deltoides*, which ſee.

ELEVATOR *Labiorum communis*, the ſame with levator anguli oris. See DEGLUTITION.

ELEVATOR *Labii inferioris*, is deſcribed in the article DEGLUTITION, under the name of levator menti.

ELEVATOR *Labii ſuperioris*, is a name given by ſome authors to that part of the levator labii ſuperioris and alæ naſi, which is inſerted into the upper lip. See DEGLUTITION.

ELEVATOR *Oculi*, is the ſuperior ſtraight muſcle of the eye. See EYE.

ELEVATOR, in *Surgery*, an inſtrument for raiſing depreſſed portions of the ſkull.

Beſides the common elevator, now generally preferred by all the beſt operators, ſeveral others have been invented, as, for inſtance, the tripod elevator, and another, which was firſt deviſed by M. I. L. Petit, and afterwards improved by M Louis.

The common elevator is an exceedingly ſimple kind of inſtrument, being in fact a mere lever, the end of which is ſomewhat bent, and made rough, in order that it may be leſs apt to ſlip away from the piece of bone which is to be raiſed. This inſtrument may be uſed by forming a fulcrum for it, either in the hand which holds it, or on the fingers of the other hand; or the operator may make a fixed point for it on the edge of the opening made with the trephine, or of that which the accidental violence has occaſioned. In the firſt caſe, it has been objected, that the inſtrument cannot be employed with much force; the hand may give way; or the elevator may ſlip away from the bone againſt which it preſſes, and thus produce a conſiderable concuſſion. In the ſecond caſe, it has been found objectionable, that the part on which the inſtrument is placed may be forced inward.

Such were the inconveniences which led to the invention of the tripod elevator, one piece of which conſiſts of three branches uniting above into one common trunk. This part of the elevator is pervaded by a long ſcrew, having below a kind of hook, and above a ſort of handle for turning it. It is with the hook that the depreſſed portion of bone is to be elevated. This part of the inſtrument is to be introduced into the opening made in the cranium, as ſoon as the elevator has been put in a proper poſition; and it is to be made to aſcend, by turning the ſcrew. Formerly, the tripod elevator was alſo ſometimes uſed conjointly with a ſort of ſcrew, which was firſt fixed in the piece of bone about to be elevated, and then drawn upward, by placing the hook in a ring, which was attached to its upper part.

The inventors of the tripod elevator were certainly very well acquainted with the imperfections of the common one; and they endeavoured to obviate them, by procuring a firmer fulcrum, and a greater degree of power. But it was neceſſary to change the ſituation of their elevator, as often as there was occaſion to raiſe a different portion of bone; and the hook, alſo, being connected with an inflexible piece of ſteel, the direction of which was always the ſame as that of the inſtrument, it became troubleſome and difficult to place the hook under the piece of bone, which ſtood in need of being raiſed.

On the foregoing accounts, M. J. L. Petit was induced to invent a new elevator. This conſiſted of a lever, mounted on a handle, and ſtraight throughout its whole length, except juſt at its very end, which was ſlightly curved, in order that it might be more conveniently put under the portion of bone which was about to be elevated. The lever under conſideration was pierced at various diſtances from its bent end with ſeveral holes, intended for the reception of a little kind of moveable ſcrew-peg, which was fixed on the top of a ſort of bridge. This latter part of the inſtrument conſiſted of a kind of arch, the ends of which were long and covered with little cuſhions, while on its centre was placed the little ſcrew-peg already mentioned. M. Petit wiſhed the peg to be joined to the bridge by means of a hinge; and as he often found it neceſſary to elevate ſeveral different pieces of bone in the ſame caſe, he thought that the little ſcrew ſhould not be completely faſtened in the hole, but that the inſtrument ſhould be capable of being turned to the right, or left, or to any point of the cranium. However, the ſtructure of the ſcrew only allowed the inſtrument, on turning this to the right or left, to be applied with its edge obliquely under the bone which one wiſhed to elevate.

M. Louis endeavoured to remove the inconveniences of Petit's elevator, by ſubſtituting for the hinge a ſort of pivot. This conſtruction rendered the lever capable of being readily moved in every direction, and of being put under any point of bone, which required being elevated, without any neceſſity for altering the poſition of the bridge forming the fulcrum.

We have only to repeat, reſpecting elevators, that all the beſt modern ſurgeons give the preference to the common one, which is moſt ſimple, and is found to anſwer every deſirable purpoſe. See TREPAN.

ELEVE, a term purely French, though of late uſed alſo in our language. Literally it ſignifies a diſciple or ſcholar, bred up under any one, being formed from the Italian, *allievo*, an apprentice or novice.

It was firſt uſed by the French writers, in ſpeaking of painters; ſuch a painter was an eleve of Da Vinci, of Raphael, &c. From painting it came to be applied to ſuch as ſtudied or learned any other art under a maſter. In the Royal Academy of Sciences, there were twenty eleves; and in that of inſcriptions, ten eleves. The eleves were to act in concert with the penſionaries.

The denomination eleve, however, was afterward ſuppreſſed, and that of adjoint ſubſtituted in its room; becauſe every body did not know the ſenſe affixed to it by the academy: and hence the penſionary academiſts had not, as formerly, each of them an eleve; but the eleves became adjoints, or aſſociates of the academy. See ACADEMY.

ELEUS, in *Ancient Geography*, an iſland of Aſia Minor, on the coaſt of Ionia; placed by Thucydides in the vicinity of the town of Miletus.

ELEUSA, an iſland of Cilicia, according to Pliny; named Sebaſta by Ptolemy; ſituated N. of Rhodes.—Alſo, an iſland of Greece, on the coaſt of Attica, in the Saronic gulf, S. of mount Hymettus, and oppoſite to a ſmall promontory. Pliny.

ELEUSIN, a town of Greece, in the iſland of Thera. Ptolemy.

ELEUSINE, in *Botany*, Gærtn. t. 1. See CYNOSURUS, ſp. 12.

ELEUSINE, in *Ancient Geography*, a village of Egypt, ſituated near Alexandria and Nicopolis, on the canal of Canopus, according to Strabo.

ELEUSINIA, in *Antiquity*, the myſteries of the goddeſs Ceres, or the religious ceremonies performed to her honour; thus called from *Eleuſis*, a maritime town of the Athenians, wherein was a temple of that goddeſs, famous for the celebration of theſe myſteries. See CEREALIA.

Some writers call the city where the Eleuſinia were celebrated, *Eleuſinia* or *Eleuſis*: Harpocration confirms this orthography, in deriving its name from *Eleuſinus*, a ſon of Mercury; to which opinion Pauſanias likewiſe adheres, in his Attics. Others who write it Ελευσις, *Advent*, ſuppoſe it thus called becauſe Ceres, after running over the world in ſearch of her daughter, ſtopped here, and put an end to her purſuit. Diodorus Siculus, lib. v. will have the name *Eleuſis* to have been given this city, as a monument to poſterity, that corn, and the art of cultivating it, were brought from abroad into Attica.

The Eleuſinia were the moſt ſolemn and ſacred ceremonies in uſe among the Greeks; for which reaſon they were called *myſteries*, by way of eminence. They are ſaid to have been inſtituted by Ceres herſelf, at *Eleuſis*, in memory of the zeal and affection wherewith the Athenians received her.

This is the account Iſocrates gives in his Panegyric: but Diodorus Siculus aſſures us, lib. vi. that the Eleuſinia were inſtituted by the Athenians, in gratitude to Ceres, for having inſtructed them to lead a leſs barbarous and ruſtic life: yet the ſame author, in the firſt book of his Bibliotheca, relates the thing in another manner.

A great drought, ſays he, having occaſioned a miſerable famine throughout all Greece, Egypt, which had that year reaped a moſt plentiful harveſt, beſtowed part of the fruits thereof upon the Athenians. It was Erechtheus that brought this extraordinary ſupply of corn: in commemoration of which benefaction, Erechtheus was created king of Athens, who inſtructed the Athenians in theſe myſteries, and the manner of celebrating them.

This account comes near to what we are told by Herodotus and Pauſanias, *viz.* that the Greeks acquired the knowledge of their gods and their religion from the Egyptians.

Theodoret, lib. i. Græcanic. Affect. writes that it was Orpheus, not Erechtheus, who made this eſtabliſhment, and who inſtituted for Ceres what the Egyptians practiſed for Iſis; which ſentiment is confirmed by the ſcholiaſt on the Alceſtes of Euripides.

Eleuſis, the city where theſe myſteries were celebrated, was ſo jealous of the glory thereof, that, when reduced to the laſt extremity by the Athenians, it would not ſurrender but on this condition, that the Eleuſinia ſhould not be taken away; though theſe were no religious ceremonies peculiar to the town, but were held common to all Greece.

There were two kinds of Eleuſinia, the *greater*, and the *leſs*; thoſe we have hitherto been ſpeaking of were the greater.

The *leſſer* were inſtituted in favour of Hercules; for that hero deſiring to be initiated into the former, and the Athenians not being able to gratify his wiſhes, becauſe the law prohibited any ſtranger being admitted; being loth, however, to give him an abſolute denial, they inſtituted new Eleuſinia, in which he aſſiſted. Theſe were afterwards celebrated at Agra, near Athens. The greater were held in the month of Boedromion, which anſwered to our Auguſt; and the leſſer in the month Antheſterion, which happened in our January. People were only brought to partake of theſe ceremonies by degrees; at firſt, they were to be purified; then admitted to the leſſer Eleuſinia; and at laſt initiated into the greater. Thoſe, who were yet only at the leſſer, were called *myſtæ*; and thoſe admitted to the greater, *epoptæ*, or *ephori*, i. e. *inſpectors*. They were uſually to undergo a probation of five years, before they paſſed from the leſſer to the greater. Sometimes, indeed, they were contented with a ſingle year; immediately after which they were admitted to the moſt ſecret religious parts of the ceremony. When any perſon was initiated, he was introduced by night into the temple, after having his hands waſhed at the entry, and a crown of myrtle put upon him. Then was opened a little box, containing the laws of Ceres, and the ceremonies of her myſteries; which the initiated perſon was to read and tranſcribe. A ſlight repaſt ſucceeded this ceremony; after which the myſta entered into the ſanctuary, over which the prieſt drew the veil, and then all was inſtantly in darkneſs. A bright light ſucceeded, and exhibited to view the ſtatue of Ceres, magnificently adorned; and while they were attentively contemplating it, the light again diſappeared, and was ſucceeded by profound darkneſs. Peals of thunder, and flaſhes of lightning, and a thouſand monſtrous figures that were perceived on all ſides in the midſt of the ſanctuary, filled the initiated with conſternation and horror; but the next moment a calm ſucceeded, and there appeared in broad day-light a pleaſant meadow, in which all ſeemed to dance and participate of mirth. Amidſt this jollity and mirth, it is ſaid, the tenets of the myſteries were revealed. Meurſius has an expreſs treatiſe on the Eleuſinia, where moſt of theſe points are proved.

Secrecy, as Le Clerc after this writer ſuggeſts, was enjoined with great ſtrictneſs, not ſo much to conceal the abominations charged on theſe myſteries by the Chriſtian fathers, as becauſe the initiated were thus let into the firſt hiſtory of Ceres and her daughter, which it was neceſſary to conceal from the public; but if it were known that theſe two goddeſſes were merely mortal women, their worſhip would have become contemptible. Cicero (Tuſc. Quæſt. l. i. c. 13.) favours this opinion. See MYSTERIES.

The matter of theſe myſteries, as related by Arnobius and Lactantius, was an imitation, or repreſentation, of what mythologiſts teach of Ceres. They laſted ſeveral days; during which, the people ran about with burning torches in their hands; ſacrificed abundance of victims, not only to Ceres, but alſo to Jupiter; made libations from two veſſels, one of them to the eaſt, and the other to the weſt; marched in pomp to *Eleuſis*, making pauſes from time to time, wherein they ſung hymns, and ſacrificed victims; and this they performed not only in going to *Eleuſis*, but in returning back to Athens. For the reſt, they were obliged to keep it an inviolable ſecret; and the law condemned to death any one who ſhould dare divulge their myſteries. Tertullian, in his book againſt the Valentinians, relates, that the figure ſhewn in the Eleuſinia, and which was ſo expreſsly prohibited to be made public, was that of a man's privy parts. Theodoret, Arnobius, and Clemens Alexandrinus, likewiſe make mention of it; but they ſay it was the figure of a woman's privities.

The day after the feaſt, the ſenate aſſembled at *Eleuſis*, apparently to examine whether every thing had been managed according to order.

ELEUSINUS Sinus, in *Ancient Geography*, an ancient name for the Saronic gulf.

ELEUSIS, a town of Attica, on the bank of the Saronic gulf, N. W. of Athens; in which the Eleuſinian myſteries were celebrated. See the preceding article.

Dr. Adam Clarke has lately (*viz.* in 1808) publiſhed a fac ſimile of a Greek inſcription found on a ſtone, which was formerly diſcovered at Eleuſis. This inſcription, according to the ſuggeſtion of the late learned profeſſor Porſon, was poſterior to the ſubjugation of Greece by the Romans, as appears by the mixture of the Roman with the Greek names. The ſtone was ſeen by M. Spon at Eleuſis in 1676, and probably by Mr. George Wheeler, who accompanied him, and who afterwards ſettled in England. But Dr. Chandler, about 100 years after, could not meet with it, though he made diligent ſearch for it: the ſtone was, therefore, probably removed before his time. It is not improbable that Wheeler might have brought it with him. By ſome accident or other it fell into the hands of ſome perſon, who, ignorant of its value as a relic of Grecian antiquity, put it down in the back kitchen of a houſe in North green, Worſhip ſtreet, London, where it long ſerved the purpoſe of a paving ſtone and chopping block. Here it was diſcovered in the year 1807.

ELEUTHERA Cilicia, a port of Cilicia, ſituated at the angle which was formed by mount Taurus and mount Amanus, in the vicinity of Cappadocia and of Syria.

Eleuthera, a town placed by Ptolemy in the interior of the iſle of Crete, and ſo called from Eleuther, one of the Curetes.

Eleuthera, or *Alabaſter iſland*, in *Geography*, one of the Bahama iſlands, whoſe climate is healthy and ſoil fertile. It has a fort and a garriſon. N. lat. 25° 14′. W. long. 76″ 31′.

ELEUTHERÆ, in *Ancient Geography*, an ancient town of Bœotia, which was afterwards transferred to the Athenians. In this town was a temple dedicated to Bacchus, and alſo a cavern and a fountain.—Alſo, a town on the river Iſter. Steph. Byz.

ELEUTHERIUS, in *Biography*, biſhop of Rome, was a native of Nicopolis, and flouriſhed in the ſecond century. He was firſt a deacon of the church, and about 177, or perhaps ſooner, was elected biſhop on the death of Soter. Soon after his elevation, letters were addreſſed to him by the martyrs of Lyons, then ſhut up in priſon, on the ſubject of the peculiar tenets of Montanus and his followers; the object of which was to recommend healing and temperate meaſures in the treatment of that ſect. During the epiſcopate of Eleutherius, the church is ſaid to have enjoyed much peace, notwithſtanding the parties which roſe up, and which zealouſly contended for the truth. Among theſe were perſons headed by Florinus and Blaſtus, both preſbyters, who maintained that God was the author of evil as well as good. They were degraded for this hereſy, and cut off from the body of the faithful. Eleutherius died in the year 192, and he is remembered by the additions which he made to the pontifical code, and which reflect credit on his liberality: of theſe, one enacted that a man ſhould not abſtain from any ſort of meat that was commonly eaten; and the other, that ſentence ſhould not be pronounced againſt any one accuſed of crimes, unleſs he were preſent to make his defence. According to Bede it was at this period that an embaſſy was ſent by Lucius, king of Britain, to Rome, to requeſt the pope to ſend over proper perſons to explain to him and his people the nature of the Chriſtian faith. Euſebius and other early hiſtorians not having noticed this fact, it ſtands on very doubtful authority. Lardner. Moreri.

Eleutherius, Ελευθέριος, in *Antiquity*, a Greek word, ſignifying *liberator*, or *deliverer*. It was uſed by the Greeks as a ſurname, or epithet of Jupiter, given him on occaſion of his having gained them the victory over Mardonius, general of the Perſians, and killed, as they ſay, 300,000 men of his army; and, by that means, delivered them from the danger they were in of being brought under the Perſian yoke.

The word is formed from ἐλεύθερος, *free*.

There were alſo feaſts ſolemnized on this occaſion, in honour of Jupiter Eleutherius, and called *Eleutheria*. They were held every five years, with races of armed chariots, &c. The Scholiaſt on Pindar, Olymp. Od. 7. ſays, they were celebrated at Platæa, the place where the victory was obtained.

The Samians had another feſtival of this name, in honour of the god of Love; and ſlaves, when they obtained their liberty, were wont to keep a ſtated holiday in remembrance of the happy day in which they were made free. Potter's Archæol. Græc. lib ii. cap. xx. tom. i. p. 388.

ELEUTHEROPOLIS, in *Ancient Geography*, a town of Paleſtine, ſituated at the diſtance of 6 miles S. of Dioſpolis, 20 miles from Jeruſalem, and 24 miles from Aſcalon, according to Antonine's Itinerary. On the W. and N. it was bounded by a plain, and on the E. by the mountains of Judea. It was an epiſcopal ſee under the metropolis of Cæſarea; and after the diviſion of Paleſtine into two provinces, it belonged to Paleſtina Prima.

ELEUTHERUS, a river of Phœnicia, whoſe ſource was among the northern eminences of mount Libanus, and which, ſwelling at certain times of the ſummer by the liquefaction of the ſnow, might derive its name, (ἐλεύθερος, *free*,) from this circumſtance. Sandys, and others after him, ſuppoſe it to be the ſame with the Caſſimair, betwixt Sidon and Tyre. Whereas Ptolemy, with whom Dr. Shaw agrees, places it according to the preſent poſition of the "Nahr el Berd," 6 miles to the northward of Tripoly. Both theſe rivers agree in a circumſtance mentioned by Pliny, that at a certain ſeaſon of the year, this river is ſo full of tortoiſes, that they were eaſily taken. This river forms the boundary betwixt Syria and Phœnicia.—Alſo, a river of Sicily, the ſource of which is marked in De l'Iſle's chart, in mount Cratas, and its mouth E. of Orethus. Its modern name is "Fiume di Miſilmeli."

ELF, or Elves Locks, in *Antiquity*, locks of hair longer than the reſt, or complicated and matted hairs, which are ſuppoſed to have been twiſted into knots by the latent influence of elves or fairies, to which Shakeſpear adverts.

———"This is that very mab,
That plats the manes of horſes in the night,
And cakes the elf locks in foul ſluttiſh hairs;
Which once entangled much miſfortune bodes."
Midſummer Nights Dreams.

A ſuperſtitious notion, which originated in the ignorance of the dark ages, and is ſtill prevalent amongſt the ſecluded vulgar; who conſider it ominous of ill luck to have theſe pulled or ſhorn: they are therefore preſerved with great care, as being eſteemed a favourable appearance. To this cuſtom Apuleius alludes, when he ſays, "Adjuro per dulcem capilli tui nodulum."

Elfs, or *Elvæ*, called alſo *Fairies*, the names of deities honoured among the Saxons, with a kind of ſacrifice called *Alf blot*.

Elfs *arrows*, a name given by the people of ſome parts of Scotland to certain ſtone weapons which they find, and which have been in uſe before tools and weapons of iron were uſed there. It is not only in Scotland that theſe are found, but in America, and many other places alſo. They are ſtyled by ſome *ceraunia*, and *thunder-bolts*, and are ſuppoſed to have fallen from the clouds in ſtorms of thunder; others, not leſs erroneouſly, ſuppoſe them to be natural foſſils; but their true origin is from the workmanſhip of man, out of common flints, and other ſtones. Woodward's Cat. Foſſ. ii. p. 52.

ELFCARLEBY, or Elfkarleby, in *Geography*, a ſmall town of Sweden, in the government of Upſal, on the Baltic ſea, near the place where the river called the Dal Elbe, or Dal Elfwe, diſcharges itſelf into that ſea.

ELFDAL, or Elfdalen, a ſmall town of Sweden, in the province of Dalecarlia.

ELFEDSJ, a mountain of Arabia, in the province of Yemen; 12 miles N. E. of Abuariſch.

ELFRIC. See Ælfric.

ELFSBORG, Old, a town of Sweden, in the province of Weſt Gothland, with a ſtrong caſtle near the ſea; 4 miles S. W. of Gothenburg.

Elfsborg, *New*, a fortreſs of Sweden, in Weſt Gothland, on an iſland at the mouth of the Moldal; 4 miles W. of Gothenburg.

ELGA, a river, which riſes 3 miles N. from Penna Macor in Portugal, and runs into the Tagus, between Alcantara and Roſmarilhal, ſeparating the countries of Spain and Portugal, during its whole courſe of about 30 miles.

ELGATTAN, a town of Africa, in the kingdom of Algiers; 37 miles S. of Bona.

ELGEND, a town of Arabia, in the country of Hadramaut; 60 miles W. of Hadramaut.

ELGERSBURG, a ſmall town of Germany, in the duchy of Saxe Gotha, not far from the Thuringian foreſt, remarkable for its manufacture of lamp black.

ELGG, a town and lordſhip of Switzerland, in the canton of Zurich.

ELGIEHAMA, a town of Africa, in the empire of Morocco, about 2 leagues from mount Atlas.

ELGIN, the capital of the county of Elgin, formerly an epiſcopal ſee, but at preſent a royal burgh, or borough, is ſituated upon the river Loſſey, about ſeven miles from the point where it falls into the North ſea, at the diſtance of 108 miles from Edinburgh. The name of Elgin, from whence the county has received one of its denominations, the other being Moray, is ſuppoſed to be derived from *Helgy*, general of the army of Sigard, the Norwegian earl of the Orknies, who, about the year 927, conquered that part of Scotland north, comprehending the preſent counties of Caithneſs, Roſs, Sutherland, and Moray. For the Norwegian hiſtory relates that he built a town to the ſouthward of Duffeyrus, and Elgin anſwers that deſcription as to its ſcite, which is alſo confirmed by the name. The Norwegians had an harbour at Burgh Duffeyr; ſeveral of their princes were named *Helgy*, and the inſcription on the common ſeal of this place is, "ſigillum commune civitatis de Helgyn." During the irruptions to which this part of Scotland was ſubjected by the northern men, Elgin had a royal fort. It appears to have been firſt incorporated in the time of Alexander II. about the year 1234. The charter grants a common guild to the burgeſſes, whence it probably then poſſeſſed ſome foreign commerce; for, in 1383, a large veſſel, called *Far coaſt*, was the property of the guild. Mr. Pennant deſcribes it as a good town, having many old houſes built after the ancient manner, the fronts projecting over piazzas, like thoſe in the city of Cheſter; and it abounds with eccleſiaſtical antiquities, which beſpeak its former conſequence. The noble cathedral, from its ruins, appears to have been once a magnificent pile. A large tower on the north and ſouth ſide of the building ſtill remains; but the central one, with the lofty ſpire and the whole roof, are fallen, which, with the mutilated fragments of monumental figures, repreſenting prelates, peers, and knights, in awful dilapidation, beſpeak the vanity of all attempts at poſthumous perpetuity. At the eaſt end two tiers of lancet-pointed windows remain; but the body is ſo ruinous as to be not eaſily defined. The weſt door is richly decorated with carving, and the choir is beautiful, with a light baluſtraded gallery running round the whole. Among other diſtinguiſhed perſonages, Boethius ſays, king Duncan I., who was ſlain by Macbeth at the ſiege of Inverneſs, is buried here. This cathedral was built by Andrew de Moray, A. D. 1224, on land granted by Alexander II., whoſe remains, the ſame year, were depoſited in the choir. The principal tower was erected, and ſome other additions made to the building by biſhop Innes, as appears from an inſcription on a column. The country in the vicinity being fertile, extremely pleaſant, and proviſions plentiful, are circumſtances that induce many wealthy families to take up their winter abode in Elgin, which may be conſidered to the highlands what Edinburgh is to the lowlands of Scotland. In 1792 it contained 658 families, and 2920 ſouls. Pennant's Tour in Scotland, and ſir John Sinclair's Statiſtical Account of Scotland.

Elgin, *County of*. See Morayshire.

ELGIS, a town of Egypt; ſix miles S. of Abu-Girgè.

ELGUS, in *Ancient Geography*, a ſmall town of Aſia Minor, in Lycia.

ELHAM, or Elam, in *Geography*, a town of Kent, England, was at a former period a place of ſome note and conſequence; for, according to Philipott, in his hiſtory, &c. of the county, "though now the magnificent ſtructures, which in elder times were here, be diſmantled, and have only left a maſs of deplored rubbiſh to direct us where they ſtood, yet in Domeſday Book it is written, that the earl of Ewe, a Norman, and near in alliance to the Conqueror, held it, and left the reputation of an honour unto it, as the reputation of the aid granted at the making of the Black Prince a knight, in the twentieth of Edward III., doth warrant." The grant of the market was made in the thirty-fifth of Henry III., at the inſtance of prince Edward, who then owned the manor, and who afterwards alienated it to archbiſhop Boniface. It is now the property of ſir Henry Oxenden, bart. of Broome. Elham park, of which mention occurs in the records of the time of Henry III., is now, like ſeveral other ancient parks in this part of the county, overgrown with wood. The church is a large building, conſiſting of a nave, aiſles, and chancel, with a maſſive embattled tower, crowned with a ſmall ſpire. The nave, which is divided from the aiſles by pointed arches, opens to the chancel by a very large pointed arch. Elham is ſixty-five miles diſtant from London, contains 27 houſes and 144 inhabitants, and has four annual fairs; the market has been long diſcontinued. Haſted's Hiſtory of Kent.

EL-HAMMA, a town of Africa, in the country of Tripoly. N. lat. 34°. E. long. 10° 40′.

ELI, in *Biography*, high-prieſt of the Iſraelites, and judge of that people for 40 years, was a deſcendant of Ithamar, the younger branch of Aaron's houſe, and united the offices of high-prieſt and judge about the year 1156 B.C. He is charged with contributing to the degeneracy of the people over whom he preſided, however pious and good with reſpect to his own character, by want of reſolution to reprove and puniſh immorality, and by a culpable inattention to the conduct of his own ſons. The negligence of Eli in the diſcharge of his office entailed calamities both on the Iſraelites and on his own family. The former were defeated by the Philiſtines, the two ſons of Eli were ſlain, and the ark, which was a ſymbol of the divine preſence, was captured by the enemy. The afflictive intelligence overpowered the remaining ſtrength of Eli, ſo that he fell backwards from his ſeat, and broke his neck, and died in the 98th year of his age.

ELIA, in *Ancient Geography*, a place of Greece, in the Peloponneſus; ſuppoſed by Polybius to be the moſt pleaſant part of Laconia. Livy ſays that it lay E. of the mouth of the Eurotas.—Alſo, a town of Paleſtine, between Naplous and Aſcalon, according to Antonine's Itinerary. Some ſuppoſe that it was the ſame with Jeruſalem, which the Romans called "Ælia."

ELIAC School, in the hiſtory of *Philoſophy*, a ſchool eſtabliſhed by Phædo of Ælis, and ſo called from the place of his birth. This ſchool adhered ſo cloſely to the doctrine of Socrates, that it is ſcarcely to be conſidered as a ſeparate ſect. Phædo, its founder, was deſcended from an illuſtrious family, but being deprived of his patrimony in early life, he was ſold as a ſlave at Athens. Socrates, however, accidentally obſerving in his countenance traces of an ingenuous mind, perſuaded one of his friends, Alcibiades or Crito, to redeem him. From this time Phædo became a diſciple of Socrates, and devoted himſelf to the diligent ſtudy of moral philoſophy under his inſtruction; and he adhered to the laſt to his maſter with the moſt affectionate attachment. He inſtituted a ſchool at Elis, after the Socratic model, which was continued by Pliſtanus, an Elian, and afterwards by Menedemus of Eretria, whence it obtained the name of the "Eretrian" ſchool. Menedemus, having removed this ſchool to Eretria, delivered his lectures to his diſciples, not ſeated on circular benches around him, which was the uſual mode, but whilſt they attended him in whatever poſture they pleaſed, ſtanding, walking, or ſitting. Menedemus roſe, from the contempt with which he was firſt received, on account of the vehemence of his mode of diſputing, into high eſteem, and was intruſted with a public office, to which was annexed an annual ſtipend of 200 talents. He diſcharged his truſt with fidelity, and accepted only a fourth part of the appointment. He was honoured with ſeveral important embaſſies, by which he eſſentially ſerved his countrymen; but becoming jealous of his intimacy with Antigonus, who became one of his diſciples, they induced him to make his eſcape to this prince. Thus mortified and diſappointed, he precipitated his end by abſtaining for ſeveral days from food, and died in the 84th year of his age, and about the 124th olympiad. His genius was verſatile and his elocution fluent. Severe in inveighing againſt the vices of others, and pure in his own manners, he commanded univerſal reſpect. In his mode of living he was ſingularly temperate; and his entertainments, conſiſting chiefly of vegetables, were always enlivened by liberal converſation.

Nothing farther is known concerning the preceptors of the Eliac or Eretriac ſchools, but that they ſtudiouſly avoided, and ſtrenuouſly oppoſed, the ſophiſtical fooleries of the Megaric ſect, and adhered cloſely to the ſimple doctrines, and uſeful precepts, which they had received from Socrates. Brucker's Philoſ. by Enfield, vol. i.

Elias Levita, in *Biography*, a celebrated Jewiſh rabbi, who flouriſhed in the 16th century, was a native of Germany, but ſpent the greateſt part of his life at Rome and at Venice, where he was employed in teaching the Hebrew language. He was diſtinguiſhed not only by his learning, but by his critical judgment; and accordingly he exploded many of the unfounded traditions of the Jews; and particularly that which referred the introduction of the vowel points to the time of Ezra, rightly aſcribing it to a much later period, or about the 6th century of the Chriſtian era. He was the author of ſeveral valuable works, that facilitate an acquaintance with the Hebrew language and writings. Among theſe we may enumerate his "Maſſoret Hammaſſoret," and his "Sepher Zickroneth," or collection of Maſoretic obſervations from ancient authors: his "Chaldaic, Talmudic, and Rabbinic Lexicon," publiſhed in 1541, fol.;—his Hebrew gloſſary, entitled "Thiſbi," publiſhed by Fagius in 1542, 8vo.;—and ſeveral works on Hebrew grammar, &c.

Elias, Matthew, or Matthias, a painter of hiſtory and portraits, born at Caſſel in 1658. His parents were very poor, and he was employed in taking care of cattle, and whilſt they were grazing he amuſed himſelf by endeavouring to draw figures on the ground. A painter of hiſtory, of the name of Corbeen, one day ſaw him drawing a fortification, with ſome figures, in his uſual mode; and pleaſed with the youth's ingenuity, requeſted of the parents of Elias to let him educate him, and teach him the art of painting. Corbeen behaved liberally to him; and Elias repaid it by diligent ſtudy, and making very conſiderable progreſs in the art, being very grateful for the great kindneſs he had received from his maſter. Corbeen appears to have maintained him ſome time at Paris for his improvement, whence he went to Dunkirk, and there painted an altarpiece, repreſenting the death of St^{a}. Barbe, which raiſed his reputation. He deſigned correctly, and compoſed his pictures well, but did not ſucceed ſo well in colouring. His works coſt him much labour to ſketch out, and prepare for the eaſel, which defect of his genius he was conſcious of, and endeavoured to conceal, by not allowing any one to ſee his preparations. His portraits of men are generally more approved than thoſe he painted of women, which want grace and beauty. He died in 1741, aged 83.

Elias, *Mount St.* in *Geography*, a mountain near the ſhore of the N.W. coaſt of America, N.W. of Admiralty bay, and S.E. of Prince William's ſound.

ELIBERIS, or Illiberris, in *Ancient Geography*, a large and rich town of Gallia Narbonnenſis; ſituated S. of Ruſcino. Conſtantine the Great re-eſtabliſhed this town, and built a caſtle, which he called after the name of his mother Helena. It is ſuppoſed to be the modern *Elna.*—Alſo, the name of a river, which watered the above-mentioned town, ſuppoſed to be *Le Tec.*—Alſo, a town of Spain, in Bœtica, which was a conſiderable place, and ſeated on a mountain, called *Sierra d'Elvira.*

ELIBIA, an epiſcopal town of Africa, in the proconſular province.

ELICA Pashnum, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a kind of red orpiment, found very frequently in that part of the world, and given internally after calcination, in intermitting fevers.

ELICE, or Helice, in *Botany*, a name by which the ancient Greek writers have ſometimes called the willow, though the more general name among them is *hea.* Heſychius gives many inſtances of the willow being called *helice.*

ELICHMAN, John, in *Biography*, an eminent phyſician, was a native of Sileſia, and practiſed medicine with great reputation in the 17th century His ſkill as a linguiſt was extraordinary, for he was well verſed in ſixteen languages. He propagated an opinion, which, to thoſe acquainted with the idioms and ſounds of the two tongues, muſt appear extremely excentric: that the German and the Perſian were cognate, or derived from the ſame origin. He made a Latin tranſlation of the Tablet of Cebes, which, with the Arabic verſion and the original Greek text, were publiſhed in the year 1640, under the inſpection of that celebrated critic Salmaſius, who prefixed an ample and learned introduction.

ELICHRYSUM, in *Botany*, ἑλιχρυσος, or ἑλειοχρυσος, from ἑλειος, *marſhy*, and χρυσος, *gold*, is an ancient Greek appellation for ſome yellow flower growing in marſhy ſituations. The deſcription of Dioſcorides may very well apply to *Gnaphalium orientale*, or rather to G. *Stoechas* of Linnæus; eſpecially as he mentions rough and rugged ground, not marſhes, for the place of growth of his ελιχρυσον What the poets intended by the above name is more difficult to determine; nor does Theophraſtus lend us much aſſiſtance. Among the moderns Matthiolus has taken *Tanacetum annuum* for the plant in queſtion, but without much probability. Tournefort adopted the name for a genus of his own, which includes the two *Gnaphalia* above-mentioned, among numerous other ſpecies whoſe flowers are not yellow, neither do ſcarcely any of them grow in moiſt places. Linnæus, therefore, who united this genus to the *Gnaphalium* of the ſame author, retained the latter name, as by far the moſt ſuitable of the two. This deciſion was reverſed by Gærtner, becauſe he followed Tournefort in eſtabliſhing *Santolina maritima* as the only true *Gnaphalium*; and by aſſuming the ſpecific name *verum*, he ſeems to imply that this plant is the γναφαλιον of Dioſcorides, a point equally difficult to confirm or refute. Finally, Willdenow, at the ſuggeſtion of Juſſieu, in judiciouſly ſeparating from the Linnæan *Xeranthemum* ſuch ſpecies as, contrary to the generic character, have a naked receptacle, has choſen for them the name *Elichryſum*, by which many of theſe plants had already been called in various books. Willd. Sp. Pl. v. 3. 1903. (Xeranthemum; Linn. Gen. 420. Schreb. 551. Ait. Hort. Kew. v. 3. 179. Mart. Mill. Dict. v. 4. Juſſ. 179.) Claſs and order, *Syngeneſia Polygamia-ſuperflua*. Nat. Ord. *Compoſitæ nucamentaceæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* imbricated; ſcales numerous, lanceolate, ſcarioſe, permanent, the inner ones longer than the diſk, coloured, ſhining, forming a radiant circle round the whole compound flower. *Cor.* compound, unequal; *florets* of the diſk very numerous, all perfect, tubular, funnel ſhaped, much ſhorter than the calyx, in five equal ſpreading marginal ſegments; thoſe of the circumference fewer, female, tubular, the length of the former, five-cleft, but rather unequally. *Stam.* (in the perfect florets) Filaments five, very ſhort; anthers forming a cylinder about as long as the corolla. *Piſt.* (in the ſame florets) Germen ſhort; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma cloven: the female florets differ only in having a ſimple club-ſhaped ſtigma, and no traces of ſtamens. *Peric.* none, except the calyx ſcarcely at all altered. *Seed* in both kinds of florets alike, oblong; down capillary or feathery. *Recept.* naked.

Eſſ. Ch. Receptacle naked. Down capillary or feathery. Calyx imbricated, its inner ſcales forming a coloured ſpreading radius.

Willdenow enumerates twenty-three ſpecies of this genus, which include moſt of the fineſt everlaſting-flowers of the Cape of Good Hope. Several more, however, require to be added to this liſt from New Holland, eſpecially *Xeranthemum bracteatum*, Venten. Jard. de la Malmaiſon, t. 2, Andr. Repoſ. t. 375, an annual ſpecies of great ſplendour, which, if raiſed on a hot-bed in the ſpring, or even in the natural ground, proves very ornamental to the flower-garden in autumn, and may be preſerved for a winter noſegay of long duration. This flower outvies the *fulgidum*, Jacq. Ic. Rar. t. 173, Curt. Mag. t. 414, an old inhabitant of the green-houſe, native of the Cape. More elegant Cape ſpecies, perhaps, are the *faſciculatum*, Andr. Repoſ. t. 242, and *ſeſamoides*, Curt. Mag. t. 425; but eſpecially *proliferum*, Andr. Repoſ. t. 374. All theſe laſt require the ſhelter of a green-houſe or conſervatory, and regular, but moderate ſupplies of water in winter.

ELICIT, or Elicite, in *Ethics*, is applied to an act of the will, immediately produced by, and of the will, and received within the ſame.

Such are willing, nilling, loving, hating, &c. Theſe acts are denominated elicit, becauſe, being before in the power of the will, they are now brought forth into act. But they are ſo far intrinſic, that ſome authors conſider them as the will itſelf; aud deny they ought to be diſtinguiſhed from it any more than light is to be diſtinguiſhed from the ſun.

ELIDION Promontorium, in *Ancient Geography*, a promontory of Thrace, in the ſouthern part of the promontory "Eſtiæ," and in the eaſtern part of the "Rhodiorum portus," on the Boſphorus of Thrace.

ELIDRION, a word uſed by the early writers in *Medicine*, in ſeveral different ſenſes; ſome uſing it as the name of maſtic, others of raphontic, and others of crude mercury. Some of the chemical writers have alſo made it expreſs a certain mixed metal, compoſed of three parts; one ſilver, another braſs, and the third gold.

ELIENESS, in *Geography*, a cape of Scotland, on the S. coaſt of the county of Fife, at the mouth of the Frith of Forth. N. lat. 56° 10′. Long. 0° 22′ E. of Edinburgh.

ELIENSIS, in *Ancient Geography*, an epiſcopal town of Africa, in the Byſacene territory.

ELIGENDO Viridario. See Viridario.

ELIGIBILITY, in the Romiſh *Canon Law*. A bull of eligibility, is a bull granted by the pope, to certain perſons, to qualify them to be choſen, or inveſted with an office, or dignity, whereof they were before incapable, by reaſon of want of age, birth, or the like.

The word is formed of the Latin *eligere*, to chuſe; whence the word eligibilitas, &c.

In ſeveral churches in Germany, a perſon, who is not of the chapter, cannot be elected biſhop, without a bull of eligibility.

ELIGII Morbus, a name given by ſome medical writers to a fiſtula.

ELIGMA, a name given by Nicolaus, Myrepſius, and ſome other authors, to that form of medicine, now called a linctus or lambative.

ELIJAH, or Elias, ſurnamed the *Thiſbite*, from his native town or territory, in *Biography*, was one of the moſt diſtinguiſhed of the Jewiſh prophets. He commenced the exerciſe of the prophetic office about 920 years B. C. and his firſt commiſſion was directed againſt Ahab, whoſe impious character and encouragement of idolatry merited reproof. The ſovereign, however, was incenſed, and the prophet was obliged to withdraw from the threatened effects of his indignation. During his retirement, Providence miraculouſly afforded him the means of ſubſiſtence. In the mean while the country was viſited with a famine, as a token of divine diſpleaſure, and at the termination of this diſtreſs, which laſted three years, the prophet made another attempt, under divine admonition, to reclaim Ahab from the profligacy of his conduct. The firſt interview produced mutual recrimination; but Elijah determined to evince to the full ſatisfaction of the aſſembled Iſraelites the abſolute nullity of thoſe Sidonian deities, in whom they had confided. The conteſt between the prophet and the prieſts of Baal is beautifully narrated in the ſacred writings; the reſult, however, was the complete triumph of the former, and the ignominious defeat of the latter, who became victims to the indignation of the people, whom they had deluded into the practice of idolatry, and the violation of the divine law. The dominion of Jehovah, as the only true God, was ſignally diſplayed: and Elijah manifeſted his divine commiſſion, by the ſucceeding event. The country was relieved under the diſtreſs occaſioned by a ſevere drought; for in anſwer to the prayers of the prophet, and in fulfilment of his promiſe, rain fell in great abundance. Jezebel, Ahab's wife, was enraged, and Elijah was obliged to withdraw into the kingdom of Judah, and to conceal himſelf for ſome time in the wilderneſs, depending for his ſupport on the extraordinary interpoſitions of Providence. Elijah was afterwards employed in various commiſſions, which he executed with a fidelity and fortitude very honourable to his character. His companion in the cloſing ſcenes of his life was Eliſha, who was ſelected to be his ſucceſſor in the prophetic office, and who was permitted to be the witneſs of his miraculous tranſlation, by which he was exempted from the common lot of mortality. This event took place in the year 896 B. C. (See 1 Kings, xvii. xviii. xix. xxi. 2 Kings, i. ii.) At a ſubſequent period, the Jews, miſinterpreting the prophecy of Malachi (iv. 5.) entertained an opinion that Elijah would again appear on earth as the harbinger of the Meſſiah. But this prophecy, properly underſtood, would only have led them to expect a forerunner and herald of the Meſſiah, poſſeſſing the ſpecial power of Elijah, and animated by ſimilar reſolution and zeal in the cauſe of public piety and virtue. It is needleſs to recite the apocryphal tales that have been related by Chriſtians and Mahometans with regard to this juſtly celebrated prophet; or to mention the ſuppoſititious writings that have been aſcribed to him. Bayle will ſupply the curious with ſpecimens of ſuch fables.

ELIM, in *Ancient Geography*, a place on the eaſtern coaſt of the Red ſea, which was the ſixth ſtation of the Iſraelites.

ELINE, in *Muſic*, the name given by the Greeks to the weaver's ſong. See Song.

ELINI, in *Ancient Geography*, a people of Greece, in Theſprotia. Steph. Byz.

ELINS, in *Geography*, a town of Poland, in the palatinate of Braclaw; 26 miles N. E. of Braclaw.

ELJOBELI, a town of Arabia, in the country of Yemen; 28 miles S. of Abu-Ariſch.

ELIOT, John, in *Biography*, known by the title of the apoſtle of the North American Indians, was a native of England, and born about the year 1604. He was educated at Cambridge, and engaged himſelf as an aſſiſtant to a ſchool, till an opportunity ſhould occur when he might embark in the work of the miniſtry. Connecting himſelf with the Puritan party he was obnoxious to all the evils which the Puritans ſuffered during the reign of Charles I. To enjoy his own opinions uncontrolled he embarked for America, and became a member of an independent church at Boſton. He officiated for the paſtor of that congregation during his abſence in England, and would have been choſen afterwards to the joint office of miniſter, but he conſidered himſelf bound by a promiſe to reſerve his ſervices for ſome friends who projected a voyage ſimilar to that which he had undertaken. Theſe friends left their native country in the year 1632, and ſettled at Roxburg, in New England. Here Mr. Eliot became their miniſter, and paſſed with his countrymen and friends the greater part of his life in the active diſcharge of thoſe duties which belong to the paſtoral office. In England he had ſuffered perſecution, yet he had not learned to reſpect the right of private judgment, with reſpect to others, and, in America, maintained the divine right of congregational church authority, while he denied that of epiſcopacy or preſbyterianiſm. This was the fault of the times, and perſecution, it is more than probable, would have been exerciſed by every party, had they poſſeſſed the power of drawing the ſword. Mr. Eliot, in the year 1646, began to devote himſelf moſt ardently to the cauſe of the native Indians, whom he wiſhed to introduce to the advantages of civilization and Chriſtianity. For this purpoſe, he learned their language, and preached among them with conſiderable ſucceſs. He was expoſed in this arduous undertaking to many and very ſerious hazards; but he ſuſtained every evil with fortitude in the perſuaſion that his labours and ſufferings would be productive of much good. He undertook and accompliſhed the mighty taſk of tranſlating the bible into the Indian language: this was printed at Cambridge, in New England, in the year 1664, and a ſhort time before Mr. Eliot's death, it was reprinted with corrections by Mr. Cotton, his fellow-labourer in the Indian miſſion. By the exertions and influence of this excellent man, many of the wandering Indian tribes were collected into regular ſocieties, and formed into congregations, which were inſtructed by him, and by others who joined him, in the manner beſt adapted to their capacities. At Roxburg he eſtabliſhed a free grammar ſchool, which has been eminently beneficial to the intereſts of learning in the New England ſtates: and among the Indians he formed ſchools in which many were trained to uſeful knowledge, and ſome of whom became qualified for a liberal education, which they afterwards received at college. The meaſures adopted by Mr. Eliot were aided by large contributions from England, with which eſtates were purchaſed and placed in the hands of truſtees, who were afterwards incorporated under the title of "The ſociety for the propagation of the Goſpel in foreign parts." This venerable apoſtle continued his labours till he arrived at his eighty-fourth year. He died in the latter end of the year 1689, having attained to the great age of eighty-ſix. Gen. Biog.

ELIOTT, George Augustus, lord Heathfield, youngeſt ſon of ſir Gilbert Eliott of Stubbs, in Roxburghſhire, Scotland, was born about the year 1718. He was educated at home by a domeſtic tutor till he was of an age fit to be ſent to the univerſity of Leyden, where he made conſiderable progreſs in the ancient and modern languages. At the royal military ſchool of La Fere in Picardy, he made himſelf maſter of tactics, and of the ſeveral branches of ſcience connected with military life. He next made a tour through thoſe parts of the continent which were beſt calculated to exhibit to him in practice what he had ſtudied in theory. Pruſſia was a model for true military diſcipline, and in her army he ſerved for ſome time as a volunteer. At the age of 17 he returned to his native country, and was introduced by his father to lieutenant-colonel Peers of the 23d regiment of foot, as a youth anxious to ſerve his king and country in the profeſſion of arms. He was accordingly entered as a volunteer in that regiment, where he continued ſomething more than a year, when he joined the engineer corps at Woolwich, and purſued the ſtudies of the place with great ardour till he was made adjutant of the ſecond troop of horſe grenadiers. With this body he went to Germany, was ſoon introduced into active ſervice, engaged in ſeveral ſevere actions, and was wounded at the battle of Dettingen. He roſe through the gradations of captain, major, and lieutenant-colonel, and reſigned the commiſſion which he held as engineer. After this he was appointed aid-de-camp to George II., and became highly diſtinguiſhed for his zeal and talents in the military ſervice. In the year 1759 he was appointed to raiſe a regiment of light horſe, which was celebrated for activity, diſcipline, and enterprize, under the name of "Eliott's light horſe." This he commanded in Germany, where he acted as a ſtaff officer, and on every occaſion he maintained a very high reputation. He was called from the continent to be employed the ſecond in command at the Havannah. On the peace of 1763, his regiment was reviewed by the king, when they preſented him with the ſtandards they had taken from the enemy. His majeſty, in teſtimony of their high merit, allowed them to be denominated, "The 15th, or King's Royal Regiment of Light Dragoons." In 1775 general Eliott was appointed commander in chief of the forces in Ireland, but his ſtay in that country was very ſhort, and ſoon after he was appointed to the command of Gibraltar, where he had full opportunity to diſplay the greatneſs and energy of his character. His ſyſtem of life was peculiarly adapted to a ſervice that required great vigilance. He was one of the moſt abſtemious men of his age; his ſuſtenance was a vegetable diet and water. He ſlept only four hours at a time, and inured himſelf to habits of order and watchfulneſs, ſo that circumſtances, painful and difficult to be borne by other men, were to him rendered pleaſant by daily practice. With a very moderate number of men, general Eliott foiled all the attempts of a numerous foe; and when the operations of the ſiege were quickened, and rendered more formidable, he ſtill maintained that ſuperiority of defence which kept danger at a diſtance. The final very ſerious attack by the famous floating batteries, ſays a writer, "only afforded one of the grandeſt ſpectacles of deſtruction that was ever beheld." On his return to England the gratitude of the Britiſh ſenate was as forward as the public voice, in rendering him that homage, which his diſtinguiſhed conduct deſerved. The thanks of both houſes of parliament were voted to the general; and his ſovereign conferred on him the honour of knight of the Bath, with a penſion during his own life, and that of another, whom he ſhould nominate. On the 14th of June, 1787, his majeſty advanced him to a peerage, by the title of lord Heathfield, baron Gibraltar, permitting him to take, in addition to his family arms, the arms of the fortreſs which he had ſo bravely defended. His lordſhip died July the 6th, 1790, in the ſeventy-third year of his age. By his lady, the daughter of ſir Francis Drake, he left one ſon and a daughter

ELIPAND, archbiſhop of Toledo, flouriſhed in the eighth century. He was the intimate friend of Felix of Urgella, and maintained, with him, that Jeſus Chriſt was the ſon of God, not by nature, but by adoption. This opinion cauſed long and violent diſputes, and was condemned by the council of the church held in the Friuli, under Paulinus, patriarch of Aquileia, in the year 791. It was afterwards condemned, together with its author, in an aſſembly of prelates, which had been convened by Charlemagne at Ratiſbon. Felix retracted, but Elipand fearleſsly avowed his adherence to what he conceived to be the truth: neither the threats of his enemies, nor the perſuaſions of his friends, could induce him to retract an iota of what he had before vindicated. Some Spaniſh biſhops endeavoured to convince him and Felix, who was again become the convert to his old opinions, of the truth of the reputed orthodox doctrine: they were ſeconded by a letter of Charlemagne himſelf to the two biſhops, entreating them to renounce their hereſy, and to unite with the other prelates of the Catholic church, in a common creed. Felix again yielded to the remonſtrances of his ſuperiors, which excited Elipand to write againſt him. This was in the year 799, and he died very ſoon afterwards. Moreri.

ELIQUATION, or LIQUATION, in *Metallurgy*, is an ingenious proceſs of ſeparating ſilver from copper by means of lead, which appears now, however, to be very little employed; but a ſhort account of it may be here given.

When rough unrefined copper contains ſilver in the proportion proper for this operation, it is firſt melted with a large quantity of lead, and the mixed alloy is caſt into loaves or conical maſſes. Theſe are then ſet in a furnace on an inclined plane of iron, with a ſmall channel grooved out and heated to a degree juſt below that of the melting point of the alloy, during which the lead melts, or, as it were, ſweats out of the loaf, carrying with it the ſilver, and the copper is left behind as a reddiſh black ſpongy maſs. This laſt is properly the proceſs of eliquation. The ſilver-holding lead is then purified on a cupel, in the way which will be deſcribed under the article SILVER.

Eliquation can only be performed with certain proportions of the three metals concerned in the proceſs. According to Cramer (Docimaſia practica: proceſſus 48), every half ounce of ſilver requires 17lbs. (or 544 times its weight) of lead for its extraction from copper by a ſingle eliquation; and on the other hand, the lead ſhould not be more than about four times the weight of the copper, otherwiſe the maſs will prove too fuſible, and the whole loaf will melt down at the heat neceſſary for the extraction of the lead and ſilver. On the other hand, if the lead is leſs than about 2½ times the weight of the copper, the loaf of liquation will not yield all the lead in one proceſs, and much of this metal, and along with it part of the ſilver, will remain after the operation.

The above data (allowing four times as much lead as copper) would therefore give for the due proportions of the alloy 544 parts of lead, 136 of copper, and one of ſilver. Other metallurgiſts diminiſh the lead ſomewhat, making it to the copper only as 11 to 3.

The whole proceſs of liquation is deſcribed at length in a valuable paper by Duhamel, in the Memoires de l'Acad. for 1788, from which the following is a ſhort extract.

The lead and crude ſilver-holding copper, being duly proportioned, are thrown into a high blaſt furnace, the floor of which is lined with a mixture of clay and charcoal, rammed hard, and laid in an inclined direction, ſo as to convey the melted metal into a ſeparate receptacle. The crude copper is firſt broken in ſmall pieces when hot, and aſſayed, to determine the proportion of ſilver. Either lead or litharge is uſed in the mixture; if the latter, it is mixed with charcoal to promote its reduction, and 120 parts of the litharge are taken as equivalent to 100 of lead. The furnace being firſt heated by itſelf for ſome hours, a baſket full of the ſcoriæ from the firſt reduction of the copper ore is thrown in, which ſoon melts, and forms a vitreous glazing, that protects the walls of the furnace from the violent action of the blaſt. The mixed metals are then thrown in at intervals, and the whole ſoon melts into a triple alloy, which flows into the receptacle, whence it is tapped out into iron moulds, whereby it aſſumes the conical ſhape requiſite for the ſubſequent eliquation. The heat required in this firſt operation is much leſs than that at which copper melts, ſo that the fuſion and reduction of the litharge go on ſpeedily, and in a well-managed furnace, ſeven loaves of liquation, each weighing about 350lbs., may be caſt in an hour.

The next proceſs is the *eliquation*, which is performed in a furnace conſtructed for the purpoſe, uſually holding ſix loaves, ſet on iron bars, ſeparated from each other by bricks, and having a channel beneath to convey the ſilver-holding lead into a baſon as it melts out. The management of the heat is here of great importance. If the proceſs goes on well, the lead flows out eaſily, and the loaves gradually ſink down, and become honey-combed, without loſing any ſenſible portion of their copper. If the heat is too great, particles of copper are viſibly carried down with the lead, which muſt be immediately prevented by ſlackening the fire. When the lead has ceaſed to flow, the loaves are taken out, and when cold have a dark red colour and a crumbly texture. It requires about four hours to eliquiate the loaves. The firſt portion of the lead is always the richeſt in ſilver, but whatever care is taken in the proceſs a little of both ſilver and lead remains, together with part of the iron, arſenic, and other impurities of the copper.

To collect the ſmall remaining portion of ſilver, a number of the porous loaves remaining after liquation are ranged in a kind of oven ſo as nearly to fill it, and are made moderately red-hot by the flame of wood drawing through it, by which a quantity of mixed metal and ſcoriæ drops down on the hearth, conſiſting of lead holding a little ſilver, of iron, ſulphur, arſenic, ſome copper, and ſcoriæ. This maſs is waſhed in a ſtamping machine, by which the ſcoriæ are got rid of, and the metals alone remain, which undergo a further purification. When the dropping from the oven-furnace begins to be red and compact, it is a ſign that all that is heterogeneous to the copper, which can be extracted in this way, is got out, and the copper itſelf begins to melt. The loaves are then taken out, and appear varniſhed with a thick vitreſcent maſs, which, on dropping them into cold water, cracks in every direction, and when cold, may be knocked off with a hammer, leaving the copper conſiderably pure. This proceſs laſts about 30 hours.

The ſilver, now transferred to the lead, is afterwards refined in the uſual manner.

The proceſs of eliquation, though highly ingenious, is expenſive and difficult to conduct, and requires a large ſupply of lead. To perform it economically, it alſo requires a copper holding a pretty exact proportion of ſilver, that is, from ⅔ds to ¾ths per cent. of ſilver, neither more nor leſs, and hence, where there are parcels of copper of greater or leſs richneſs in ſilver, much judgment is exerciſed in mixing them in ſuch proportions as to allow of eliquation with the leaſt expence.

ELIRE. See Congé *d'Elire.*

ELIS, in *Ancient Geography*, a country of Greece, ſituated to the weſt of the Peloponneſus, bounded on the north by a part of Achaia, on the eaſt by Arcadia, on the ſouth by Meſſenia, and on the weſt by the Ionian ſea. The length, from ſouth to north, was about 20 leagues, and its breadth, from weſt to eaſt, from ſix to ſeven. It was watered by a great number of ſmall rivers, which rendered it very fertile. By ancient authors, however, it is chiefly diſtinguiſhed by its groves of olive-trees; and it was much frequented by the Greeks who attended the Olympic games. Beſides its olives, it furniſhed abundance of hemp, flax, and ſilk. This country was divided into three parts, *viz.* Triphylia, to the ſouth, the Piſatide, in the middle, and Elide Proper, to the north.

Elis, was alſo the name of the capital of the fore-mentioned province, ſituated in the northern part of it, on the river Peneus. This town, indeed, gave its name to the province, and, according to Strabo, was built ſoon after the ſiege of Troy. It was adorned with temples, porticoes, and gymnaſia, where the athletæ were formed for various kinds of combat. Pluto, Bacchus, and Venus, had their reſpective temples in this city. The ſtatue of Venus bore the name of "Cœleſtis," and it was formed by Phidias of gold and ivory. The feet of the goddeſs reſted upon a tortoiſe.

ELISHA, in *Biography*, a Hebrew prophet, was the ſon of Shaphat, and ſelected by Elijah, from the purſuits of agriculture, to be his ſucceſſor in the prophetic office. Many inſtances occur in the abſtract of his hiſtory, contained in the ſacred writings, which evince the miraculous powers with which he was endowed, and which ſerved as teſtimonies to his prophetic commiſſion. To the ſcriptures we ſhall refer the reader for an account of them. Eliſha's life and office were continued to a very advanced age, and terminated about the year 830 B.C. See 1 Kings, xix. 2 Kings, ii.—ix. xiii.

ELISI, Filippo, an Italian ſinger of the firſt claſs, with a *ſoprano* voice of great compaſs; who, though an admirable ſinger, was ſtill a greater actor: his figure was large and majeſtic, and his voice clear, well-toned, and full.

He was fond of diſtant intervals, of 14 or 15 notes, and took them well. Several airs of Jomelli, which he introduced in different operas, were calculated to ſhew the dexterity and accuracy with which he could form theſe remote intervals. He ſung an "Aria parlante in Arianna e Teſeo: fra ſtupido e penſoſo," compoſed moſt admirably by Galuppi, in a new and fine ſtyle of dramatic muſic; in which the accompaniments, in two of three ſmall triplets after each note in the baſe, had a new and fine effect.

Eliſi remained here at firſt only one ſeaſon, part of 1760 and 1761. But the impreſſion which his performance made on lovers of muſic and judges of good ſinging, was not ſoon forgotten.

ELISION, in *Grammar*, the cutting off, or ſuppreſſing a vowel at the end of a word, for the ſake of ſound or meaſure.

Eliſions, excepting in poetty, are but little known in Engliſh; in Latin, French, &c. they are frequent, and conſiſt moſtly in ſuppreſſions of the final *a*, *e*, and *i*: as in *Phillida amo ante alias. Si ad vitulum ſpectes*, &c.

In writing, eliſions are often marked by an apoſtrophe; as *egon' quem quæram?* for *egone. Emin' ego te?* for *emine. Veniſtin'* for *veniſtine*, &c. *Cett' eſperance*, for *cette; l'homme*, for *le homme.*

In the pronunciation we make frequent eliſions, but do not mark them in writing: thus we write *riſque it*, but pronounce *riſq' it.* So the French pronounce *un' ame*, but write *une ame.* In effect, they never mark any eliſions but at the end of the monoſyllables *je*, *ne*, *le*, *te*, *ce*, *que*, and *la*. They never elide in the *o*, nor *u*, nor *i*, but in the conjunction *ſi*, before *il*; nor *a*, but in *la*.

In poetty, the ſyllable in which a vowel is elided, is never reckoned; and great care is taken to avoid the claſhing of ſyllables where there is no eliſion, this making what they call a *hiatus* or *chaſm.*

Some reduce the *ecthlipſis* under the head of eliſions; as in *monſtrum, horrendum, ingens*, &c. See Ecthlipsis.

ELISORS, or Electors, in *Law*, are two clerks of the court, or two perſons of the county named by the court, and ſworn, to whom the *venire* ſhall be directed, in caſes of exception or challenge to the ſheriff or coroners for kindred or partiality, for the choice of a jury. Theſe eliſors ſhall indifferently name the jury, and their return is final: no challenge being allowed to their array.

ELISSUS, in *Ancient Geography*, a town of the Peloponneſus, in Arcadia, which was deſtroyed by the Lacedæmonians.—Alſo, a river of the Peloponneſus, in Sicyonia, the ſame with *Eliſſon.*

ELIXATION, or Lixiviation, is the ſeparation by means of ſolution, of a ſimple or compound ſalt, from any inſoluble matter with which it is naturally or caſually mixed. Water is the menſtruum employed for this purpoſe, and the method of performing it varies according as the water is uſed, hot or cold. In the former caſe, a boiler is nearly filled with water, and when the liquor is ſufficiently hot, the ſubſtance to be lixiviated is carefully ſtirred in: the inſoluble reſidue is then withdrawn by means of a rake, or any other convenient inſtrument, and other portions of the mixture are added, and treated in the ſame way as the firſt, till the liquor is ſufficiently ſaturated.

In cold lixiviation (as of alum ore), a caſk with a falſe bottom is filled with the earthy mixture, and water is then poured on till the mixture is covered by it. After remaining in this ſtate for a longer or ſhorter time, according to circumſtances, the plug-hole at the bottom of the caſk is opened and the liquor drains through, carrying with it all the ſoluble parts and leaving the inſoluble behind: the water thus ſaturated is called a lixivium.

ELIXIR, in *Pharmacy.* This term was applied to a large claſs of liquid medicines, conſiſting for the moſt part of reſins, aromatics, or other powerful medicines, infuſed in ſpirits of wine, and employed for internal uſe. In fact, elixirs ſo nearly reſemble the tinctures, in their general compoſition, that the term elixir is now entirely dropped in the modern pharmacopœias, and the formulæ for ſome of the moſt valuable preparations of this claſs have been transferred, with ſome alteration and much ſimplification, either to the claſs of *tinctures,* or to that of *ſpirits.* The term elixir, however, is ſtill retained in popular uſe.

Menage derives the word from the Arabic, *elicſir,* properly ſignifying *fraction,* becauſe elixirs have the force of breaking diſeaſes: others more naturally derive it from the Arabic, *alexiro,* an artificial extraction of ſome eſſence; others from the Greek, ελαιον, *oil,* and συρω, *I draw,* q. d. an extract of the oil, which is the eſſential part of mixts; others from the Greek verb, αλεξεω, *I help,* or *aſſiſt,* becauſe of the great ſuccours we receive from elixirs.

Elixir *aloes,* a name given in the late London Diſpenſatory to the medicine commonly known by the name of "elixir proprietatis," and now called "tinctura aloes compoſita," which is there ordered to be made in the following manner: take tincture of myrrh a quart; powder of ſocotrine aloes, and fine ſaffron, of each three ounces; digeſt them a due time, and then preſs off the tincture, and filtre it for uſe. The "elixir proprietatis" is a remedy ſaid to have been firſt invented by Paracelſus. See Tincture.

Elixir *myrrhæ compoſitum,* is now called "tinctura ſabinæ compoſita." See Tincture.

Elixir *paregoricum,* a name given in the late London Diſpenſatory to the "elixir aſthmaticum" of Quincy, which is there ordered to be made thus:

Take flower of benjamin, and ſtrained opium, of each a dram; camphor, two ſcruples; eſſential oil of anniſeeds, half a dram; rectified ſpirit of wine, a quart; digeſt all together a proper time, and then ſtrain off the ſpirit. This allays tickling coughs, relieves difficult breathing, and is uſeful in many diſorders of children, particularly in the hooping-cough. The doſe for an adult is from 50 to 100 drops. This is now called "tinctura opii camphorata." See Tincture.

Elixir, *ſacred.* See Tincture *of Rhubarb.*

Elixir *ſalutis.* See Tincture *of Sena.*

Elixir *ſtomachic,* is prepared by boiling two ounces of gentian-root, one ounce of Curaſſoa oranges, and half an ounce of Virginia ſnake-root, and infuſing them for three or four days in two pints of French brandy, and then ſtraining out the elixir. This is an elegant ſtomachic bitter. A ſmall glaſs, twice a day, relieves in flatulencies, indigeſtion, want of appetite, and ſimilar complaints. A large doſe alſo relieves the gout in the ſtomach.

Elixir *of vitriol, acid,* is prepared by gradually mixing one pint of the aromatic tincture with three ounces of oil of vitriol; and after the fæces have ſubſided, filtering the elixir through paper in a glaſs funnel. This is ſaid to be an excellent medicine for hyſteric and hypochondriac patients, afflicted with flatulencies, ariſing from a relaxation or debility of the ſtomach, and inteſtines. It is to be taken on an empty ſtomach, twice or thrice a day, in a glaſs of wine or water, or of any bitter infuſion; and the doſe may be from 10 to 40 drops.

Elixir, among the *Alchemiſts,* is uſed for the philoſopher's ſtone, or the powder of projection; and ſometimes for an univerſal medicine, which will cure all diſeaſes, called, by way of excellence, the *grand elixir.*

Thoſe two things moſt alchemiſts take to coincide; ſo that what will make gold, they think, will cure all diſeaſes. See Philosopher's *ſtone.*

The notion of a grand elixir is of a long ſtanding.

ELIXIS, a name given by ſome of the *Old Writers* to that form of medicine now called a linctus.

ELIXOIA, in *Ancient Geography,* an iſland of the Hyperboreans, at the mouth of the river Carambyca (the Dwina;) now the *Podeſemſka* at the mouth of the Dwina.

ELIZABETH, in *Biography,* queen of England, one of the moſt celebrated ſovereigns of this or of any country, was the daughter of Henry VIII. by his queen Anne Boleyn, and born in the year 1533. She was educated in the principles of the Proteſtant religion, and was diſtinguiſhed for her attainments in claſſical literature. By the laſt will of her father ſhe was nominated third in order of ſucceſſion, but by the influence of the duke of Northumberland, ſhe was by an act of Edward VI. excluded from the crown, to which nevertheleſs ſhe attained on the death of her ſiſter Mary. During, however, the reign of that ſiſter, ſhe was treated with the utmoſt indignity and ſeverity, committed to the Tower, and threatened with ſtill more awful calamities. Her confinement in this fortreſs was ſhort, for even the judges of Mary could find no plea againſt her, and ſhe was ſent from thence to Woodſtock, where, though kept in ſafe cuſtody, ſhe was treated with much reſpect. Her ſufferings and her principles endeared her to the nation, and ſhe became ſo extremely popular that it was, in a ſhort time, deemed impolitic to put any reſtraint upon her. When ſet at liberty ſhe choſe ſtudy and retirement, and was very ſubmiſſive to the will of her ſiſter. Attempts were made to draw her into ſome heretical declarations, but in every inſtance ſhe acted with ſo much prudence and caution as to give her enemies no hold upon her. She complied with the external forms of the eſtabliſhed religion, though it was well known, ſhe was inimical to the principles which her ſiſter eſpouſed, and which led her to the moſt atrocious acts of cruelty.

On the death of Mary, Elizabeth was immediately proclaimed ſovereign, to the ſatisfaction of the great majority of the people; indeed almoſt all deſcriptions of perſons rejoiced in the change, as that in which the glory of the country, and the ſafety of individuals ſeemed ſo much concerned. Elizabeth was at Hatfield when ſhe heard of her ſiſter's death, and, after a very few days, ſhe repaired to the he metropolis through immenſe crowds of the people, who ſtrove with each other who ſhould diſplay the ſtrongeſt teſtimonies of their reſpect and affection. On her entrance into the Tower, her mind was ſo ſtrongly affected with a compariſon of her preſent proſperity with her former ſufferings, that ſhe fell on her knees, and expreſſed the warmeſt acknowledgments to Almighty God for the deliverance which had been afforded her from the moſt cruel perſecution; a deliverance, ſhe ſaid, no leſs miraculous than that which Daniel had received from the den of lions. From this moment, in the true ſpirit of the Chriſtian religion, ſhe determined to forget all the injuries ſhe had endured, and forgave all who had been inimical to her principles during the reign of Mary.

Propoſals of marriage had been formerly made her by the king of Sweden, which ſhe thought fit to decline: a ſimilar offer was now made by Philip of Spain, her late ſiſter's huſband, which ſhe likewiſe rejected, ſignifying, in both caſes, that ſhe was determined to lead a ſingle life. She now turned her thoughts to the reſtoration of the principles of the reformation, which was effected by the firſt parliament that met after her acceſſion, and from this period England took the decided ſtation among Proteſtant countries, which it has ever ſince maintained.

Elizabeth at this time arrogated to herſelf that ſupremacy over the faith and worſhip of her ſubjects, which before was ſuppoſed to belong excluſively to the court of Rome. In her ſeveral plans reſpecting religion, ſhe proceeded with great caution; ſhe checked the forward zeal of thoſe who were for overſetting, at once, the eſtabliſhed religion of the country; ſhe publiſhed a proclamation by which ſhe prohibited all preaching without a ſpecial licence, and though ſhe diſpenſed with theſe orders in favour of ſome preachers of the Proteſtant religion, ſhe took care that they ſhould be the moſt calm and moderate of the party.

By the Catholics, Mary, the young queen of Scotland, who had received her education in France, was regarded as the true ſovereign of England; ſhe even aſſumed the enſigns and title of Engliſh royalty, which Elizabeth could never forget nor forgive. Mary, when ſhe found it was in vain to look to the crown of England, in oppoſition to the reigning queen, wiſhed to be regarded as the preſumptive ſucceſſor to the throne, which was refuſed. From this time Mary was conſidered as a rival, and every means was taken to thwart her projects, and diſappoint her expectations. The conduct of Mary, which will be more diſtinctly noticed under her own article, was not only imprudent in the higheſt degree, but furniſhed ample ſcope for the invectives of her enemies. In 1568, ſhe was obliged, from fear of her own ſubjects, to take refuge in England, and her retreat was ſo ſudden, that ſhe had no opportunity of giving to Elizabeth any previous intimation of her intentions. It was reſolved by the Engliſh miniſtry to detain her a perpetual priſoner, and a ſort of pretext was given them, by her offer to ſubmit the juſtice of her cauſe to the judgment of her ſiſter queen. An accuſation was accordingly brought againſt her by the regent Murray, and commiſſioners appointed to hear the caſe. Mary refuſed to reply to the charges exhibited againſt her, and demanded to be reſtored to her kingdom, or to be ſent to France, a favour which was as poſitively denied. The conſequence of this meaſure was a ſecret negociation between Mary and the duke of Norfolk, the head of the Catholic party, who propoſed marriage to her, and was ſupported in his views by the kings of France and Spain. The diſcovery of this project cauſed the duke to be committed to the Tower. This was followed by other rebellions and inſurrections which excited in the mind of Elizabeth much uneaſineſs; and various negociations were carried on with the Scots for her reſtoration, but without effect.

Elizabeth was now conſidered as the head of the Proteſtant party in Europe, and in this character ſhe made a treaty of alliance with the French Hugonots, and afforded them aid in men and money, and received in return the port of Havre-de-Grace, which was held ſome time by an Engliſh garriſon, but was at length obliged to ſurrender. Between France and Spain there was an avowed league for the extirpation of hereſy, and Elizabeth felt herſelf juſtified, by way of ſelf-defence, to give aſſiſtance to the cauſe of Proteſtantiſm, wherever it was in danger of being ſuppreſſed by force. She not only gave a favourable reception to the Flemiſh exiles who took refuge in England, from the tyranny of the duke of Alva, and brought over their arts and induſtry, but ſhe ventured upon ſtopping a large loan of money which ſome Genoeſe merchants were ſending by ſea to the duke, and which ſome Hugonot privateers had ſeized and brought into the Engliſh ports. The Spaniſh court retaliated, by exciting an inſurrection among the Engliſh catholics, at the head of which was the duke of Norfolk, who was afterwards diſcovered, tried, convicted and beheaded, for his crimes. On the horrible maſſacre at Paris, in Auguſt 1572, Elizabeth put herſelf and court into deep mourning, and received, with a marked and ſolemn ſilence, the French embaſſador who was ſent to apologize for the bloody deed. But ſhe was too prudent to break entirely with the French court, and ſuffered negociations to be carried on for her marriage with the king's brother, the duke of Alençon, the youngeſt ſon of Catherine de Medicis, whom, after a long courtſhip, ſhe rejected, and ſent back to the Netherlands in great wrath.

In 1575, Elizabeth, as the head of the Proteſtants, was offered the poſſeſſion and ſovereignty of the revolted Dutch provinces, on condition of becoming their protectreſs againſt the Spaniards. This for the preſent ſhe rejected, though in about three years after ſhe ventured to ſign a treaty of alliance with the united ſtates. In the year 1584, an aſſociation was entered into by the ſubjects of England, comprehending perſons of all ranks, with a view of affording her perſonal protection againſt her enemies, who were ſuppoſed to be chiefly adherents to Mary Queen of Scots. About this period laws of great ſeverity were enacted againſt the Jeſuits and popiſh prieſts, a plot having been diſcovered to aſſaſſinate the queen, which was known to be favoured by the papal court. Elizabeth now ventured to ſet at defiance the hoſtility of Spain, by entering into a treaty with the revolted Low Countries, by which ſhe engaged to aſſiſt them with a conſiderable force, on condition of having ſome of their ports put into her hands for ſecurity. She might indeed have poſſeſſed herſelf of the ſovereignty, but was ſatisfied with having her favourite, the earl of Leiceſter, admitted into the council of the ſtates. At the ſame time ſhe ſent a powerful armament againſt the Spaniſh ſettlements in the Weſt Indies, under ſir Francis Drake, and entered into a league of mutual defence with James king of Scotland, whoſe friendſhip ſhe cultivated, though ſhe kept his mother in priſon.

Another conſpiracy againſt the life of Elizabeth was detected in 1586; the perſons principally engaged in it unqueſtionably maintained a correſpondence with the unfortunate Mary, though it has been doubted whether ſhe was privy to the intended aſſaſſination. The plot was unravelled by her miniſter Walſingham, who ſuffered the plan to be carried on till he had detected all the conſpirators, and had ſufficient evidence under her own hand, to involve the queen of Scots as a participator in the intended offence. Fourteen of the conſpirators were convicted and executed, and Mary herſelf was brought to trial before a grand commiſſion of forty noblemen and privy counſellors, who after the uſual forms pronounced and ſigned a ſentence of death againſt her. But Elizabeth was unwilling to ſign the warrant of execution, and was anxious to remove the odium of the deed from herſelf. Parliament, probably by her deſire, demanded the execution of the ſentence, as ſhe wiſhed it to be ſuppoſed that her compliance was extorted from her by the clamours of the people. She is, however, charged with being privy to an attempt made upon the keepers of the priſoner to induce them to diſpatch her in a more private manner. This they nobly rejected, and a letter, ſigned by Walſingham to ſir Amias Poulet, on this ſubject is ſtill extant, to the diſgrace of that miniſter who could condeſcend to ſo baſe an expedient. At length the warrant was made out, and the deed was executed, Feb. 8. 1586–7. As ſoon as the news was communicated to the queen, ſhe affected an exceſs of grief and aſtoniſhment. She even pretended that the thing had been done contrary to her inclination, and committed to priſon Daviſon, who had been her agent in the buſineſs, and had him brought to trial and heavily fined. In no inſtance, perhaps, was hypocriſy carried to a higher pitch than in this by Elizabeth, which was equally derogatory to her good ſenſe, and to the known firmneſs of her mind in difficult caſes. The diſſimulation of the queen was not, however, without its effect; it ſoftened the reſentment of the king of Scotland, who, inſtead of revenging the death of his mother, entered into an amicable correſpondence with the court of England.

The next thing which engaged the attention of the queen and her miniſters was the famous Armada, which, as we have ſeen, was intended for the entire conqueſt of the iſland. (See ARMADA.) Elizabeth next became the ally of Henry IV. in order to vindicate his title, and eſtabliſh him firmly on the throne of France, and for ſome years the Engliſh auxiliaries ſerved in France, while ſeveral naval expeditions, undertaken by individuals, or by the queen, raiſed the reputation of England to an extraordinary height. At this period Robert Devereux, earl of Eſſex, the queen's favourite, highly diſtinguiſhed himſelf, but the events of his life have been already deſcribed. See DEVEREUX.

In 1601, Elizabeth held a conference with the marquis de Roſni, who is better known in hiſtory as the celebrated Sully, for the purpoſe of eſtabliſhing, in concurrence with England, a new ſyſtem of European power, with a view of controlling the vaſt influence of the houſe of Auſtria, and producing a laſting peace. The queen coincided with his projects, and the French miniſter departed in admiration of the ſolidity and enlargement of her political views. The queen, having ſuppreſſed an inſurrection in Ireland, and obliged all the Spaniſh troops ſent to its aſſiſtance to quit the iſland; ſhe turned her thoughts towards relieving the burdens of her ſubjects; ſhe aboliſhed a number of monopolies, and became extremely popular. But the execution of her favourite, the earl of Eſſex, gave a fatal blow to her happineſs. When ſhe learnt from the counteſs of Nottingham, that he had ſolicited her pardon, which had been concealed from her, ſhe at firſt became furious with rage, and when the violence of anger ſubſided, ſhe fell into the deepeſt and moſt incurable melancholy, rejecting all conſolation, and refuſing food and ſuſtenance of every kind. She remained for days ſullen and immoveable, “feeding,” ſays the hiſtorian, “her thoughts on her afflictions, and declaring life and exiſtence an inſufferable burden to her”. Few words ſhe uttered, and they were all expreſſive of ſome inward grief, which ſhe cared not to reveal: but ſighs and groans were the chief vent which ſhe gave to her deſpondency, and which, though they diſcovered her ſorrows, were never able to eaſe or aſſuage them. Ten days and nights ſhe lay upon the carpet, leaning on cuſhions which her maids brought her, and her phyſicians could not perſuade her to allow herſelf to be put to bed, much leſs to make trial of any remedies which they preſcribed to her. Her anxious mind at laſt had ſo long preyed on her frail body, that her end was viſibly approaching; and the council being aſſembled, ſent the keeper, admiral and ſecretary, to know her will with regard to her ſucceſſor. She anſwered with a faint voice, that, as ſhe had held a regal ſceptre, ſhe deſired no other than a royal ſucceſſor. Cecil requeſting her to explain herſelf more particularly, ſhe ſubjoined, that ſhe would have a king to ſucceed her, and who ſhould that be, but her neareſt kinſman, the king of Scots? Being then adviſed by the archbiſhop of Canterbury to fix her thoughts upon God, ſhe replied, that ſhe did ſo, nor did her mind in the leaſt wander from him. Her voice ſoon after left her; her ſenſes failed; ſhe fell into a lethargic ſlumber, which continued ſome hours, and ſhe expired gently, without farther ſtruggle or convulſion, in the 70th year of her age, and forty-fifth of her reign.

“So dark a cloud overcaſt the evening of that day which had ſhone out with a mighty luſtre in the eyes of all Europe. There are few great perſonages in hiſtory who have been more expoſed to the calumnies of enemies, and the adulation of friends, than queen Elizabeth, and yet there is ſcarcely any whoſe reputation has been more certainly determined by the unanimous conſent of poſterity. The unuſual length of her adminiſtration, and the ſtrong features of her character, were able to overcome all prejudices; and obliging her detractors to abate much of their invectives, and her admirers ſomewhat of their panegyrics, have at laſt, in ſpite of political factions, and, what is more, of religious animoſities, produced an uniform judgment with regard to her conduct. Her vigour, her conſtancy, her magnanimity, her penetration, vigilance, and addreſs, are allowed to merit the higheſt praiſes, and appear not to have been ſurpaſſed by any perſon that ever filled a throne: a conduct leſs rigorous, leſs imperious, more ſincere, more indulgent to her people, would have been requiſite to have formed a perfect character. By the force of her mind, ſhe controlled all her more active and ſtronger qualities, and prevented them from running into exceſs. Her heroiſm was exempt from temerity, her frugality from avarice, her friendſhip from partiality, her active temper from turbulency and a vain ambition; ſhe guarded not herſelf with equal care or equal ſucceſs from leſſer infirmities; the rivalſhip of beauty, the deſire of admiration, the jealouſy of love, and the ſallies of anger.”

Under the wiſe conduct of Elizabeth the Proteſtant religion was firmly eſtabliſhed, factions reſtrained, government ſtrengthened, the power of Spain nobly oppoſed, and withſtood, oppreſſed neighbours ſupported, a navy created, commerce rendered flouriſhing, and the national glory aggrandized. No ſovereign was ever more jealous of power and prerogative; yet ſhe was truly ambitious of obtaining the general affections of her ſubjects. She made, during her long reign, frequent progreſſes, and paid many domeſtic viſits, which were partly the reſult of policy, partly of economy. She wiſhed to be thought a friend to literature, but never diſplayed the liberality of a patroneſs. Her manners and language were but little ſuited to the delicacy of the female character.

“When we contemplate her as a woman,” ſays Mr. Hume, “we are apt to be ſtruck with the higheſt admiration of her great qualities and extenſive capacity, but we are apt alſo to require ſome more ſoftneſs of diſpoſition, ſome greater lenity of temper, ſome of thoſe amiable weakneſſes by which her ſex is diſtinguiſhed. But the true method of eſtimating her merit, is to lay aſide all theſe conſiderations, and conſider her merely as a rational being, placed in authority, and entruſted with the government of mankind. We may find it difficult to reconcile our fancy to her as a wife or miſtreſs, but her qualities as a ſovereign, though with ſome conſiderable exceptions, are the object of undiſputed applauſe and approbation." The laxity of her morals in ſome particular points has given occaſion to reproach, and it is impoſſible to juſtify her conduct with regard to the queen of Scots, but ſhe was nevertheleſs great as a ſovereign, though not eſtimable as a woman. Hume's Hiſt. of England.

Elizabeth, empreſs of Ruſſia, was the daughter of Peter the Great, was born in 1709, and when arrived at years of maturity, was admired for her perſonal attractions. By the revolution of the year 1741, Ivan, whom the empreſs Anne had nominated for her ſucceſſor, was ſet aſide, and Elizabeth renewed in her perſon the line of Peter the Great upon the throne of Ruſſia. Although her beauty, as well as rank and large dowry, occaſioned ſeveral offers, none of them were accepted, and ſhe died ſingle. From the period of her acceſſion, ſhe renounced all thoughts of the connubial ſtate, and adopted her nephew Peter. Her diſlike to marriage, however, did not proceed from any diſinclination to men; for ſhe freely owned to her confidents, that ſhe was never happy but when in love; if a capricious paſſion, which was ever changing its object, may be dignified by that name. The ſame characteriſtic warmth of temper hurried her no leſs to the extremes of devotion; ſhe was ſcrupulouſly exact in her annual confeſſions of the wanderings of her heart, in expreſſing the utmoſt contrition, and in punctually adhering to the minuteſt ceremonies and ordinances of the church. With regard to her diſpoſition, ſhe is generally ſtyled the humane Elizabeth; as ſhe made a vow never to inflict any capital puniſhments during her reign, and ſhe is alſo ſaid to have ſhed tears upon the news of victories gained by her troops, from the reflection that they were not obtained without great bloodſhed. By an edict paſſed in her reign, corporal penalties were ſubſtituted, except in ſome caſes of high treaſon, in the room of capital ſentences. From this ſuppreſſion of capital puniſhment in all inſtances excepting treaſon, the humanity of Elizabeth's diſpoſition has been highly extolled, and ſhe has been repreſented, not only by the lively Voltaire, but even by the ſagacious Blackſtone, as a pattern of legiſlative clemency. It ſhould be recollected, however, that the ſtate priſons were filled with wretched ſufferers, many of whom, unheard of and unknown, periſhed in damp and unwholeſome dungeons; beſides, the ſtate inquiſition, or ſecret committee, appointed to judge perſons ſuſpected of high treaſon, had conſtant occupation during her reign; many, upon the ſlighteſt ſurmiſes, were tortured in ſecret; many underwent the knoot, and expired under the infliction of this torture. Two ladies of rank underwent this cruel puniſhment, had their tongues cut out, and were baniſhed into Siberia. The mind of Elizabeth was perpetually haunted by ſuſpicions of the inſecurity of her elevated ſtation, and by the dread of a revolution ſimilar to that which had placed her on the throne. Elizabeth eſtabliſhed the Academy of Arts, and annexed it to the Academy of Sciences. (See ACADEMY.)

This empreſs died in 1761, the 21ſt year of her reign and the 53d of her age; in December, the ſame month in which ſhe was born, and in which ſhe was advanced to the throne. Peter III. whom ſhe nominated as her ſucceſſor, was in about ſix months reduced to the neceſſity of abdicating the empire, in favour of Catharine II. (See CATHARINE.) He died on the 7th day of his confinement at Robſcha, a ſmall imperial palace, 20 miles from Peterhof, and his remains were interred in the church of the convent of St. Alexander Nevſki at Peterſburgh. Coxe's Travels in Ruſſia.

Elizabeth, in *Geography*, a poſt town of America in Lancaſter county and ſtate of Pennſylvania, containing about 30 houſes, a Dutch church, and 546 inhabitants; 18 miles N.W. by W. of Lancaſter, and 84 W. by N. of Philadelphia.—Alſo, a ſhort ſouthern arm of James river, in Virginia; affording an excellent harbour, ſufficiently capacious for the accommodation of 300 ſhips. The channel is from 150 to 200 fathoms wide, and at common flood-tide it has 18 feet water to Norfolk, ſeated near the mouth of its eaſtern branch.

Elizabeth's *Bay*, a bay in the ſtraits of Magellan, at the entrance of which are two ſmall reefs, that appear above water. All round the bay there is good landing, though it is much expoſed to the weſterly winds. The beſt place for anchoring is Paſſage point. Sufficient wood may be procured here for the uſe of ſhips, and there is good watering at a ſmall river. The iſland affords celery and cranberries. S. lat. 50° 43′. W. long. 73° 24′. Variation 2 points eaſterly.

Elizabeth, *Cape*, a lofty promontory on the N.W. coaſt of America, S.W. of Prince William's ſound. N. lat. 59° 10′. E. long. 207° 45′.—Alſo, a headland and townſhip of North America, in the county of Cumberland, and ſtate of Maine. The cape lies in N. lat. 43° 33′. W. long. 70° 10′, E. by S. from the centre of the town 9 miles. The town contains 1355 inhabitants. It was incorporated in 1765, and lies 126 miles N.E. of Boſton.

Elizabeth *City*, a county of Virginia, in America, lying between York and James rivers, having Warwick and York counties on the W. and Cheſapeak bay on the E. and N. On its ſea-coaſt are ſeveral ſmall iſlands, the chief of which are Long and Egg iſlands. The S.E. extremity of the county is Point Comfort. It contains 1256 free inhabitants, and 1522 ſlaves.

Elizabeth *City*, a town of Paſquatank county in N. Carolina, in which is a poſt-office; 299 miles from Waſhington.

Elizabeth's *Iſland*, lies in the ſtraits of Magellan, and affords a ſupply of freſh water, celery, and ſome wild fowl. The ſhores alſo abound with ſhell-fiſh.

Elizabeth *Iſlands*, a group of ſmall iſlands on the S.E. ſide of Buzzard's bay, extending ſouth-weſterly from the extremity of Barnſtable county in the Maſſachuſetts, and bearing N.W. from Martha's vineyard; ſituated between 41° 24′ and 41° 32′ N. lat., and between 70° 38′ and 70° 56′ W. long. They are about 16 in number; and the chief of them are Naſhawn, Paſqui, Naſhawenna, Pinequeſe, and Cattahunk: all theſe belong to Duke's county.

Elizabeth-*Grand*, a town and diſtrict of Ruſſia, in the province of Catherinenſlaf, ſeated on the Ingul, falling into the Bog.

Elizabeth-*Town*, a poſt-town and borough of America, in Eſſex county, New Jerſey; pleaſantly ſituated on a ſmall creek which enters into Arthur-Kull. Its ſoil is equal to any in the ſtate, of which it is one of the oldeſt towns, having been purchaſed of the Indians in 1664, and ſettled ſoon after. The compact part of the town contains about 150 houſes, 2 brick churches, one for Preſbyterians and the other for Epiſcopalians, and an academy. It lies

15 miles S.W. by W. of New York.—Alſo, a town of Alleghanny county, in Pennſylvania, on the S.E. ſide of Monongahela river, between Redſtone Old Fort and Pittſburg, about 18 miles from each. Many boats are built here for the trade and emigration to Kentucky, and in the vicinity are ſeveral ſaw-mills. It has 1904 inhabitants. Another town of the ſame name in this county contains 111 inhabitants. N. lat. 40° 13′. W. long. 79° 22′.—Alſo, a poſt-town of Maryland, and capital of Waſhington county, formerly called "Hagarſtown," ſeated in the fertile valley of Conegocheague. The houſes are 300. Epiſcopalians, Preſbyterians, and German Lutherans have each a church. The court-houſe and market-houſe are handſome buildings, and the gaol is a ſubſtantial edifice of ſtone. The trade with the weſtern country is conſiderable, and there are many mills in the neighbourhood on Antietam creek.—Alſo, the chief town of Tyrrel county, in Edenton diſtrict, North Carolina. It has a gaol, court-houſe, and a few dwelling-houſes, 40 miles from Fayetteville, and 55 from Wilmington.—Alſo, a poſt-town and the chief in Bladen county, North Carolina, ſeated on the N.W. branch of Cape Fear. It has a court-houſe, gaol, and about 30 houſes, 36 miles S. of Fayetteville, and 47 N.W. of Wilmington.—Alſo, a poſt-town of Eſſex county, in New York, ſituated on the W. ſhore of lake Champlain, N. of Crown point, containing 900 inhabitants; 529 miles N. by E. from Waſhington.—Alſo, a townſhip in the county of Leeds, in Upper Canada; the ninth townſhip in aſcending the river St. Lawrence; well watered by the river Tonianta, and three other ſtreams.

ELK, a creek of America, in Northumberland county, Pennſylvania, which, uniting with Penn's creek, falls into the Suſquehanna, 5 miles below Sunbury.—Alſo, a navigable river of the eaſtern ſhore of Maryland, which riſes in Cheſter county, Pennſylvania, by two branches, *viz.* Big and Little Elk creeks. At their confluence ſtands Elkton.—Alſo, a ſhort navigable river in the ſtate of Teneſſee. It riſes on the N.W. ſide of Cumberland mountain; runs S. weſterly, and falls into the Teneſſee, a little above the Muſcle ſhoals; about 40 miles W.N.W. of the creeks' croſſing place.

Elk *lake*, one of the chain of ſmall lakes which connects the lake of the Woods with lake Superior. N. lat. 48° 41′. W. long. 93°.

Elk, in *Ornithology*, a name by which many have called the cygnus ferus, or wild ſwan, a ſpecies of *Anas*. See Duck.

Elk, in *Zoology*, a ſpecies of the cervus, or ſtag. See Cervus *alces*.

ELKARRIE, in *Geography*, a town of Arabia, in the country of Yemen; 24 miles N.E. of Abu-ariſch.

ELKASSARAN, a town of Arabia, in the country of Yemen; 8 miles E. of Chamir.

ELKE, is mentioned in our *Statutes*, as a kind of yew to make bows. 32 Hen. VIII. cap. 9.

ELKHORN, in *Geography*, a ſmall water of Kentucky river, in America. The Elkhorn lands, ſituated in a bend of Kentucky river in Fayette county, where this ſmall river riſes, are much eſteemed.

ELKRIDGE, a ſmall town of America, in Ann Arundel county, Maryland, on the S. bank of Patapſco river, and on the W. ſide of Deep-run; famous for the bright tobacco called "Kite's foot;" 8 miles S.W. of Baltimore, and 19 N.W. of Annapolis. N. lat. 39° 12½′.

ELKTON, a poſt town of conſiderable trade, at the head of Cheſapeak bay, in Maryland, and the capital of Cecil county; though, ſays Mr. Weld, it is a dirty diſagreeable place. The tide flows up to the town, and it derives great advantages from the carrying trade between Baltimore and Philadelphia. Upwards of 250,000 buſhels of wheat are collected here annually for ſupplying thoſe markets, or the neighbouring mills. Elkton conſiſts of one ſtreet, containing about 90 houſes, irregularly built, a court houſe, and a gaol. On the W. ſide of the town is an academy. It is 10 miles N.E. of Charleſtown, 47 S.W. of Philadelphia, and 56 N.E. of Baltimore.

ELKUVAR, a river of Ruſſia, which runs into the Tobol.

ELL, Ulna, a meaſure, which obtains, under different denominations, in moſt countries.

The ell is the ſtandard, or meaſure, whereby cloths, ſtuffs, linens, ſilks, &c. are uſually meaſured, or eſtimated, anſwering, in good meaſure, to the yard of England, the canna of Italy, the vara of Spain, the palm of Sicily, &c.

Servius will have the ell to be the ſpace contained between the two hands when ſtretched forth; but Suetonius makes it only the cubit.

The ells which occur moſt frequently in England, are Engliſh and Flemiſh; the ell Engliſh contains three feet nine inches, or one yard one quarter, Engliſh meaſure; the ell Flemiſh contains twenty-ſeven inches, or three quarters of a yard; ſo that the ell Engliſh is to the Flemiſh ell as five to three.

M. Ricard, in his Treatiſe of Commerce, reduces the ells thus: an hundred ells of Amſterdam are equal to ninety-eight three quarters of Brabant, Antwerp, and Bruſſels; to fifty-eight and an half of England and France; to an hundred and twenty of Hamburgh, Francfort, Leipſic, and Cologne; an hundred and twenty-five of Breſlaw; an hundred and ten of Bergen and Drontheim; and an hundred and ſeventeen of Stockholm.

ELLEDAT, in *Geography*, a town of Ceylon; 12 miles S. of Candy.

ELLEHOLM, a ſmall and very ancient town of Sweden, in the province of Blekingen; 7 miles from Carlſhamn, which formerly had a caſtle.

ELLENBOGEN, a town of Germany, in the county of Bregentz; 17 miles S.S.E. of Bregentz.

ELLENHOFEN, a town of Germany, in the county of Bregentz; 14 miles E.N.E. of Bregentz.

ELLERENA, a town of North America, in Mexico, and province of Zacatecas; 25 miles W. of Zacatecas.

Ellerena, a town of Spain, in the province of Eſtremadura, ſituated in a low tract abounding with fruits and paſtures, at the foot of Sierra Morena, and containing about 7000 inhabitants, diſtant 17 leagues S.S.E. of Merida, near the border of Andaluſia. In the mountains, 4 miles from the town, a ſilver mine was formerly diſcovered.

ELLESMERE, a market town of Shropſhire, which lies 16 miles N.N.W. from Shrewſbury, and 176 N.W. from London. It is pleaſantly ſituated on an eminence near the margin of a deep lake, which occupies a ſpace of one hundred and twenty acres, well ſtocked with fiſh, and particularly eels, whence the town derives its name. From its form and other circumſtances it appears to have been a very ancient place, and lying in the marches of Wales, being diſtant from the boundary ſtone three miles, a mound called Wat's dyke ſix, and about nine from the celebrated Clawdd Offa; it was at an early period very ſtrongly fortified. According to the Chronicle of Cheſter the caſtle, with the fertile diſtrict around, was given by king John as a dower with his natural daughter Joan, when he beſtowed her in marriage on Llewellin, prince of North Wales. After the death of that prince it came into the family of L'Eſtrange, and John L'Eſtrange was governor of the caſtle in the thirty-third year of Henry I. Leland ſpeaks of the caſtle as ſtanding in his time, that the town had four well-built ſtreets, and was privileged with two annual fairs; but at that time had no market. The building is now no more, and the ſite, ſtill ſurrounded with three walls and foſſes, is formed into a bowling green, from whence is a moſt delightful proſpect. The number of houſes, as appears by the returns made under the population act, was 1035, inhabited by 5553 perſons.

This town formerly gave name to the hundred, which at preſent is denominated Pim-hill. It gives the title of baron to the family of Egerton. Thomas Egerton, celebrated for his talents and virtues, was made lord keeper of the great ſeal by queen Elizabeth; and lord high chancellor, baron of Elleſmere, and viſcount Brackley, by king James: and a deſcendant, John William Egerton, is now lord Elleſmere, and earl of Bridgewater. This place has of late been much benefited by a navigation, called the Elleſmere canal, which forms a communication between the river Dee at Cheſter, and the Severn at Shrewſbury. This was cut under the ſanction of an act paſſed in the thirty-fourth year of the preſent reign; and, by ſubſequent acts, has been extended and ramified by collateral branches; which communicate with other parts of Shropſhire, and the interior of Wales. The aqueduct, formed by a bridge of numerous arches, over which the canal paſſes acroſs the wide flowing river Dee, is conſidered as a *chef d'œuvre* of modern engineering, and maſonry. This ſyſtem of inland navigation in the counties of Cheſter, Flint, Denbigh, and Salop, was firſt ſuggeſted by Mr. John Duncombe in 1789; on which the opinion of Mr. Jeſſop having been taken, and an act obtained, the execution of this grand deſign was confided to Mr. Thomas Telford, the engineer, under whom the ſame has been now nearly completed. (See Canal.) A rail-way branch has been made to Plas-Kynaſton collieries ſince that article was written. A ſteam-engine at Elleſmere park, erected for the purpoſe of ſupplying the Wirral part of the line with ſalt water from the Merſey, has deſtroyed the fiſh in this part of the canal, and is ſaid to have much inconvenienced ſome farmers on the line, by the want of freſh water for their cattle, although ſome miles inland, as is alſo the caſe on the Droitwich canal, from the ſalt ſprings by which the ſame is ſupplied. On the opening the famous Port-Cyſylty aqueduct, an appropriate oration was delivered, and was ſince printed, ſee the Gentleman's Magazine, vol. lxxv. p. 1228.

ELLEZELLES, a ſmall town of France, in the department of Jemappe, chief place of a canton in the diſtrict of Tournay, with a population of 4008 individuals. The canton contains four communes and 14,430 inhabitants, upon a territorial extent of 70 kiliometres.

ELLICHPOUR, a fine city of Hindooſtan, the capital of a large province or diſtrict of the ſame name; ſubject to the Nizam; but paying a "chout," or nominal fourth part of its revenues to Nagpour. It was anciently the chief city of Berar Proper, by which Mr. Rennell diſtinguiſhes the province known in Ayin Acbaree by that name; for Berar, in modern acceptation, includes the whole country between Dowlatabad and Oriſſa; the eaſtern part of which was neither reduced by Acbar, nor even known, in particulars, to the author of the Ayin Acbaree; 122 miles nearly W. of Nagpour. N. lat. 21° 12′. E. long. 78° 51′.

ELLIGER, Ottomar, in *Biography*, called the Old, a painter of fruit and flowers; he was born at Gottenburg in 1633. He ſtudied and imitated with great ſucceſs the peculiarities of Daniel Segers. Elliger's works are much eſteemed upon the continent, but are here very little known. He paſſed ſome time at the court of Berlin, invited there on account of his merit and reputation; it is not known when or where he died.

His ſon, known by the name of the younger Elliger, ſtudied hiſtoric painting. He was born at Hamburgh in 1666, and having acquired ſome facility of handling under his father, he was placed as a diſciple with Michael Van Muſſcher, a ſkilful painter of converſation pieces: but aiming at ſomething of a higher caſt, he took Gerard Laireſſe for his maſter, under whom he quickly acquired thoſe principles of compoſition which he deſired, and working upon them, gained conſiderable reputation.

Several of his largeſt and beſt works are at Amſterdam. The elector of Mentz rewarded, in a very ample manner, the exertion of his talents upon two deſigns, one, the "Death of Alexander," the other, the "Nuptials of Peleus and Thetis," which were much admired and applauded. Elliger, however, politely declined the honour of being appointed principal painter to the elector; and unhappily gave up the latter part of his life to diſſipation and drunkenneſs; which weakened his talents and ruined his reputation. He died in 1732, aged 66.

ELLINGTON, in *Geography*, a townſhip of America, conſiſting of about 200 families and 1209 inhabitants in Tolland county, Connecticut, diſtant about 12 miles N.E. of Hartford city, and 6 W. of Tolland.

ELLIOTT, William, in *Biography*, an Engliſh engraver, of a mild and benevolent mind, who reſided in London, and died in the year 1766. He engraved ſome large plates for the elder Boydell, but his works are not highly celebrated. A large landſcape, after Gaſper Pouſin, ſeveral after the Smiths of Chicheſter, and a portrait of Helena Formans, (the ſecond wife of Rubens,) are mentioned by Strutt, as among the beſt of his engravings.

ELLIPOMACROSTYLA, in *Natural Hiſtory*, the name of a genus of cryſtals. The word is derived from the Greek ἐλλιπὴς, *imperfect*, μακρὸς, *long*, and ϛυλος, *a column*, and expreſſes an imperfect cryſtal, with a long column. The perfect figure of cryſtal being a column terminated by a pyramid at each end; thoſe which want this character are eſteemed imperfect; and accordingly bodies of this genus are defined to be imperfect cryſtals, with ſingle pyramids; one end of their column being affixed to ſome ſolid body, and compoſed of thin and ſlender hexangular columns, terminated by hexangular pyramids. Of this genus there are ſeveral ſpecies.

ELLIPOPACHYSTYLA, the name of a genus of cryſtal. The word is derived from the Greek ἐλλιπὴς, *imperfect*, ϖαχὺς, *thick*, and ϛύλος, *a column*, and expreſſes a cryſtal of the imperfect kind, with a thick column. The bodies of this genus are cryſtals compoſed of an hexangular column, conſiderably thick and ſhort, and affixed irregularly at one end to ſome ſolid body, and terminated at the other by an hexangular pyramid. Of this genus there are only two known ſpecies.

ELLIPSE, or Ellipsis, in *Geometry*, one of the conic ſections, is formed by the common ſection of a plane and a conic ſurface, when the curve line common to the two ſurfaces completely ſurrounds the cone, and the cutting plane is neither parallel to the baſe of the cone, nor takes a ſubcontrary poſition. See Conics, Def. 5th, and Schol. Prop. 34.

The periphery of the ellipſe, like the circle, returns into itſelf, and completely incloſes ſpace. In familiar language, this figure is called an oval.

The definitions relating to the ellipſe have already been laid down in the article Conics, where the principal properties which it poſſeſſes in common with the other figures, produced by the interſection of a plane and a conic ſurface, have been demonſtrated. The more characteriſtical properties, which are peculiar to the ellipſe, will at preſent engage our attention.

1. If two circles be deſcribed, (*Plate* VII. *Conics*, *fig.* 1.) one upon the greater axis of an ellipſe, and one upon the leſſer axis, theſe two circles will touch the periphery of the ellipſe only at the extremities of the common diameter; and the circle upon the greater axis will fall entirely without the ellipſe, and the other circle entirely within it. This is manifeſt from Prop. 39, Conics.

The circle upon the greater axis is ſometimes called the circumſcribed circle; and the circle upon the leſſer axis, the inſcribed circle of the ellipſe.

2. If a point, F, be aſſumed in either axis of an ellipſe, and from that point an ordinate be drawn both to the ellipſe and to the circle deſcribed upon that axis; then ſhall the ordinate of the circle, F G, be to the ordinate of the ellipſe, F H, as A B, the axis upon which the circle is deſcribed, to the other axis D E.

For, (Cor. 2. Prop. 28. Conics)

$$AF \times FB, \text{ or } FG^2 : FH^2 :: AB^2 : DE^2,$$

$$\text{And therefore } FG : FH :: AB : DE.$$

3. Let M N, (*fig.* 2.) intercepted between the axes of an ellipſe, be equal to the difference of the two ſemi-axes, A C and C D: then, if M N be produced, ſo that $MG = CD$ and $NG = AC$; the point G will be in the periphery of the ellipſe.

Draw G O and G F perpendicular to C D and A B, and draw CH parallel to NG, and produce FG to meet it in H: then $CH = NG = AC$: therefore H is in the periphery of a circle deſcribed upon the axis A B. The two triangles N G O and H C F are plainly equal in all reſpects, therefore $NO = HF$.

$$\text{Now, } NO : OC :: NG : MG;$$

$$\text{That is, } HF : GF :: AC : CD:$$

therefore the point G is in the periphery of the ellipſe (2).

And if *m n*, intercepted between the axes of an ellipſe, be equal to the ſum of the ſemi-axes A C and C D; and the point G be taken, ſo that $nG = AC$, and $mG = CD$: it may be ſhewn, by the like reaſoning, that the point G is in the periphery of the ellipſe.

4. If from a point (*fig.* 3.) without an ellipſe two tangents be drawn to the curve, and a ſtraight line to the centre; the laſt-mentioned line will biſect the chord that joins the two points of contact.

Draw C P and C Q, ſemi-diameters of the ellipſe, parallel to the tangents T M and T N; and produce the ſame tangents to meet a diameter F G, parallel to the chord M N, in D and E. Then T M and T N are proportional to C P and C Q (Cor. 1. Prop. 28. Conics), and alſo to M D and N E (2. 6. Euc.); therefore M D and N E are proportional to C P and C Q. Therefore,

$$MD^2 : NE^2 :: CP^2 : CQ^2$$

$$\text{Prop. 38. Conics,} \left\{ \begin{array}{l} NE^2 : FE \times EG :: CQ^2 : CG^2 \\ DF \times DG : MD^2 :: CG^2 : CP^2. \end{array} \right.$$

Conſequently $DF \times FG = FE \times EG$ (22. 5. Euc.); and by adding CG^2 to both, $DC^2 = CE^2$. Therefore $DC = CE$; and T C will biſect M N.

Cor.—The tangents T M and T N are inverſely proportional to the perpendiculars C R and C S, drawn to them from the centre of the ellipſe.

Let M C and C N be joined: becauſe $MO = ON$, the triangle $TMC =$ triangle CNT: therefore $TM \times CR = TN \times CS$, for theſe rectangles are the doubles of the triangles.

5. If a tangent of an ellipſe H B (*fig.* 4.) meet a diameter produced, and an ordinate H F be applied to the ſame diameter from the point of contact: then, the ſemi-diameter C A will be a mean proportional between C B and C F, the parts between the centre and the tangent, and the centre and the ordinate.

Let A M, a tangent of the curve, meet H P in M; and draw A H and C M cutting A H in O, and H F in N; join A N. The triangles A O M and H O N are equal in all reſpects; for they are equi-angular, and $HO = AO$ (4); therefore A M H N is a parallelogram (33. 1. E.) Becauſe N A is parallel to B H, therefore,

$$BC : CA :: MC : CN;$$

and becauſe H F is parallel to A M (Cor. 1. Prop. 16. Conics), therefore,

$$AC : CF :: CM : CN.$$

$$\text{Conſequently } BC : CA :: CA : CF.$$

Cor.—The rectangle $BF \times FC = AF \times FD$.

For $BC \times CF = BC \times CA - CF^2 = AC^2 - CF^2 = AF \times FD$.

6. If G P (*fig.* 5.) drawn perpendicular to a tangent of the curve at G, cut the axis A B in P, and the axis D E in Q, then will P G be to Q G as the ſquare of the axis D E to the ſquare of the axis A B.

Let the tangent meet the axis A B produced in T, and draw G F perpendicular to A B. Then, (Cor. 2. P. 28. Conics)

$$DE^2 : AB^2 :: GF^2 : AF \times FB;$$

Becauſe P G T is a right-angled triangle,

Therefore, (Cor. 8. 6. E.) $GF^2 = TF \times FP$; alſo (Cor. 5.) $AF \times FP = TF \times FC$; therefore

$$DE^2 : AB^2 :: TF \times FP : TF \times FC :: PF : CF.$$

$$\text{But } PG : GQ :: PF : FC.$$

$$\text{Therefore } PG : QG :: DE^2 : AB^2.$$

7. If a parallelogram R S T U (*fig.* 6.) be formed by drawing tangents to an ellipſe at the extremities of two conjugate diameters M N and P Q: that parallelogram ſhall be equal to the rectangle under A B and D E, the two axes of the ellipſe.

From D, one of the extremities of either axis, draw D L perpendicular to that axis, and let it meet one of the ſides of the parallelogram in L; join C L and D M, and draw C H perpendicular to R S. Becauſe D L and L M are tangents, C L will biſect D M (4), and conſequently the triangles C L D and C L M will be equal: therefore $CD \times DL = CH \times LM$. Therefore

$$CD : CH :: LM : DL.$$

$$\text{But (Cor. 1. 28. Conics) } CP : CA :: LM : DL;$$

$$\text{Therefore, } CD : CH :: CP : CA;$$

$$\text{Conſequently, } AC \times CD = CP \times CH.$$

But $CP \times CH$ is one-fourth part of the parallelogram RSTU, and $AC \times CD$ is one-fourth part of the rectangle $AB \times DE$: therefore, parallelogram $RSTU = AB \times DE$.

8. The ſum of the ſquares of any two conjugate diameters of an ellipſe (*fig.* 7.) is equal to the ſum of the ſquares of the two axes.

From M and P, the extremities of two conjugate diameters of an ellipſe, draw M T, P S, tangents of the curve cutting the axis B A in T and S: draw M H and P K ordinates to the ſame axis, and P O an ordinate to the axis D E. Becauſe M N and P Q are conjugate diameters, therefore M T is parallel to P Q, and P S to M N: hence the triangles C M T and C P S are equi-angular, and the perpendiculars MH and PK will cut the two baſes ſimilarly. Therefore,

$$CT : TH :: CS : CK;$$

And (1. 6. E.) $CT \times CH : CH \times TH :: CS \times CK : CK^2$.
But (Cor. 2. 28. Conics) $AC^2 : AH \times HB :: CD^2 : MH^2$;
And (5, & Cor.) $AC^2 = CT \times CH$, and $AH \times HB = CH \times TH$; therefore,

$$CS \times CK : CK^2 :: CD^2 : MH^2;$$

And (5.) becauſe $CS \times CK = AC^2$,

$$AC^2 : CK^2 :: CD^2 : MH^2.$$

Now, if this laſt proportion be compared with the two following ones, *viz.*

$$\text{(Cor. 2. 28. Conics.)} \left\{ \begin{array}{l} AC^2 : AH \times HB :: CD^2 : MH^2, \\ AC^2 : CK^2, \text{ or } PO^2 :: CD^2 : DO \\ \quad \times OE, \end{array} \right.$$

we muſt infer that $CK^2 = AH \times HB$, and $MH^2 = DO \times OE$. Therefore,

$$CK^2 + KP^2 + MH^2 + HC^2 = AH \times HB + HC^2 + DO \times OE + CO^2.$$

But the firſt of theſe ſums is $= MC^2 + CP^2$, and the ſecond is $= AC^2 + CD^2$: therefore, $MC^2 + CP^2 = AC^2 + CD^2$.

9. If AG and BK (*fig.* 8.), two tangents of an ellipſe, be both parallel to the ſemi-diameter CD, and be interſected by a third tangent GK; the ſquare of CD will be equal to the rectangle $AG \times BK$, which is contained by the parts of the parallel tangents between the points of contact and the third tangent.

Join AB, which will paſs through the centre C (Cor. 18. Conics): draw HQ parallel to AB, and HO to CD: produce CD to meet GK in P. Then AC and CD are conjugate diameters (Cor. 24. Conics), and HO is an ordinate to AB, and HQ to CD. Therefore (5),

$$CT : CA :: CA : CO.$$

Convertendo, $CT : TA :: CA : AO$,

Alter. & Comp. $CT : TB :: TA : TO$.

Therefore, by ſimilar triangles,

$$PC : BK :: AG : HO, \text{ or } CQ.$$

Conſequently, $BK \times AG = PC \times CQ$. But,

(5) $PC \times CQ = CD^2$, therefore $BK \times AG = CD^2$.

10. Two right lines, Mf and MF (*fig.* 9.), drawn from a point in the periphery of an ellipſe to the two foci, make equal angles with the tangent MT, drawn from the ſame point.

Let the tangent MT meet the greater axis produced in T, draw MK perpendicular to the ſame axis, and produce fM to O. Then,

$$(47.\ 1.\ E.)\ fM^2 - MF^2 = fK^2 - KF^2;$$

that is, $(fM + MF)(fM - MF) = Ff \times (fK - KF)$.

But $fM + MF = 2\,AC$ (42. Conics), $fF = 2\,FC$, and $fK - KF = 2\,CK$: therefore,

$$AC \times \frac{fM - MF}{2} = FC \times CK.$$

$$\text{Therefore, } AC : CF :: CK : \frac{fM - MF}{2}.$$

$$\text{But (5) } TC : CA :: CA : CK.$$

$$\text{Ex æquo, } TC : CF :: AC, \text{ or } \frac{fM + MF}{2} : \frac{fM - FM}{2},$$

And, componendo & dividendo,

$TC + CF$, or $Tf : TC - CF$, or $TF :: fM : MF$: therefore (3. 6. E.) TM biſects the outward angle FMO; that is, FM and fM make equal angles with TM.

11. If MP (*fig.* 10. *Plate* VIII.) touch an ellipſe, and Mf be drawn from the point of contact to either focus, then CP, drawn from the centre parallel to Mf, and limited by MP, will be equal to AC, half the tranſverſe axis of the ellipſe.

Draw MF to the other focus, and alſo FR and CS parallel to MP. Becauſe $FC = Cf$, therefore $fS = SR$. And becauſe fM and FM make equal angles with MP (9), it is plain that the triangle MRF will be iſoſceles, and $FM = MR$. But $2\,SM = fM + MR = fM + MF = 2\,AC$ (42. Conics): therefore $SM = AC$. And, becauſe $CSMP$ is a parallelogram, therefore $CP = SM = AC$.

Cor. 1. If FP be joined, it will be perpendicular to MP.

Let CP meet MF in H; then MF will be biſected in H. Becauſe CP is parallel to Mf, therefore the angle HPM is equal to the angle HMP: therefore $PH = HM = HF$: therefore P is in the circumference of a circle deſcribed upon the diameter MF; and the angle MPF, in a ſemicircle, is a right angle.

Cor. 2. If FP and fQ be drawn perpendicular to a tangent of an ellipſe from the two foci, the points P and Q are in the circumference of the circle deſcribed upon the tranſverſe axis as a diameter.

12. The rectangle under FP and fQ, any two perpendiculars drawn to a tangent of the curve from the foci, is equal to the ſquare of the leſs axis CD.

For the points P and Q are in the circumference of a circle deſcribed upon the greater axis AB: therefore, if PF be produced to meet that circle again in O, the ſegment QPO, which contains a right angle, will be a ſemicircle: therefore QC and CO are in one right line, and the two triangles QCf and OCF will be equal, and Qf will be equal to FO. Therefore $Qf \times FP = OF \times FP = AF \times FP = AC^2 - CF^2 = CD^2$. (Def. 23. Conics.)

13. A ſtraight line Tf (*fig.* 11.), drawn from the interſection of two tangents of an ellipſe to one of the foci, will make equal angles with two right lines Mf and Nf, drawn from the points of contact to the ſame focus.

Draw MF and NF to the other focus, and produce fM and fN till MG be equal MF, and NH to NF: draw TG, TF, TH. Becauſe TM makes equal angles with MG and MF (10), it is plain that $TG = TF$ (4. 1. E.): and, for a like reaſon, $TH = TF$: therefore $TG = TH$. But $fM + MF = fN + NF$ (42. Conics); that is, $fG = fH$. Hence, it is plain, that the two triangles TGf and THf are equal in all reſpects (8. 1. E.), and the angle TfG is equal to the angle TfH.

Cor. 1. The two lines Tf and TF, drawn to the foci, divide the angle MTN, contained by the tangents, into equal parts.

$$\text{For, } GTF - fTF = 2\,MTF - fTF = GTf,$$

$$\text{And, } HTF + fTF = 2\,NTF + fTF = HTf;$$

$$\text{Therefore, } 2\,MTF - fTF = 2\,NTF + fTF:$$

$$\text{And hence, } MTf = NTF$$

$$MTF = NTf.$$

Cor. 2. If two tangents of an ellipſe (*fig.* 12.), drawn from the extremities of a chord paſſing through one focus F, interſect in T; then TF is perpendicular to the chord MN. For the angles TFM and TFN (*fig.* 11.) are, in all caſes, equal; and when MF and FN are in one right line, each of them becomes a right angle.

14. If a tangent of an ellipſe, as DE (*fig.* 13.), interſect two perpendiculars drawn from the extremities of the tranſverſe axis, in the points D and E; then two right lines, drawn from theſe points to one of the foci F, will contain a right angle.

Draw FM to the point in which DE touches the ellipſe: then, becauſe AE and BD are tangents of the curve, FE

will biſect the angle AFM (13), and FD will biſect the angle DFM; whence the propoſition is manifeſt.

15. If MN (*fig.* 14.) be any chord drawn through the focus of an ellipſe, and PQ likewiſe drawn through the focus, be ordinately applied to the tranſverſe axis AB: then, four times the rectangle MF × FN will be equal to the rectangle MN × PQ.

Draw MS and NR perpendicular to AB, and NG, MK, PH, perpendicular to the directrix that correſponds to the focus F. Then (43. Conics),

$$PF : PH, \text{ or } FL :: NF : NG, \text{ or } LR.$$

$$(17.\ 5.\ E.)\quad PF : PH :: NF - PF : FR.$$

In like manner, $PF : PH :: PF - FM : FS.$

11. 5. E. and alternando, $NF - PF : PF - FM :: FR : FS :: NF : FM;$

$$\text{Therefore, } (NF - PF) \times FM = (PF - FM) \times FN:$$

$$\text{And } 2\,NF \times FM = PF \times MN;$$

$$\text{Therefore, } 4\,NF \times FM = PQ \times MN.$$

16. Let ABCD be a quadrilateral figure inſcribed in an ellipſe, and from M any point in the curve, let PQ and RS (*figs.* 15, and 16.) be drawn parallel to two adjacent ſides AB and AD; and let the firſt of theſe lines meet the oppoſite ſides of the figure in P and Q; and the ſecond, the two other oppoſite ſides in R and S: then the ratio of the rectangle MP × MQ to the rectangle MR × MS will be equal to the ratio of the ſquare of the diameter of the ellipſe drawn parallel to AB to the ſquare of the diameter drawn parallel to AD.

When the two ſides AD and BC (*fig.* 15.) of the quadrilateral are parallel, let the right line, which biſects AD and BC, cut RS in K, and let RS meet the ellipſe again in O: becauſe MO, AD, and BC, are all parallel, it is plain that the right line which biſects AD and BC will be a diameter of the ellipſe, and will biſect the remaining line MO: but the ſame line which biſects AD and BC will alſo biſect RS parallel to AD and BC, and terminated by the right lines which limit AD and BC: hence, it is plain, that RO = MS. Therefore the ratio of the rectangle RM × MS to MP × MQ is equal to the ratio of RM × MO to RA × AD; that is (28. Conics), to the ſquare of the diameter of the ellipſe drawn parallel to AD to the ſquare of the diameter parallel to AB.

When BC is not parallel to AD (*fig.* 16.) let it, produced if neceſſary, meet AD and RS in T and U; let RS meet the curve again in O, and join BO, QS. Then, by ſimilar triangles,

$$BT : TA :: BU : UR,$$

$$CT : TD :: CU : US.$$

$$\text{Therefore, } BT \times CT : TA \times TD :: BU \times UC : UR \times US,$$

$$\text{but (28. Conics), } BT \times CT : TA \times TD :: BU \times UC : MU \times UO;$$

$$\text{Therefore, } MU \times UO = RU \times US; \text{ and}$$

$$US : UO :: UM : UR :: UQ : UB.$$

Therefore (2. 6. E.) SQ and BO are parallel; conſequently the triangles QMS and BRO are equi-angular, and,

$$SM : OR :: MQ : RB;$$

$$\text{Therefore, } SM \times MR : OR \times RM :: MQ \times MP : RB \times RA.$$

Alternando,

$$SM \times MR : MQ \times MP :: OR \times RM : RB \times RA.$$

But (28. Conics) the ratio of OR × RM to RB × RA is equal to the ratio of the ſquare of the ſemi-diameter of the ellipſe parallel to AD to the ſquare of the ſemi-diameter parallel to AB: whence the propoſition is manifeſt.

Cor. 1. The ratio of SM × MR to MP × MQ is conſtantly the ſame, wherever the point M is aſſumed in the periphery of the ellipſe.

Cor. 2. If, from any point M (*fig.* 17. *Plate* IX.) aſſumed in the periphery of an ellipſe, four right lines, MH, MK, MG, and ML, be drawn ſo as to make given angles with the four ſides of a quadrilateral inſcribed in an ellipſe; then the ratio of MK × MG, the rectangle contained by two of the lines drawn to the oppoſite ſides of the quadrilateral, to MH × ML, the rectangle of the lines drawn to the other two oppoſite ſides, will be conſtantly the ſame, wherever the point is aſſumed in the periphery.

For, having drawn the lines MPQ and RMS, as in the propoſition; the four lines MK, MG, MH, and ML will have given ratios to the four lines MP, MQ, MR, and MS, each to each: and hence the ratio of MK × MG to MH × ML, is compounded of the ratio of MP × MQ to MR × MS and given ratios: whence the corollary is manifeſt.

Of the deſcription of an ellipſe in plano.

1. When the tranſverſe axis (*fig.* 18.) and the two foci of an ellipſe are given, any number of points in the curve may be thus found: Take any point O in the tranſverſe axis AB, and from F and *f*, the two foci, as centres, with radii reſpectively equal to AO and BO, let arcs of circles be deſcribed to interſect in M and *m*; and theſe two points will be in the periphery of the ellipſe (42. Conics): and, by aſſuming different points in the tranſverſe axis, as many points as ſhall be thought neceſſary may be found in the periphery of the figure.

When the two axes are given, the foci may be readily found (Cor. Def. 23. Conics); and then the curve may be deſcribed by this method.

2. Divide the ſemi-conjugate axis CE, (*fig.* 19.) and the two halves of the tranſverſe axis AC and CB, into the ſame number of equal parts, in the points, 1, 2, 3, &c.: with the radius CE deſcribe a quadrant of a circle, and draw 1 *r*, 2 *r*, 3 *r*, &c. ordinates of the circle; alſo draw 1 L, 2 L, 3 L, &c. perpendicular to AB, and reſpectively equal to 1 *r*, 2 *r*, 3 *r*, &c: then will all the points L, L, L, &c. be in the periphery of an ellipſe, of which AB and ED are two axes. The reaſon of this conſtruction is manifeſt from (1).

3. An ellipſe (*fig.* 18.) may alſo be deſcribed in various ways, by a point which is made to move by proper mechanical contrivances. And, firſt, if the ends of a thread, which is exactly equal in length to the tranſverſe axis AB, be fixed in the foci F and *f*; and a deſcribing pencil be carried quite round, till it return to the place it ſet out from, in ſuch a manner as to keep the thread always ſtretched out; then the curve, ſo deſcribed, will be the periphery of an ellipſe, as is manifeſt from P. 42. Conics.

4. If two rulers, as FH and *f*K, (*fig.* 20.) each equal in length to the tranſverſe axis AB, have their extremities fixed in the foci ſo as to be moveable round theſe points; and if the other extremities of the rulers be connected by a third ruler HK, which is equal in length to F*f*, the diſtance of the two foci, ſo as to be moveable about the points H and K: then if the ruler HK be moved round the centres F and *f*, the interſection of the rulers *f*K and FH will deſcribe the periphery of an ellipſe, of which AB is the tranſverſe axis, and F and *f* the two foci.

For join FK: it is plain that the triangles FHK and *f*FK are equal in all reſpects, for the three ſides of the one are equal to the three ſides of the other, each to each: therefore the angle MFK is equal to the angle FKM:

therefore $FM = MK$. Therefore $FM + Mf = fK = AB$: conſequently M is in the periphery of an ellipſe, of which A B is the tranſverſe axis, and F and f the foci.

5. If P M (*figs.* 21, and 22.) be taken in a ſtraight ruler equal to the ſemi-tranſverſe axis, and M Q equal to the ſemi-conjugate axis; and if P Q, which is equal to the ſum or difference of the two ſemi-axes, be ſo moved that its extremity Q may ſlide along B A, and its extremity P along the line C D; then the point M will deſcribe the periphery of the ellipſe which has A C and C D for its ſemi-axes. This is manifeſt from (3). Elliptical compaſſes are an inſtrument conſtructed as in *fig.* 21.

6. If a ruler C O, (*figs.* 23, and 24.) equal to half the ſum or half the difference of the ſemi-axes of an ellipſe, be moveable about the centre of the ellipſe C; and another ruler O P, of an equal length, be connected with it ſo as to be moveable about the point O; and if O M be taken in O P, ſo as to be equal to half the difference of the ſame ſemi-axes in the firſt caſe, and to half their ſum in the other caſe: then if the ruler C O be moved round about the centre C, while the point P is made to ſlide along the tranſverſe axis A B; the point M will deſcribe the periphery of the ellipſe.

In C O, or in C O produced, take O K and O L each equal to O M; join M L and M K, and let M K, produced if neceſſary, cut the tranſverſe axis A B in H: becauſe the two lines C O and O M are, the one, equal to half the ſum, and the other, to half the difference of the ſemi-axes A C and C D; it is plain that $CK = CA$, and $CL = CD$: and becauſe $OP = OC$ and $OM = OL$, therefore M L is parallel to A B: but the angle K M L, in a ſemi-circle is a right angle, and therefore K H is perpendicular to A B. Now,

$$CK : CL :: AC : CD :: KH : HM;$$

and, becauſe K is in the periphery of the circle deſcribed upon the tranſverſe axis, therefore M is in the periphery of the ellipſe (2).

Of the area of an ellipſe.

1. The area of a circle deſcribed upon the tranſverſe axis of an ellipſe, is to the area of the ellipſe, as the tranſverſe axis is to the conjugate axis.

Let a polygon (*fig.* 25.) of an even number of ſides, be inſcribed in the circle upon the tranſverſe axis, ſo as to have two of the angles that are diametrically oppoſite ſituated in A and B; and from all the other angular points of the polygon let perpendiculars, F O, G C, &c. be drawn to A B, and let a polygon be formed within the ellipſe by joining all the points where the perpendiculars cut the periphery: becauſe the ordinates F O, G C, &c. of the circle, have a conſtant ratio to the correſpondent ordinates N O, D C, &c. of the ellipſe, namely, the ratio of A C to C D; therefore the ſeveral triangles F B O, F O C, F G C, &c. that compoſe the polygon in the circle will have the ſame conſtant ratio of A C to C D, to the ſeveral triangles N B O, N O C, and D N C, &c. that compoſe the polygon in the ellipſe, each to each (1. 6. E.); conſequently the polygon inſcribed in the circle will have to the polygon inſcribed in the ellipſe the ratio of A C to C D (24. 5. E.)

And becauſe a polygon of an even number of ſides may be inſcribed in the circle, which ſhall be greater than any ſpace leſs than the circle, it is clear that no ſpace leſs than the circle can have to the ellipſe the ſame ratio that A C has to C D: for if ſo, then a polygon greater than the ellipſe might be inſcribed in it.

And, again, no ſpace greater than the circle can have to the ellipſe the ſame ratio that A C has to C D: for then the circle would have to a ſpace leſs than the ellipſe, the ſame ratio that A C has to C D: but a polygon may be inſcribed in the ellipſe that ſhall be greater than any ſpace leſs than the ellipſe; and, then from what has been ſhewn, the correſponding polygon in the circle would be greater than the circle itſelf.

Therefore the circle upon the diameter A B is to the ellipſe as A C is to C D.

Cor. The area of the ellipſe is equal to the area of a circle deſcribed with a radius equal to a mean proportional between the ſemi-axes A C and C D.

For the circle upon the diameter A B has to the circle, whoſe radius is equal to a mean proportional between A C and C D, the ſame proportion that A C has to C D.

By this propoſition the quadrature of the ellipſe is made to depend upon the quadrature of the circle. And this is true not only of the whole elliptic area, but of any ſegment of it. For, by the like reaſoning, it may be ſhewn that any ſegment of the circumſcribing circle, as M B F, has to the correſponding ſegment of the ellipſe K B N, the ſame proportion that A C has to C D; that is, the ſame proportion that the whole circle has to the whole ellipſe.

Of the rectification of the ellipſe.

The length of a circular arc and the area of the ſector which ſtands upon it, increaſe in the ſame proportion: and hence the menſuration of circular areas, and the finding of the lengths of the bounding arcs, are problems ſo nearly connected, that the ſolution of the one is a conſequence of that of the other. But the arc of an ellipſe is a curve line of unequal and continually varied flexure, and increaſes after a very different rate from the area which it bounds. And the finding of the lengths of ſuch arcs has been found to be a problem of a higher and more difficult claſs than the menſuration of the correſpondent ſpaces. There are few problems on which more has been written than on the rectification of the ellipſe. The complete ſolution of it has required the ſucceſſive labours of many ingenious mathematicians, and has been the occaſion for inventing ſome of the niceſt artifices in the whole compaſs of analyſis. The ſubject is too abſtruſe to be diſcuſſed in this place, and we ſhall be content with giving a uſeful formula for the computation of an elliptic arc.

Let A C, (*fig.* 26.) the ſemi-tranſverſe axis of an ellipſe, be $= 1$; C D, the ſemi-conjugate, $= b$; $1 - b^2 = e^2$; $CF = x$, $FE = y$: then

$$AC^2 : CD^2 :: AF \times FP : FE^2;$$

that is, $1 : b^2 :: 1 - x^2 : y^2$:

and hence $y = b\sqrt{1 - x^2}$. Alſo, let E denote the length of the elliptic arc D E, between the conjugate axis and the ordinate: then, $\dot{E} = \dot{x}\sqrt{1 + \frac{b^2 x^2}{1 - x^2}} = \frac{\dot{x}\sqrt{1 - e^2 x^2}}{\sqrt{1 - x^2}}$.

To find the fluent, we may aſſume $E = A^{\circ} + \int \frac{\dot{x}}{\sqrt{1 - x^2}} + \left\{ A^{(1)}x + A^{(3)}x^3 + A^{(5)}x^5 +, \&c. \right\} \sqrt{1 - x^2}$; then by taking the fluxion of this expreſſion, and equating it to the former value of $\dot{E}$ reduced into a ſeries, we ſhall eaſily obtain the following equations for determining the aſſumed co-efficients, $A^{(0)}$, $A^{(1)}$, $A^{(3)}$, &c. *viz.*

1 =

$$1 = A^{(0)} + A^{(1)}$$
$$-\frac{1}{2}e^2 = 3\,A^{(3)} - 2\,A^{(1)}$$
$$-\frac{1 \cdot 1}{2 \cdot 4}e^4 = 5\,A^{(5)} - 4\,A^{(3)}$$
$$-\frac{1 \cdot 1 \cdot 3}{2 \cdot 4 \cdot 6}e^6 = 7\,A^{(7)} - 6\,A^{(5)}$$
$$\&c. \qquad \&c.$$

And by combining theſe equations ſo as to exterminate $A^{(1)}$, $A^{(3)}$, $A^{(5)}$, &c. we get,

$$A^{(0)} = 1 - \frac{1}{2} \cdot \frac{1}{2}e^2 - \frac{1 \cdot 1}{2 \cdot 4} \cdot \frac{1 \cdot 3}{2 \cdot 4}e^4 - \frac{1 \cdot 1 \cdot 3}{2 \cdot 4 \cdot 6} \cdot \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6}e^6, - \&c.$$

By means of this ſeries $A^{(0)}$ may be computed, and then the remaining co-efficients of the aſſumed ſeries will be found by the following eaſy formulas:

$$A^{(1)} = 1 - A^{(0)}$$
$$A^{(3)} = \frac{2}{3}A^{(1)} - \frac{1}{2} \cdot \frac{e^2}{3}.$$
$$A^{(5)} = \frac{4}{5}A^{(3)} - \frac{1 \cdot 1}{2 \cdot 4} \cdot \frac{e^4}{5}.$$
$$A^{(7)} = \frac{6}{7}A^{(5)} - \frac{1 \cdot 1 \cdot 3}{2 \cdot 4 \cdot 6} \cdot \frac{e^6}{7}.$$
$$\&c. \qquad \&c.$$

When $x = 1$, or when E becomes a quadrant of the ellipſe, the expreſſion will be reduced to its firſt term $A^{(0)} \times \int \frac{\dot{x}}{\sqrt{1 - x^2}} = A^{(0)} \times \frac{\varpi}{2}$, ϖ denoting 3.14159, &c. the periphery of a circle whoſe diameter is 1: and hence the quadrant of the ellipſe is equal to

$$\frac{\varpi}{2} \times \left\{ 1 - \frac{1}{2} \cdot \frac{1}{2}e^2 - \frac{1 \cdot 1}{2 \cdot 4} \cdot \frac{1 \cdot 3}{2 \cdot 4}e^4 - \frac{1 \cdot 1 \cdot 3}{2 \cdot 4 \cdot 6} \cdot \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6}e^6, \&c. \right\}$$

On the ſubject of the rectification of the ellipſe, ſee the Edin. Tranſactions, vol. iv. and v. London Tranſ. 1804. Landen's Memoires. Le Gendre, Mem. de l'Acad. 1786. Le Gendre Mem. ſur les Tranſcendantes Elliptiques. Euleri opuſcula, Berlin, 1750. See QUADRATURE, and RECTIFICATION.

ELLIPSIS, in *Grammar* and *Rhetoric*, is a verbal figure, or a figure of ſyntax, wherein ſomething is ſuppreſſed, or left out, in a diſcourſe, and ſuppoſed or underſtood; or it is a defect or omiſſion of ſome part of a ſentence, which muſt be ſupplied in order to render the conſtruction complete and fully to expreſs the ſenſe. See on this ſubject the Port Royal Latin Grammar, vol. ii. p. 168, &c. See ZEUGMA.

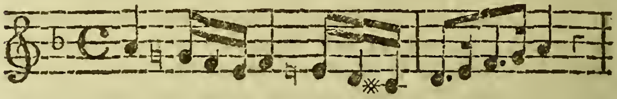
This figure is often uſed in proverbial ſpeeches, as when we ſay; "many men, many minds," that is, "have many minds;" alſo, "the more danger, the more honour," that is, "gains more honour." This figure alſo occurs, when, being under the tranſport of a violent paſſion, a man is not at leiſure to ſpeak every thing out at length, the tongue being too ſlow to keep pace with the rapid motions of the mind, ſo that on theſe occaſions we only bring forth broken interrupted words and expreſſions, which repreſent the violence of a paſſion better than any conſiſtent diſcourſe. When uſed in this ſenſe, it is more generally called *apoſiopeſis*, which ſee. See alſo ASYNDETON.

F. Boſſu conſiders the ellipſis as a mode of diſguiſing ſentences, by ſuppreſſing the word which ſhould make the particular application, and leaving the whole in a kind of ingenious ambiguity. Thus, the Trojans, in Virgil, being reduced by Turnus to the laſt extremity, and ready to be deſtroyed, by Æneas coming to aſſiſt them; upon which the poet ſays, "Spes addita ſuſcitat iras." Which expreſſion ſignifies either, in particular, that the hope they conceive retrieves and augments their courage; or in general, that the hope of aſſiſtance at hand naturally raiſes courage, and gives people new ſtrength.

If the poet had added a word, and ſaid, "Ollis ſpes addita ſuſcitat iras," the paſſage had been expreſsly reſtrained to the firſt ſenſe, and had ceaſed to be a ſentence, and commenced only the application of a ſentence: the ſuppreſſion of that word makes it a ſentence in form.

This, that excellent critic looks on as one of the fineſſes of the Latin tongue, wherein it had vaſtly the advantage of the modern tongues. Trait. du Poeme Epique, p. 466, &c.

ELLIPSIS has a place in Walther's Lexicon as a muſical term, to expreſs a paſſage when broken, and rendered imperfect by a reſt; but though ſome note is left out in moments of rage and perturbation, it is underſtood, or the time would be broken.



ELLIPSOID *Figure of the Earth*, in *Geology*. The terraqueous globe, having been found by the meaſurement of degrees in different latitudes, by the rates of the vibration of a pendulum in different parts, &c. to agree nearly with an ellipſoid, having the polar axis for its conjugate diameter, which ſir Iſaac Newton had ſhewn to be the form which a fluid maſs revolving on an axis would aſſume; Mr. Whitehurſt, Mr. Kirwan, and other geological writers, have thence inferred, that the ſolid matters of the globe were once *in a fluid ſtate*. It is worthy, however, of conſideration, that the preſent appearances and the Newtonian theory may be perfectly reconciled, without having recourſe to a ſoft or liquefied ſtate of the hard ſubſtances which now appear in the earth; the inconceivable number of fragments into which the earth is now divided by its faults or fiſſures, appear to give it a facility for obeying the impulſes of gravity and centrifugal force towards an equilibrium, almoſt as great as in a fluid, taking the immenſity of the maſs into conſideration; and it is only by the juſt equilibrium of all its preſent parts, aqueous and ſolid, that the continents and iſlands now preſerve an elevation above the aqueous ſpheroid, which they evidently once had not; as their aquatic mineral remains teſtify.

The term ſpheroid is ſometimes uſed when ſpeaking of the earth's figure, ſynonymouſly with ellipſoid; but M. Bouguer having applied the term ſpheroid to a ſolid generated from a curve of the fourth order, which he conceived would agree better with the terreſtrial meaſurements then known than an ellipſoid, it will be well hereafter to preſerve theſe diſtinctions, and not uſe the term ellipſoid, but for the figure generated by a true Apollonian ellipſis, reſerving the term ſpheroid for any other kind of ſolid, generated by the rotation of an oval curve, or nearly approaching thereto.

ELLIPTIC, or ELLIPTICAL, ſomething that belongs to an ellipſis.

ELLIPTIC-*Arch*, in *Architecture*, a part of the curve of an ellipſis employed in an arch. It has this advantage over a circle when employed in bridge building, that it not only ſaves materials, but gives more room under the arch at the hanches, and therefore, in a navigable river or canal, veſſels will paſs more eaſily under it than under a circle.

ELLIPTIC *Arc*. See CATENARIA.

ELLIPTIC *Motion*. Theory of the elliptic motion of the planets round the ſun. (*Plate* XII. *Aſtronomy*, *fig*. 103.)

Definitions.—The excentricity of the orbit is the diſtance C S of the centre from the focus. The radius vector is the line drawn from the centre of the ſun to the centre of the planet. If M repreſent the place of the planet for a given inſtant, S M is its radius vector.

The line of apſides is the greater axis of the ellipſe, and it marks the aphelion and perihelion of the planet. The aphelion A, or ſuperior apſide, is the point in which the planet is at its greateſt diſtance from the ſun. The perihelion P, or lower apſide, the point in which it is the neareſt.

The anomaly is in general the diſtance of a planet from its aphelion, but ſome modern aſtronomers have adopted the method of reckoning the anomaly from the perihelion ; for ſince this muſt be done in the caſe of comets, it appears more uniform and conſiſtent to make a general rule ſerve for all. However, as this is a matter totally indifferent to the theory, we ſhall for the preſent ſuppoſe the anomaly reckoned from the aphelion.

There are ſeveral ways of conſidering this diſtance.

The *true* anomaly is the angle formed at the focus of the ellipſe, by the radius vector and the line of apſides, as A S M.

The *excentric* anomaly is the angle formed at the centre of the ellipſe, by the greater axis and the radius of a circumſcribing circle, drawn to the extremity of an ordinate paſſing through the place of the planet, as N C A. The *mean* anomaly is the diſtance from the aphelion ſuppoſed proportional to the time, ſo that a planet which ſhould employ ſix months to go from A to P, would at the end of one month have 30° of mean anomaly. If a line C X be taken to mark the mean anomaly, and this line be ſuppoſed to revolve uniformly round the centre C, the line C X will at firſt be more advanced than the line C N, becauſe A N increaſes ſlower towards the aphelion, the real motion of the planet being leſs than the mean motion, and this diſtance X N will increaſe, as long as the real motion is ſlower than the mean motion.

The difference between the *true anomaly* and the *mean anomaly* forms the *equation of the centre.*

Since the mean anomaly is proportional to the time, and is a portion of the time of a whole revolution, it may be meaſured by any quantity that has a uniform increaſe; thus, not only A X, the angle A C X, and the ſector A C X, may be taken to repreſent the mean anomaly, but even the elliptic ſector or area A S M formed by the radius vector S M, the portion of the greater axis S A, and the elliptic arc A M. Becauſe the areas deſcribed are proportional to the times.

Kepler, having found that the planets deſcribed ellipſes, with areas proportional to the times, it only remained to conclude the true place for a given time.

When the whole time of a revolution of a planet is known, for example, that of the earth equal to 12 months, and it is required to aſſign its place in its orbit at the end of one month, the problem conſiſts in determining the ſector A S M ſuch, that it will be $\frac{1}{12}$th of the whole ſurface of the ellipſe : this ſector is the mean anomaly, and may be expreſſed in degrees by dividing 360° by 12. It is in degrees, minutes, and ſeconds that the anomalies are always found in aſtronomical tables.

When the mean anomaly is known, or the ſurface of the ſector A M S, a queſtion ariſes, how to find the true anomaly, or the angle A S M of this ſector. Kepler perceived the difficulty of this problem, " having given the mean anomaly to find the true," even in a circle, for the difficulty is the ſame as in an ellipſe, and he invited the mathematicians of his time to endeavour to find a ſolution. This problem ſtill continues to be called the " Problem of Kepler," who thus expreſſes himſelf on the ſubject.

Hæc eſt mea ſententia ; quæ quominus videbitur geometricæ pulchritudinis, hoc magis adhortor geometras ut mihi ſolvant hoc problema. Datâ areâ partis ſemicirculi, datoque puncto diametri, invenire arcum et angulum ad illum punctum : cujus anguli cruribus et quo arcu data area comprehenditur ; vel aream ſemicirculi ex quocumque puncto diametri in data ratione ſecare. Mihi ſufficit credere ſolvi a priore non poſſe propter arcus et ſinus ετερογενειαν.

This problem has never yet been ſolved in any other manner than by approximation. But in practice the inveſtigation is very much ſimplified by reverſing the queſtion, and ſuppoſing known the true anomaly to find the mean. This method is ſhorter and often more exact than the direct method; it was very ſucceſsfully employed by La Caille in determining the motion of the ſun; and is founded on two theorems, which only ſuppoſe known ſome properties of trigonometry and the conic ſections.

Lemma.—In an ellipſe A M P, about which is circumſcribed the circle A N P, C X being the line of mean anomaly, M the true place of the planet, R M N an ordinate paſſing through the planet, the circular ſector A N S A ſhall always be equal to the circular ſector A C X, which repreſents the mean anomaly.

Demonſtration.—Let T be the whole time of a revolution, and *t* the time employed by the planet in going from A to M, then, becauſe the areas are proportional to the times, we have *t* : T :: ſector A M S : to the whole ſurface of the ellipſe. In the ſame manner, ſince A C X is the mean anomaly, *t* : T :: A C X : ſurface of the circle. But by the property of the ellipſe A M S : A N S :: the ſurface of the ellipſe : the ſurface of the circle. We have thus two proportions, with three terms in common, from which it may be inferred that A C X and A N S are equal to each other.

The ſquare root of the perihelion diſtance is to the ſquare root of the aphelion diſtance as the tangent of half the true anomaly is to the tangent of half the excentric anomaly.

Demonſtration.—In the triangle R S M (by the property of right-angled triangles,) the tangent of half the angle R S M is equal to the oppoſite ſide R M, divided by the ſum of the two other ſides S R, S M. Hence in the right-angled triangles M S R, N C R, we have this proportion :

tang. $\frac{1}{2}$ M S R : tang. $\frac{1}{2}$ N C R : : $\frac{RM}{SR+SM} : \frac{RN}{CR+CN}$.

Inſtead of the ratio R M : R N, ſubſtitute C D to C A, which is equal to it by the property of the ellipſe, and inſtead of S R + S M its value P R . $\frac{SA}{CA}$, and likewiſe P R inſtead of C R + C N, then the above proportion will be changed into the following.

Tang. $\frac{1}{2}$ M S R : tang. $\frac{1}{2}$ N C R :: $\frac{CD.CA}{PR.SA} : \frac{CA}{PR}$ :: C D : S A. If *a* be the ſemi-diameter of the ellipſe, *e* the excentricity C S, then tang. $\frac{1}{2}$ M S R : $\frac{1}{2}$ N C R :: C D : S A :: $\sqrt{a^2-e^2} : a+e$; dividing the two laſt terms by $\sqrt{a+e}$; tang. $\frac{1}{2}$ M S R : tang. $\frac{1}{2}$ N C R :: $\sqrt{a-e} : \sqrt{a+e} :: \sqrt{PS} : \sqrt{SA}$, or the ſquare root of the perihelion diſtance is to the ſquare root of the aphelion diſtance as the tangent of half the true anomaly is to the tangent of half the excentric anomaly.

The difference between the excentric anomaly and the mean anomaly is equal to the product of the excentricity by the ſine of the excentric anomaly.

Demonſtration.—The circular ſector A N S A is equal to the ſector of the mean anomaly A C X, if the common portion A C N be taken from both, the ſector N C X will be equal to the triangle C N S. The area of the circular ſector

N C X is equal to the product of C N by half the arc N X. The area of the triangle C N S is equal to the product of C N by half the height S T, which is a perpendicular let fall from the focus S upon the baſe N C, continued beyond the centre C; thus the two areas being equal, and having one of the multipliers C N common to both, the other multipliers are alſo equal; therefore the arc N X is equal to the ſtraight line S T. But in the triangle S T C, T being a right angle, S T is equal C S. ſin. T C S, according to the common expreſſion of rectilinear trigonometry; therefore N X = C S . ſin. T C S = C S . ſin. A C N; therefore the difference N X between the excentric anomaly A N, and the mean anomaly A X, is equal to the product of the excentricity C S by the ſine of the excentric anomaly A C N.

In order that the lines N X, S T, C S, may be compared with each other, they muſt be expreſſed in parts of the ſame denomination.

The mean anomaly is expreſſed in degrees, minutes, and ſeconds; therefore S T, and the excentricity C S, muſt be expreſſed in ſeconds. To obtain it, it is ſufficient to know, that the radius A C of any circle whatever, A N X, is equal to about 57°, or to the arc of 206264″.8; thus the arc equivalent to the excentricity C S may be obtained by ſtating this proportion: the mean diſtance, or the radius A C, is to the excentricy C S as the arc equal to the radius is to the arc equivalent to C S, or to the number of ſeconds which the excentricity contains. Therefore this number is $\frac{206264''.8 \, . \, CS}{AC}$.

If we ſtate A C : C S : : 1 : *e*, that is to ſay, if *e* is the excentricity in parts of the mean diſtance, *e* will be equal $\frac{CS}{AC}$; and to expreſs the excentricity in ſeconds, it would be ſufficient to multiply the number 206064″.8 by *e*, the logarithm of which is 5.3144251332. This is alſo the arithmetical of the log. ſin. of 1″, ſo that 206264″.8 = $\frac{1''}{\text{ſin. } 1''}$, and the ſin. 1″ = $\frac{1''}{206264''.8}$. Whenever Mayer wiſhes to expreſs a quantity in ſeconds, he divides it by the ſine of 1″. If, on the contrary, he wiſhes to expreſs a number of ſeconds, in decimals of the radius, he multiplies it by the ſine of 1″. In fact, the ſine and the arc of 1″ are apparently equal. We may ſay 1″ : ſin. 1″ : : a number of ſeconds is to the ſame number expreſſed in ſimilar parts to thoſe of the ſine 1″, that is to ſay, in decimals of the radius, and the fourth term of this proportion is in ſin. 1″. This method may be retained more eaſily, and ſin. 1″ takes up leſs room in a formula. Sometimes 57° is written inſtead of 206264.″8.

It is the ſame in all quantities which are found in calculations expreſſed in parts of radius; where it is required to have them in ſeconds, they are multiplied by 206264″, where the conſtant log. 5.3144251332 is added to their log.

It is the contrary if their arcs are in ſeconds, and they are required in decimals of the radius.

Before we proceed to give an example of the above theorems, we ſhall inſert the following table for each planet, which contains the two conſtant logarithms computed for the proportions of the two theorems.

The firſt for the excentric anomaly, is half of the difference between the logarithm of the aphelion diſtance and that of the perihelion diſtance: this added to the logarithm of the tangent of half the true anomaly gives the logarithm of the tangent of half the excentric anomaly.

The ſecond logarithm ſerves to find the mean anomaly; it is the ſum of the logarithm of the excentricity and of the log. of 57°, &c. an arc equal radius. This conſtant logarithm added to the ſine of the excentric anomaly gives the logarithm of the difference between the excentric and mean anomalies. In the ſame table is annexed the logarithm of the minor axis, which ſerves to find the diſtance. It is the half ſum of the logarithms of the aphelion and perihelion diſtances.

Planets.			
Mercury	0.0905430	4.6272651	9.5784504
Venus	0.0029905	3.1522975	9.8593275
The Sun	0.0072927	3.5394899	9.9999387
Mars	0.0405448	4.2833172	0.1810076
Jupiter	0.0208955	3.9963597	0.7157339
Saturn	0.0244430	4.0643360	0.9788940
The Moon	0.0239255	4.0550625	9.9993412
Herſchel	0.0206824	3.9919124	1.2801270

Example.—Suppoſe the true anomaly of Mars to be 1^{s} 0° 8′ 40″, and that it be required to convert it into mean anomaly, the logarithm of the aphelion diſtance, according to the tables of De la Lande, is 5.221552; the log. of the perihelion diſtance 5.140463; the half difference of their logarithms 0.0405448, this is the conſtant logarithm for the firſt analogy, as in the above table.

The diſtances which anſwer to the two logarithms of the tables, are 1665530 and 1381856, the half ſum of theſe two diſtances is 1523693, this is the ſemi-axis of the ellipſe, or the mean diſtance of Mars from the Sun, the half of the difference between theſe diſtances is 141837, or the excentricity. This excentricity muſt be converted into a fraction, the mean diſtance of Mars being taken as unity; thus,

152369 : 1 : : 14183 : 0.0930877, which is a decimal fraction of the diſtance of Mars, and its logarithm is 8.9688921. To reduce it into ſeconds, it muſt be multiplied by the arc equal radius, which gives 19200, whoſe logarithm is 4.2833172.

Log. of excentricity 14183.7 - -		4.1517895
Subt. log. of ſemi-axis 152369 - -		5.1828974
Difference - - - - -		8.9688921
Add log. of 57° or arc = rad. - -		5.3144251
Sum of the conſtant log. of the 2d proportion		4.2833172
Conſtant log. for the 1ſt. - - -		0.0405448
Log. tang. of ½ true anom. 15° 4′ 20″		9.4302374
Log. tang. of ½ excent. anom. 16° 28′ 13″.8		9.4707822
Therefore the excent. anom. is 3256.176.		
Conſt. log. for the 2d proportion - -		4.2833172
Log. ſin. excent. anom.	37° 56′ 27″.6 -	9.7354193
Log. of 10440″.9, or -	2 54 0.9 -	4.0187365
Add. excent. anom. -	32 56 27.6	
Mean anomaly - =	35 50 28.5	

If the true anomaly ſurpaſſes 180° or ſix ſigns, take its ſupplement to 360°, and after having found the mean anomaly, take its ſupplement to 360°, that the mean anomaly may be always reckoned according to the ſigns.

In this manner we may find the mean anomaly having given the true, but it is uſually the true anomaly we wiſh to find. The mean anomaly being given, we muſt then proceed thus;

By inſpection of the tables, it may be ſeen nearly what equation of the centre correſponds to the degree of anomaly which is given. This is to be applied to the mean anomaly, to have the true, and this true anomaly is to be converted back again into mean, by the preceding rules. If the mean anomaly which reſults is the ſame as that given, it ſhews that the equation employed is correct; if the mean anomaly is found too great, then the ſuppoſed true anomaly muſt be diminiſhed, and thus by theſe two ſuppoſitions, by a ſimple proportion, a mean anomaly may be found which exactly accords with the given one, the difference between this and the true anomaly employed to find it is the exact equation ſought.

The radius vector, or the diſtance of the planet from the ſun, is found by means of the true anomaly, and the excentric anomaly by making the following proportion.

Sin. of true anom. : ſin. excen. anom. : : $\frac{1}{2}$ minor axis : radius vector.

Demonſtration.—Draw the line N Q parallel to the radius vector M S; then by ſimilar triangles S M : Q N :: R M : RN :: C D : C K or C N; hence S M : C D :: Q N : C N :: ſin. Q C N : ſin. C Q N :: ſin. R C N : ſin. R S M, and ſin. R S M : ſin R C N :: C D : S M, which is the diſtance required.

It is to facilitate the uſe of this theorem that in the above table is inſerted the logarithm of the minor axis for the principal planets. By the property of the ellipſe C D, or $\sqrt{SD^2 - CS^2} = \sqrt{CP^2 - CS^2} = \sqrt{CP + CS} \times \sqrt{CP - CS}$; that is, C D is equal to the product of the ſquare roots of the aphelion and perihelion diſtances.

Example.—The true anomaly being 30° 8′ 40″, the excentric anomaly 32° 56′ 27″.6, it is required to find the radius vector or diſtance of Mars from the ſun. Add together the log. of the aphelion diſtance and the log. of the perihelion diſtance, take the half of their ſum, which is equal to the log.

of the ſemi-axis - - - -	= 0.1810076
Add log. ſin. excen. anom. 32° 56′ 27″.6	= 9.7354193
	9.9164269
Subt. log. ſin. true anom. - - -	9.7008609
Remainder is the log. of the radius vector 0.64273 - -	0.2155660

Elliptic *Space*, is the area contained within the circumference, or curve of the ellipſis.

It is demonſtrated: 1. That the elliptic ſpace is to a circle deſcribed on the tranſverſe axis, as the conjugate diameter is to the tranſverſe axis.

2. That the elliptic ſpace is a mean proportional between two circles deſcribed on the tranſverſe and conjugate axes. See Ellipsis.

Elliptic *Conoid*, is the ſame with the ſpheroid.

Elliptic *Specula*, or *Mirrors*. See Mirror.

Elliptic *Winding ſtairs*. See Stairs.

Elliptic *Wind-mill*. See Wind-mill.

Elliptic *Compaſſes*, an inſtrument made uſually in braſs, for the drawing any ellipſis or oval, by one revolution of an index. See Ellipsis and Compass.

Elliptic *Dial*, is an inſtrument uſually of braſs, with a joint or fold together, and the gnomon to fall flat, for the ſake of the pocket.

By it are found the meridian, hour of the day, riſing and ſetting of the ſun, &c. See Dial.

ELLIPTICUM Folium, in *Botany*. See Leaf.

ELLIPTOIDES, an infinite ellipſis, *i. e.* an ellipſis defined by the equation $a y^{m+n} = b x^m \times a - x^n$, wherein $m > 1$ or $n > 1$. See Ellipsis.

Of this there are ſeveral kinds or degrees; as the cubical elliptoid, wherein $a y^3 = b x^2 \times a - x$. A biquadratic or ſurdeſolidal elliptoid, or that of the third order, wherein $a y^4 = b x^2 \times a - x^2$.

If any other ordinate be called v, and the correſpondent abſciſs z; there will be

$$a y^{m+n} = b z^m \times a - z^n:$$

Conſequently,

$$a y^{m+n} \div a v^{m+n} :: b x^m \times a - x^n : b z^m \times a - z^n;$$

That is, $y^{m+n} : v^{m+n} :: x^m \times a - x^n : z^m \times a - z^n$.

ELLIS, John, in *Biography*, an eminent naturaliſt, the celebrated aſſertor of the animal nature of Corallines, was born, we believe, in London, about the year 1710, but our opinion is founded chiefly on conjectural evidence. By a book now before us, in his hand-writing when a boy, it appears that he began the ſtudy of vulgar fractions Oct. 1, 1723, and purſued it afterwards to a conſiderable extent. He is preſumed to have been engaged in merchandize, and poſſibly in ſome public office, or place under government, but of his preciſe occupation or ſtation in life, we have no exact information. He ſoon imbibed a general taſte for natural hiſtory, and having numerous friends and correſpondents in various parts of the world, eſpecially America and the Weſt Indies, he was indefatigable in procuring ſeeds and ſpecimens of plants, as well as inſects, ſhells, corals, and every kind of natural curioſity. He laboured to diſcover and to teach the beſt methods of collecting and preſerving ſuch objects, as well as to procure receipts for varniſhes, cements, colours, or any thing elſe which might be uſeful to him as a practical naturaliſt. Microſcopical enquiries ſoon engaged his attention, and he improved the microſcope then in uſe, ſo as to render it more convenient for his purpoſe. He was the friend of Peter Collinſon, of the Rev. Dr. Hales, and of Dr. Alexander Garden, with whom he agreed no leſs in taſte for natural ſcience, than in excellence of moral and religious character through life.

The ſtudies and amuſements of Ellis have indeed had many votaries, whoſe numbers, for a century paſt, have been rapidly encreaſing in this and other countries. But how few among theſe vaſt numbers have, like him, had the lot of making a grand and original phyſiological diſcovery, which removes a numerous and intricate tribe of beings from one kingdom of nature to another, and ſo clearly elucidates their whole economy that no ſubſequent doubts can ariſe, at the ſame time diffuſing collateral light, in various directions, through other ranks of creation! The progreſs of the diſcovery of the animal nature of corals and corallines, to which we allude, is well detailed by our author in the introduction to his Natural Hiſtory of Corallines, publiſhed at London in 1755, in quarto, with 37 plates of the various ſpecies. The idea appears to have occurred to him in the autumn of 1751, and ſpring of 1752, when in diſpoſing ſpecimens of various marine productions, hitherto deemed plants, upon paper, he ſoon learned, by their difference of texture, to diſcriminate ſuch as he ſuſpected to be more of an animal than vegetable nature. He preſented a collection of theſe new-diſcovered animals to the Royal Society, of which he was already become a fellow, and his opinions were confirmed by thoſe of ſeveral learned naturaliſts there aſſembled. This original collection ſtill remains in four glazed frames, over the chimney-piece of an apartment in the Britiſh Muſeum. In Auguſt 1752, Mr. Ellis undertook the neceſſary examination of theſe productions in a living ſtate in the iſle of Shepey, accompanied by a draughtſman. Here he firſt ſaw the various living animals, of which the corallines were but the ſhells or caſes, and we may eaſily conceive the pleaſure with which he watched their various movements in queſt of food, or in the enjoyment of animal life, all ſo ſtrikingly deciſive of the truth of his preconceived theory. In June 1754, the celebrated botaniſt and artiſt Mr. Ehret accompanied him in an excurſion to the Suſſex coaſt; and the pencil of this able man was well employed in the ſervice of his diſcoveries as they aroſe. The fruits of this excurſion were communicated to the Royal Society, in the 48th volume of whoſe Tranſactions the remarks of Mr. Ellis on the ſubject in queſtion are found, in one letter to the Rev. Dr. Birch, and three others to Mr. Peter Collinſon. A fourth letter to the laſt-mentioned naturaliſt is printed in the 49th volume of the ſame publication, containing an account of a "curious fleſhy coral-like ſubſtance." This is now named *Alcyonium Schloſſeri*. Another excurſion in Auguſt 1754, along the northern coaſt of Kent, in company with Oeder the celebrated Daniſh botaniſt, furniſhed Mr. Ellis with ſeveral new ideas on the ſubject of his reſearches, eſpecially the mode of propagation of theſe animals. He alſo learned to preſerve the polypes in an expanded ſtate, by ſuddenly immerſing the ſpecimens in proof ſpirit, by which the vital principle was extinguiſhed before they could withdraw into their cells. By theſe repeated obſervations upon our Britiſh corallines, and comparing them with ſome of the exotic more ſolid or horny kinds, this acute philoſopher was enabled to prove that even theſe laſt are formed upon the ſame principle. Nothing can be more certain than that their ſtems, however ſolid, are originally congeries of tubes, filled up and obliterated by the ſubſequent depoſition of horny matter, as the polypes advance upwards, and branch off into various new colonies. The ſame may be obſerved of the more ſtony productions properly called corals. Theſe are likewiſe aggregate animals, whoſe ſhells while ſoft cohere laterally into one common maſs; whereas univalve ſhell-fiſh are ſolitary individuals, whoſe ſhells as they encreaſe are convoluted upon themſelves. In the famous Wentletrap, *Turbo ſcalaris*, theſe convolutions do not touch each other, except by the intervention of thin tranſverſe plates; the ſame thing is remarkable in the ſtraight tubes of the coral named *Tubipora muſica*.

The doctrine of Mr. Ellis however did not eſcape controverſy. Dr. Job Baſter, a learned Dutch naturaliſt, communicated to our Royal Society ſome doubts upon the ſubject, which are printed in the 50th volume of the Philoſophical Tranſactions, where alſo Ellis's reply may be ſeen. The great Ruſſian naturaliſt Dr. Pallas was likewiſe among his opponents, as well as that indefatigable writer ſir John Hill; but the ſcruples of the latter were afterwards ſo far removed, that he tried to extend the diſcovery of Ellis to *Fungi*, wanting to prove them alſo of an animal nature; in which he was unqueſtionably as much miſtaken as in his previous diſbelief of the animal nature of corallines. To detail the arguments on either ſide would now be ſuperfluous. We ſhall conclude the ſubject by remarking, that notwithſtanding the diſcoveries of Ellis, Linnæus has, even in the laſt edition of his *Syſtema Naturæ*, retained ſo much of the old error as to define Zoophytes "compound animals, which bear flowers, their vegetating ſtem paſſing by metamorphoſis into a flowering animal." In a note he explains his opinion that the animals do not, like thoſe of ſtony corals, form their caſes or ſhells, but are themſelves formed by thoſe ſhells, which he conceives to be truly of a vegetable nature. He allows indeed the flowers to be real animals, with organs of generation and of motion. This error is corrected by Gmelin, who juſtly unites the *Lithophyta* and *Zoophyta* of Linnæus into one order under the latter denomination, and defines them "compound animals, flowering like plants;" ſuch at leaſt is his meaning, though *animalium* is printed for *plantarum more*.

In botany Ellis diſtinguiſhed himſelf by an account of two new genera, the *Haleſia* and *Gardenia*, printed in the Phil. Tranſ. vol. 51. The former was named after his learned friend the Rev. Dr. Hales, and is an American flowering ſhrub or tree of great elegance, which bears our climate well; the latter is a fine Indian ſhrub, well known in our ſtoves, named after Dr. Garden, long reſident in Carolina. He publiſhed alſo a ſeparate pamphlet on the Venus's Fly-trap; ſee DIONÆA *muſcipula*; and was the author of a fourth new genus, *Gordonia*, named after Mr. Gordon of Mile-end. Every genus therefore which he eſtabliſhed has remained unſhaken, and we may venture to predict will ever continue ſo, while botany continues a ſcience. The *Gordonia* was deſcribed in the 60th vol. of the Phil. Tranſ. along with a new ſpecies of *Illicium*, or Starry Aniſe, from Weſt Florida. In the 57th vol. of the Tranſ. Mr. Ellis deſcribes ſome *Confervæ*, hitherto unknown. One of his moſt favourite botanical objects was to aſcertain the true Varniſh-tree of Japan, which he contends, in oppoſition to Miller, to be diſtinct from the American *Toxicodendron*. The controverſy may be ſeen in the 49th and 50th volumes of the Phil. Tranſ. The point ſeems not yet well determined, but the American plant is certainly *Rhus Vernix* of Linnæus. Our author publiſhed ſeparately an hiſtorical account of Coffee, with remarks on its culture and uſe, and a plate of the ſhrub; alſo a deſcription of the Mangoſtan and Bread-fruit, with four plates. Theſe are quarto pamphlets, and the latter contains many uſeful "directions to voyagers, for bringing over theſe and other vegetable productions." This laſt ſubject frequently engaged Mr. Ellis's attention, and makes a ſeparate quarto pamphlet publiſhed in 1770. In the 51ſt and 58th volumes of the Phil. Tranſ. are papers of his, on the preſervation of ſeeds. Nor were theſe all the ſcientific purſuits of his indefatigable mind. He wrote alſo in the Tranſ. various other papers on Corals, Sea Pens, and other animals of the ſame tribe, as well as on the Cochineal Inſect; on the *Coluber Ceraſtes*, or Horned Viper of Egypt; on that ſingular animal, found by his friend Garden in Carolina, the *Siren lacertina* of Linnæus, now eſteemed a *Muræna*; on the ſtructure of the Windpipes in ſeveral birds and in the Land Tortoiſe; and even on the method of making Sal Ammoniac in Egypt. It appears moreover, by many ſpecimens of his collecting, that he was an aſſiduous obſerver of the internal ſtructure or anatomy of vegetables, on which no doubt he had conferred with Dr. Hales, whoſe experiments and obſervations he ſeems often to have had in view.

It would have been extraordinary if the numerous communications of Mr. Ellis to the Royal Society had failed of the peculiar reward, ſo richly merited, which that learned body has in its power to beſtow. Accordingly Sir Godfrey Copley's medal was, on the 30th of Nov. 1768, delivered to him by Sir John Pringle, then Preſident; and it being uſual to ſingle out ſome one or two papers in particular for ſuch a compliment, one "on the animal nature of the genus of Zoophytes called *Corallina*," in a letter to Linnæus, and another "on the *Actinia ſociata*," in a letter to the earl of Hillſborough, both printed in the 57th vol. of the Tranſ. were ſelected for this purpoſe.

Of the private occurrences of the life of this diſtinguiſhed man we have not much information. In a manuſcript letter to the Rev. Mr. Borlaſe dated March 3d, 1764, the following paſſage is remarkable. "You too greatly over-value my little progreſs in natural knowledge. Had I been regularly bred to it I might have made ſome progreſs in it worth notice, but I aſſure you the ſmall advance I have made in it was only to amuſe a mind diſtreſſed by a ſeries of misfortunes, and I thank God it has had that great and good effect, ſo as to render this part of my life the moſt happy of the whole, by my being taken notice of by men of worth and honour." Thus modeſtly wrote a man whoſe diſcoveries form an epocha in natural ſcience, and thus felt a Chriſtian philoſopher, whoſe heart expanded to all his fellow-creatures! He was at this time much acquainted with the excellent Dr. Solander, who laboured with him at the ſtudy of exotic Zoophytes, as well as of the Britiſh Sea-weeds. On the former ſubject a ſplendid poſthumous work in quarto appeared in 1786, under the direction of the author's daughter, who dedicated it to ſir Joſeph Banks. This book is illuſtrated by 63 beautiful engravings, ſome of them inferior to none in natural hiſtory. Whether Mr. Ellis had been unſucceſsful in trade, or from any other cauſe not perfectly at eaſe in his circumſtances, we know not, but he wrote as follows to a friend in Feb. 1764. "I thank God the agency for Weſt Florida, which my lord Chancellor (Northington) has got me, makes me eaſy and happy, and I hope will prove of uſe to natural hiſtory. My buſineſs does not oblige me to leave London." It appears that in 1757 he reſided in Laurence-lane; in 1771 in or near Gray's-inn; and that he had occaſionally a ſummer reſidence at Fulham. In a letter to another friend, dated Gray's-inn, Jan. 2. 1771, is the following paſſage. "By lord Northington's goodneſs I have been made agent of Weſt Florida, and lately have got the agency of Dominica. This comfortable income has enabled me to purſue with ſpirit my favourite ſtudy of natural hiſtory." After a ſeries of declining health, Mr. Ellis died on the 15th of October 1776, being, as we preſume, about 66 years of age, though the time of his birth is not mentioned either in the advertiſement prefixed to his poſthumous work, or in the Gentleman's Magazine for 1776, where he is ſaid to have died on the 5th of October. His perſon was tall, his features expreſſive and ſtrongly marked. Of the time of his marriage, or any particulars concerning his wife, we have no account. One only daughter, named Martha, ſurvived him, to whom he left a handſome competency, and for whom he had the ſtrongeſt parental affection, which ſhe moſt abundantly merited and returned. This excellent lady, who inherited her father's taſte and character, more eſpecially his piety and ſenſibility of mind, with a conſiderable likeneſs to his perſon, was the ſecond wife of Alexander Watt, eſq. of Northaw, Herts. She bore her huſband ſeveral ſons, now for the moſt part engaged in the naval ſervice of their country, and one lovely daughter, who ſurvived her mother but a few years. Mrs. Watt died in childbed at Northaw in the ſpring of 1795. Her will, written entirely in her own hand, and a letter to her huſband, found after her deceaſe, are worthy of the pen of a Richardſon and the character of a Clariſſa. She honoured the writer of this article with her friendſhip, and enriched him with all her father's original ſcientific correſpondence and other papers, as well as ſome ſpecimens illuſtrative of his writings. The bulk of Mr. Ellis's muſeum was however ſold by auction in London in June 1791. Ellis's MSS. and printed works. S.

Ellis, in *Geography*, a river of America, in the ſtate of Maine, being a branch of Great Amereſcoggin river.

ELLISIA, in *Botany*, named by Linnæus in honour of John Ellis, eſq. F. R. S. author of ſeveral botanical diſſertations and diſcoveries. Linn. Gen. 97. Screb. 169. Willd. Sp. Pl. v. 1. 815. Mart. Mill. Dict. v. 2. Juſſ. 129. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Aſperifoliæ*, Linn. *Borragineæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in five deep, lanceolate, ſpreading, permanent ſegments. *Cor.* of one petal, funnel-ſhaped; tube nearly cylindrical, much ſmaller than the calyx, marked internally with 15 ſtreaks; limb in five obtuſe ſegments. Nectary two ſmall teeth at the baſe of each ſtamen. *Stam.* Filaments five, awl-ſhaped, ſhort; anthers roundiſh. *Piſt.* Germen ſuperior, roundiſh, briſtly; ſtyle thread-ſhaped, ſhort; ſtigmas two, oblong, erect. *Peric.* Capſule coriaceous, roundiſh with a tranſverſe ſtricture, downy, of two cells and two valves, deciduous. *Seeds* two in each cell, one above the other, globoſe, dotted. Corrected from the MSS. of Linnæus communicated by Dr. Smith.

Eſſ. Ch. Corolla funnel-ſhaped, much narrower than the calyx. Capſule coriaceous, ſuperior, of two cells and two valves. Seeds two in each cell, dotted, one above the other.

E. *Nyctelæa*, Linn. Mant. 336. Nov. Act. Upſal. v. 1. 97. t. 5. f. 5. (Polemonium Nyctelæa; Linn. Sp. Pl. ed. 2. 231. Scorpiurus humilis virginianus, foliis rutaceis; Moris. v. 3. 451. Sect. 11. t. 28. f. 3.) This, the only known ſpecies, is a native of Virginia, and is more ſingular in fructification, than beautiful or remarkable in appearance. It is preſerved in ſome curious botanical gardens, but is hardy enough to bear our climate without any care. *Root* annual. *Stem* decumbent, much branched, leafy, brittle. *Leaves* alternate, ſtalked, pinnatifid, roughiſh. *Flowers* ſmall, pale blue, on ſimple ſolitary ſtalks oppoſite to the leaves.

ELLISVILLE, in *Geography*, a poſt-town of America, in Cumberland county, Pennſylvania, 156 miles from Waſhington.

ELLOPIA, in *Ancient Geography*, a name formerly given to the iſland of Euboea, from Ellops the ſon of Ion, who ſettled in this iſland.—Alſo, an inland town of this iſland, which, according to Strabo, ſtood at the foot of mount Telebrium. The inhabitants of this place were compelled, after the battle of Leuctra, by the tyrant Philiſtides, to leave their native country, and ſettle at Iſtiæa.—Alſo, a country of Greece, in the vicinity of Dodona.—Alſo, a town of Greece, toward Dolopia.

ELLOPIUM, a town of Greece, in Ætolia, according to Polybius.

ELLORA. See Elora.

ELLORE, in *Geography*, one of the northern circars of Hindooſtan, N.E. of Condapilly, and N.W. of the bay of Bengal. See Circar.—Alſo, the capital of this circar, 32 miles N. of Maſulipatam. N. lat. 16° 43′. E. long. 81° 11′.

ELLOTIA, Ελλωτια, among the Greeks, a feſtival in memory of Europa, Agenor's daughter; who was called Ελλωτις by the people of Crete.

ELLSWORTH, in *Geography*, a townſhip of America, in Hancock county and ſtate of Maine, on both ſides of Union river; incorporated in 1800.

ELLWOOD, Thomas, in *Biography*, was born at the village of Crowell, near Thame, in Oxfordſhire, in the year 1639, where he received his education, which, owing to the narrow circumſtances of his father, was very limited. When he had attained the age of 21, he was accidentally thrown among the quakers, and received indelible impreſſions, in favour of their ſentiments, from the preaching of Edward Burroughs. This alteration in his religious principles gave great offence to his father, who could not brook the change of manners, language, and dreſs, aſſumed by his ſon, and who behaved towards him with an unbecoming ſeverity, often inflicting on him blows, and a kind of domeſtic impriſonment. At length the young man was permitted to pay a viſit to a friend; and, on his return, paſſed moſt of his time in the kitchen and among the ſervants, in order that his father might not be offended with his wearing a hat in his preſence. He ſoon after became a writer, and a zealous preacher among the friends. His firſt work was entitled, "An Alarm to the Prieſts, or a Meſſage from Heaven to warn them." In the ſame year, 1660, when this was publiſhed, Ellwood was arreſted and impriſoned at Oxford, on account of an intercepted letter, which was interpreted by the government to be of a political and libellous nature. His impriſonment was ſhort, and not attended with any circumſtances of peculiar rigour.

Ellwood was now looked up to as a diſtinguiſhed preacher, and felt the want of more learning than he had acquired in early life, and applied all his leiſure time in improving himſelf. He, by means of his friend Iſaac Penington, procured the employment of reader to the great Milton, which obliged him to read many Latin books, ſo that the language ſoon became familiar to him; and as Milton eaſily knew, by the tone of his voice, whether he underſtood his author, he would, in difficult caſes, ſtop him, and explain thoſe parts which he did not ſeem to comprehend. This confinement did not agree with his health; and he was in a ſhort time obliged to leave London. In 1665, Ellwood procured apartments for his maſter at Chalfont, and was the occaſion of his writing Paradiſe Regained, by aſking him, what he who had ſaid ſo much on Paradiſe Loſt, could ſay of Paradiſe Found? Ellwood was again impriſoned in Bridewell and Newgate, for being found at a meeting of the friends in London; but was diſcharged, after a ſhort time, without the form of a trial. He was next ſelected by his friend Iſaac Penington, as the tutor to his children, an employment in which he continued till the year 1669; but, during his reſidence in this family, both he and his patron were arreſted at Amerſham, while attending a funeral at the quakers' burying ground, and committed to Aylſbury gaol, where they were kept till the enſuing aſſizes, when they, with other priſoners of the ſame deſcription, were ordered to be fined 6*s.* 8*d.* each, and diſcharged. This ſum they refuſed to pay, and were committed for one month longer. Scarcely had Ellwood eſcaped from this priſon, when he was committed to the houſe of correction at Wycombe, where he was confined a quarter of a year. At the latter end of the ſame year he was married, and ſettled at Hungerhill, near Amerſham, Bucks, where he became a zealous adherent to the riſing ſociety of the friends; and was extremely uſeful, after the paſſing of the "Conventicle Act," in ſuppreſſing the infamous trade of ſpies and informers. In one inſtance, he was able to prove an alibi with regard to a friend; and then indicted and convicted the informers of perjury.

Ellwood now became an author, and publiſhed many works, which were highly eſteemed by the friends of his party. For one, *viz.* "A Caution to Conſtables and others concerned in the Execution of the Conventicle Act," he was cited to appear before the magiſtrates, who were empowered to commit him to priſon till the next aſſizes, but who took his word for appearing when called on, and never troubled him more on that head. In 1694, he publiſhed a poſthumous work of George Fox, which contained a voluminous journal of the events of his life; and in 1705, he gave the public the firſt part of "Sacred Hiſtory, or the hiſtorical Part of the Holy Scriptures of the Old Teſtament;" which he continued, in the year 1709, by a volume of the hiſtory of the New Teſtament. This was the principal work of our author, who died of the palſy, on the 1ſt of March, 1713, in his 74th year. He was a man of conſiderable abilities, poſſeſſed much natural wit, and ſome learning. His integrity was unqueſtionable; and his zeal in what he thought right could be damped by no obſtacles, nor by any ſufferings to which he was expoſed. Gen. Biog.

ELLYCHNIOTOS, in the medical writings of the *Ancients*, the name of a ſort of tent uſed by the ſurgeons, and made of cotton or lint, rolled up into the form of the wick of a lamp or candle. See the next article.

ELLYCHNIUM, a name given, by the ancients, to that ſort of matter, whatever it was, which ſerved them in common uſe for the wicks of their lamps, and had, beſides this, its uſe in ſurgery. Galen expreſsly directs the uſe of the ſofteſt ellychnium, ſuch as that of Tarſus, inſtead of ſponge, in chirurgical caſes. But we are far from being aſcertained, at preſent, of what this ellychnium of Tarſus was. The commentators have gueſſed differently as to the meaning of the word; and Cornarius ſuppoſed it to ſignify a ſort of ſpongy and light fungus, which, when properly wrought up, might be made to ſerve for the wicks of lamps, being very inflammable, as we well know many of the funguſes to be, particularly that ſort which the people of ſome countries call ſpunck, and uſe inſtead of tinder, to catch fire from the ſparks of flint and ſteel; and when in its natural lax ſtate, might, by its open ſpongy texture, be very well ſuited to imbibe any medicinal fluid, and retain it a long time, while applied to any diſeaſed part. Others have gueſſed it to be the xylon, or cotton of the ancients; but, from Galen's propoſing it to be uſed inſtead of ſponge, it ſeems much more probable to have been what Cornarius ſuppoſes. Galen, lib. xiii. and xiv. Cornar. Comment. in 3. Κατ. τοπ.

ELLYS, Anthony, in *Biography*, a learned prelate of the church of England, was born about the year 1693. He ſtudied at Clare-hall, Cambridge, where he took his degrees. He obtained ſeveral valuable livings; and was, in the year 1728, created doctor of divinity, when king George II. paid a viſit to the univerſity of Cambridge. After this he took an active part againſt the repeal of the teſt and corporation acts, and wrote one of the ableſt works on that ſide of the queſtion, entitled, "A Plea for the Sacramental Teſt, as a juſt Security to the Church eſtabliſhed, &c." He next publiſhed an anſwer to Hume's Eſſay on Miracles. This was publiſhed in 4to. in the year 1752; and almoſt immediately afterwards, Dr. Ellys was promoted to the ſee of St. David's. He died at Gloceſter, in the year 1761, aged 68 years. After his death, in 1763, was publiſhed the firſt part of a work entitled, "Tracts on the Liberty, ſpiritual and temporal, of Proteſtants in England;" and in 1765, the ſecond part was given to the public. The deſign of the former is partly to vindicate the eſtabliſhment of the church of England againſt the objections of the proteſtant diſſenters; but principally to examine and confute the tenets of the church of Rome. The ſecond part relates to civil liberty, in which the author vindicates the principles of the whigs; and in the diſcuſſion he has collected a large fund of hiſtorical, conſtitutional, and legal knowledge. The work was drawn up under the patronage of government; and on account of the labour which it coſt him, he was rewarded with the biſhopric of St. David's, though, for reaſons not now known, it was not publiſhed till after his death. The biſhop likewiſe publiſhed ſome ſingle ſermons. His character is drawn by the editors of his poſthumous works, as not only eminent for his fine parts, extenſive knowledge, and ſound judgment; but for a heart ſo overflowing with benevolence and candour, as never even to conceive terms of acrimony towards the opinions or perſons of thoſe who differed from him: and he always thought a perſon, though on the right ſide of a queſtion, with principles of perſecution, to be a worſe man than he that was on the wrong. Biog. Brit.

ELM, in *Agriculture*, the name of a very common deciduous tree, of which there are different ſpecies and varieties. See Ulmus.

The common or Engliſh elm, and moſt of the other ſorts, ſucceed well in ſoils of a ſtiff, loamy, retentive quality, which are in ſome meaſure inclined to moiſture, growing in ſome caſes to conſiderable height and ſize of bole. They are occaſionally planted both as hedge-row timber and in mixed plantations, though their wide ſpreading branches render them in ſome degree improper for the latter ſituations. In the former caſes, the banks ſhould be well cleaned and wrought over, and the trees be planted out about the latter end of September, being well ſecured by proper ſtakes from the effects of the winds. Their heads ſhould likewiſe be conſiderably reduced before they are ſet out, but without injuring the leading ſhoots, or the branches being too cloſely pruned.

Theſe trees are well ſuited for being planted out in the view of affording ſhelter, or as a ſcreen for breaking off the violence of the winds, as they are capable of being trained up in the form of a hedge, being kept conſtantly cloſely cut in, to make them grow thick and cloſe, as well as to a great height. Near tillage land they are, however, very objectionable, as their roots run very extenſively near the ſurface of the ground, and of courſe obſtruct the operations of the plough.

In the planting of this ſort of trees, great care ſhould be taken not to bury their roots too deep, eſpecially when the ſoil is of the clayey or loamy kinds. The plants ſhould not be too large when planted out, as they do not ſucceed ſo well. The plants may be raiſed by ſuckers, and from ſeeds in ſome of the ſorts.

As timber, the common elm is probably to be preferred to moſt of the other ſorts; but ſome of the other kinds grow equally large in ſoils which ſuit them. This is the caſe with that which is called the witch-elm. The worſt ſort in point of timber is that which is uſually denominated the Dutch elm.

Elm, in *Botany*. See Ulmus.

Elm, in *Geography*, a ſmall town of Switzerland, in the canton of Glaris; 6 miles S. of Glaris.

Elm-*Bark*, in *Pharmacy*. The bark of the elm has been ſtrongly recommended, and is occaſionally uſed in obſtinate cutaneous complaints. It is given in the form of decoction (decoctum corticis ulmi) of moderate ſtrength; that is, about an ounce to a pint of water, and in the doſe of at leaſt a pint daily. This decoction is mucilaginous and ſlightly aſtringent.

Elm-*Wood, Petrified*, in *Natural Hiſtory*. It is related by Mr. Stedel, that he found pieces of elm-wood, which had been left about ſeven years in a fountain near Ulm, and had become petrified or converted into ſtone. (6 Roz. 8vo, 3d part, p. 18.) The alleged converſion of wood into ſilicious ſtony maſſes, in modern times, has been doubted by moſt modern writers: and indeed it appears doubtful, whether any of the numerous ſilicious ſtones, that are found with a ligneous texture, can be identified with any recent or known woods, but like the animal remains which often accompany them in a petrified or altered ſtate, when ſcientifically examined and compared with recent ſpecies, they are found all to belong to a prior race of organized beings now totally extinct. See *Petrified* Wood.

ELMA, in *Geography*, a town of Ruſſia, in the government of Archangel, at the conflux of the river Elma with the Petchora; 312 miles E. of Archangel.

EL-MACIN, in *Biography*, an Egyptian, who ſucceeded his father as ſecretary to the council of war, under the ſultans of Egypt, in the year 1238, is chiefly known as author of a chronicle of the Mahometan caliphs, written in Arabic, which commences with Mahomet, and goes down to the reign of Moſtader-Billah, who died in the year 1138. He relates year by year, but in few words, what concerns the Saracen empire, intermixing with it a portion of the hiſtory of the Chriſtians of the Eaſt. He is ſuppoſed, from his manner of writing, to have been a Chriſtian; yet enjoyed places of truſt and diſtinction under the Mahometan princes. His hiſtory was tranſlated out of the Arabic into Latin, by Erpenius, and printed in both languages at Leyden, in folio, in the year 1625. Bayle.

ELMAHAD, in *Geography*, a town of Arabia, in the country of Yemen; 8 miles N.N.W. of Zebid.

ELME, Saint, a ſtrong caſtle of the iſland of Malta, on a rock cloſe to the town of La Valette, which protects the two harbours.—Alſo, an old caſtle of France, near Colioure, in the department of the Eaſtern Pyrenées.

EL-MEDEA, called alſo *Africa* (*Turris Hannibalis*), a ſea-port town of Africa, in that part of the country of Tunis which was the ancient Byzacium or winter circuit, ſituated upon a peninſula, 5 miles to the ſouth of Cape Demaſs. It appears to have been formerly a place of great ſtrength and importance. The port, which was an area nearly of 100 yards ſquare, lies within the walls of the city, with its mouth opening towards Capoudia; but it is not now capable of receiving the ſmalleſt veſſel. Leo ſays, that it was founded (or poſſibly rebuilt) by Mahdi, the firſt patriarch of Kaerwan, and therefore aſſumed his name; but the delicacy of the ruins afford reaſon for ſuſpecting, that the founder was not an Arabian. Thuanus has miſtaken this place for Aphrodiſium, which Dr. Shaw ſuggeſts, in his "Travels," to have been more probably at Faradeeſe, a ſmall village and port in the plains of Hamam-et.

ELMEDINA, or Almedine, a town of Africa, in the empire of Morocco, on the edge of mount Atlas.—Alſo, another of the ſame name, near the ſea-coaſt.

ELMEN, or Alt Salza, a town of Germany, in the circle of Lower Saxony, and principality of Magdeburg; 10 miles S.S.E. of Magdeburg.

ELMENAU. See Ilmenau.

ELMHAM, North, once a city, is now an inconſiderable village in the county of Norfolk, England, about 4 miles north of Eaſt Dereham. It was given by the Saxon prince Sigebert to Falix, who converted the Eaſt Anglians to Chriſtianity, and was the firſt biſhop of that part of the heptarchy. At the time the province of Eaſt Anglia was divided into two dioceſes, this place became a ſeat of the biſhop preſiding over the northern portion. During this partition, ten biſhops ſucceſſively reſided here; but in the time of Wybred the 11th, the ſees were again united, and fourteen others ſubſequently ſate, till the ſee was removed from this place to the city of Norwich, by Herbert de Loſſinga, in the time of William Rufus, A. D. 1094. The biſhops of Norwich continued occaſionally to reſide here; and a fine caſtle, moated round, was erected by biſhop Spencer, in the time of Richard II. The ruins of this palace ſtill remain; and the ſite of the ancient cathedral, built by biſhop Herbert, is ſtill viſible. Near it ſubterraneous hollows have been diſcovered, and old wells, which have been filled up. In an encloſure near Broom-cloſe, half a mile from the village, the ground was perceived to ſink circularly in three different places; in one of which the hole was 12 feet broad, and 20 feet deep. But veſtiges of higher antiquity have been traced: for in this cloſe were found numerous urns, including divers braſs inſtruments, Roman coins, and a ſilver ſeal ring or annular ſignet, ornamented with an eagle holding a thunderbolt. Henry VIII. granted the manor to Thomas lord Cromwell, who was the firſt lay proprietor. The preſent poſſeſſor is Richard Milles, eſq. in right of his mother, the eldeſt daughter of Richard Warner, eſq. who built a handſome manſion here in 1729, which ſeat is called North Elmham Park.

ELMINA, or LA MINA, a town of Africa, in the kingdom of Fetu or Fetou, ſo called by the Portugueſe, but by the natives Oddena, which is very long but narrow; the houſes being built of a ſtone, hewn out of a neighbouring rock. In the year 1684, this town was ſo populous and ſo powerful, and the inhabitants ſo brave, that they were the terror of the whole coaſt. Since that period it has been depopulated by the ravages of the ſmall-pox, and by the tyrannical government and wars of Commendo. This town is ſeated on the river Benja, in a low, flat peninſula, formed by the ocean on the ſouth, the river on the north, Commendo on the weſt, and the famous citadel of St. George d'Elmina on the eaſt. Towards Commendo it is fortified by a ſtrong wall of large ſtone, a deep ditch, and ſome pieces of cannon. The wall begins at the ſea-ſide, and ſtretches along to the banks of the river, which ſeparates the town from the fort on mount St. Jago. The Dutch call this fort Conſradbourgh, which they built for the ſecurity of Elmina, in a ſituation that commands both the town and their chief factory. The inhabitants are robuſt and warlike, but more civilized than other negroes, on account of their familiar acquaintance with the Europeans. Their uſual occupations are fiſhing, trading, and making palm-wine and oil. Their commerce extends along the coaſt, as far as Whidah. In the town are many artizans, who work in metals in a manner little inferior to that of the beſt European mechanics. They caſt and carve in gold and ſilver; they make buttons, plain or filligree rings, chains, ſword-hilts, and other ornaments; nor are they ignorant of the method of cutting, grinding, and poliſhing cryſtal and glaſs. The town contains about 200 houſes, occupied chiefly by mechanics. It is divided into three diſtricts, each of which is governed by a chief, called by the negroes kaffo; with a number of ſubordinate officers. Theſe three chiefs, with their councils, form the regency and legiſlative part of this ſmall republic; ſince the Portugueſe rendered it independent of the kings of Fetu and Commendo, who poſſeſs the ſovereignty of the whole country beſides. The inhabitants have thus found means to render themſelves formidable to all their neighbours, and to acquire an independence that is not poſſeſſed any where elſe on the Gold Coaſt. The river Benja, which glides by the walls of the town, furniſhes a fine bay ſalt, produced in the ſame manner as in different parts of Europe. The citadel of Elmina ſtands on a rock, bounded on one ſide by the ocean, defended by ſtrong baſtions, and ſurrounded by a high ſtone wall, in the centre of the Gold Coaſt, ſo as to be commodiouſly ſituated for the purpoſes of trade and the ſecurity of the trader. The works of this fort were begun by the Portugueſe, and completed by the Dutch; and it is ſaid to be larger, more convenient, and beautiful than Cape Coaſt, though leſs pleaſant in reſpect of ſituation. The fort of Conradſbourgh ſtands on mount St. Jago, on the frontier of the kingdom of Fetu. Below mount St. Jago the company have a fine garden, incloſed by high ſtone walls, and beautifully laid out in parterres and rows of orange, lemon, palm, and cocoa-trees; and furniſhing all ſorts of fruits, roots, and pulſe, peculiar to that country, as well as the natural growth of Europe. In the centre ſtands a magnificent dome or temple, ſurrounded by lofty trees, which afford the moſt delightful cooling ſhade and fragrance.

ELMORE, a townſhip of America, in Orleans county, and ſtate of Vermont, containing 45 inhabitants.

ELMOROSIA, a name given by the Moors to a diſh they are very fond of. It is made of pieces of beef, or of camel's fleſh, ſtewed with butter, honey, and water; ſome add rob of wine to it, and others garlic; but there are always added onions, ſaffron, and ſalt. Phil. Tranſ. No. 253.

ELMSHORN, in *Geography*, a ſmall town of Denmark, in that part of Holſtein called the county of Rantzau, ſituated on the river Aue, which runs into the Elbe, and by means of which the inhabitants carry on a good trade, chiefly in turf and charcoal. The population does not amount to more than 1000 individuals. It is on the road from Huſum to Hamburgh, 26 miles N. of the latter place.

ELNBOGEN, a town of Bohemia, and capital of a circle or diſtrict, within the circle of Saatz, called "the circle of Elnbogen," or "Loket;" ſituated on a rock, ſurrounded with mountains, near the Egra; 62 miles W. of Prague, and 32 S.W. of Saatz.

ELNE, a ſmall town of France, in the department of the Eaſtern Pyrenées, on the river Tech, not far from the Mediterranean ſea; 6 miles S. of Perpignan.

ELNE, a river of England, in the county of Cumberland, which runs into the Iriſh ſea; 4 miles N. of Workington.

ELNIA, a town of Ruſſia, in the government of Smolenſk; 32 miles E.S.E of Smolenſk. N. lat. 54° 25'. E. long. 33° 19'.

ELOANX, a name given by ſome writers to auripigmentum, or orpiment.

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